

**PERSONAL VS. SOCIO-TECHNICAL CHANGE:  
INFORMING AND INVOLVING HOUSEHOLDERS FOR  
SUSTAINABLE ENERGY CONSUMPTION**

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## Abstract

This study develops and tests a novel information approach for Northern householders based on a holistic systems rationale to meet the challenge of the 2000 Watt Society and sustainable consumption.

Conventional energy analysis and policy focuses most often on individuals' direct choices that affect household energy demand. But institutional, technological, and social constraints are at least as important as personal ones in explaining individuals' patterns and levels of energy consumption. This research seeks to test the practicability and utility of illuminating the role of such "less-discretionary" factors – the evolution and interaction of infrastructures, technologies, social norms, and so on – for the public. A broader accounting of the factors influencing end-users' energy-consuming devices, services, and practices may help facilitate their role in managing and shaping them.

Energy use and conservation behaviors should be viewed in the context of broader consumption patterns and constraints. Dholakia et. al. (1983) used the term *discretionary* to characterize the individual's scope in making micro choices; we coin the term *non- or less discretionary* for the constraining macro consumption pattern, as it relates to the individual. Many factors shape this non-discretionary consumption. We present a multifaceted expert account of these in Chapter 3 where energy is viewed through the lens of general consumption and Northern consumer societies. In the final theoretical and literature-based chapter, Chapter 4, we explore lay knowledge and views of energy consumption and develop a second related, original dialectical construct for energy analysis, Energy-Revealing vs. Social-Revealing.

The general question informing the study is what kind of information is best communicated to individuals to help them (1) conserve energy in their households and/or (2) stimulate institutional changes – conducive to furthering the effort to bring the household sector's energy consumption more in line with sustainability dictates? That is, assuming an end-user-targeted, information-knowledge approach is at all useful to this end, what sorts of knowledge sets are most important, and what might be useful and effective means of instilling, communicating, or encapsulating them? Shifting the border toward the discretionary, on an individual or longer-term national scale, by involving consumers in both individual action and the process of institutional ecological reform, is one of the key notions of this study.

The empirical portions of the study consist of a review of past research on Swiss perceptions of energy and, primarily, the collaborative development of energy accounting software according to the theory and its deployment in in-depth interview sessions. As a pilot experiment, 21 subjects were interviewed from a pool of candidates ranging in age, income, education, profession (or students' field of study), housing, car use, environmental leanings, and other variables.

The following abstracted description of the interview session also summarizes the software interfaces and capabilities: The subject enters information to generate his status quo energy profile, comprising direct and embodied sector components like heating, living, diet, and transportation; he compares himself to the national average and his household type. The subject then generates short- and mid-term conservation profiles. In the long-term screen, the subject chooses levels for various technological parameters – industrial, commercial, residential, and transportation efficiencies; modal split for goods transport; and electric power generation mix – notes effects on profiles, and compares his conservation profiles with his status quo profile under the influence of technological changes. The subject chooses levels for demographic and social parameters in Switzerland, including population, household size, consumption, driving and flying levels, auto occupancy rates, and living space; he assesses

the differential effect of combined variables on Swiss energy use. Finally, the subject scales up any of his personal profiles to Swiss national levels.

In analyzing the resulting data, we categorized subjects into three groups on the basis of their status quo energy use, willingness to reduce, and several other criteria. Other data were analyzed with reference to these groups and to the subjects as a whole.

After experience with the program, subjects on average had a slightly diminished view of the efficacy of personal interventions to reduce consumption compared to less personally discretionary measures. However, for reducing direct energy consumption in living, diet, public transportation, and air travel, short to mid-term personal steps were on average more effective than broad-scale technological improvements like higher efficiencies, especially among students. Most subjects, particularly young professionals, expressed a willingness to make modest efforts to conserve electricity for living and diet activity sectors.

Another finding is that after experience with the program, a strong majority of subjects identified social and demographic variables as more important than technological variables, if the future goal is a reduction in national energy use. In addition, a majority of subjects felt that Swiss society has the ability to make a collective choice of its energy consumption levels and that therefore the driving forces are not entirely irreversible or intractable. Here too, however, capability does not imply a national willingness to exercise it.

Viewing all groups together, a small majority indicated they had no means of contributing to the "greening" of structural or social elements surrounding energy consumption. A number believed they had some influence, but only a few invoked their roles as consumers or citizens of a democracy. Several engineering and architecture students viewed themselves as potentially influential decision makers in their future career capacities.

Most subjects thought the program would be useful for informational and educational purposes with the general public, perhaps given certain changes or simplifications, or with advanced high school students and/or in a suitable educational environment.

The configuration of energy accounting software described here brought technological and social systems into a dynamic interplay with householders' individual behaviors. Its innovative features and use in interviews let laypeople discover for themselves how nuanced and changeable is the discretionary border, in different individual life situations and at different levels of aggregation. Subjects from all three empirical data sets reviewed here seemed on average to put somewhat more emphasis on top-down changes; however, by the interview's end, subjects could not in good faith entirely "pass the buck" in terms of personal effectiveness and responsibility.

The three analytical groups showed themselves to be clearly differentiated in their use of energy-consuming devices and services, in their direct reduction potential, in their recognition of the role of factors higher up on production-consumption chains and networks, and in their possible willingness to participate in the greening of these chains and systems. Various lifestyle groups might therefore use or support certain consumption interventions differentially over other strategies. The interviews began to explore Swiss participants' views on possibilities for consumer involvement in the ecological modernization of collective consumption practices and/or those of producers or providers. Further extensions of this approach, especially more contextual and political applications, might best be pursued in social and participatory settings such as focus groups. The influence of different values, especially among cultural sub-groups, could also be investigated.

## Zusammenfassung

Diese Arbeit hat ein neues Informationswerkzeug entwickelt und getestet, das sich an Haushalte im Norden richtet. Es geht von einem ganzheitlichen, system-orientierten Ansatz aus und soll den Herausforderungen der 2000 Watt-Gesellschaft und des nachhaltigen Konsums gerecht werden.

Herkömmliche Energieanalyse und -politik konzentrieren sich vorwiegend auf die direkten Entscheidungen von Individuen, die die Energienachfrage von Haushalten beeinflussen. Institutionelle, technologische und soziale Rahmenbedingungen sind jedoch mindestens so wichtig wie persönliche Entscheidungen, wenn es darum geht, das Konsumverhalten und -niveau von Einzelpersonen zu erklären. In dieser Forschungsarbeit wird untersucht, wie machbar und nützlich es ist, derartige "weniger beeinflussbaren" Faktoren – die Entwicklung und das Zusammenspiel von Infrastruktur, Technologie, gesellschaftlichen Normen, usw. – der Öffentlichkeit aufzuzeigen. Ein besseres Verständnis der Faktoren, die die energieaufwändigen Apparate, Dienstleistungen und Praktiken der Endnutzer beeinflussen, führt u.U. dazu, dass die Endnutzer eine grössere Rolle bei der Gestaltung dieser Faktoren spielen können.

Energieverbrauch und Sparverhalten sollten im grösseren Zusammenhang von allgemeinem Konsumverhalten und -einschränkungen betrachtet werden. Dholakia u.a. (1983) benützt den Ausdruck "beeinflussbar" (discretionary), um den Entscheidungsspielraum von Einzelpersonen auf der Mikroebene zu beschreiben; wir prägen den Ausdruck "nicht oder weniger beeinflussbar" (non- or less-discretionary) zur Beschreibung der Einschränkungen des Konsumverhaltens auf der Makroebene, die für Einzelpersonen relevant sind. Dieses nicht beeinflussbare Konsumverhalten wird durch viele Elemente bestimmt. In Kapitel 3 werden diese in einer vielschichtigen Expertenauswertung vorgestellt, in der Energie unter dem Blickwinkel des allgemeinen Konsums und der Konsumgesellschaften des Nordens betrachtet wird. Im letzten Literatur- und Theoriekapitel, Kapitel 4, untersuchen wir das Wissen und die Ansichten von Laien zum Energieverbrauch. Ferner entwickeln wir dort ein weiteres neues, damit verknüpftedialektisches Konstrukt zur Energieanalyse: "Energie-Aufzeigen" versus "Gesellschaft-Aufzeigen" (Energy-Revealing vs. Social-Revealing).

Dieser Arbeit liegt folgende allgemeine Frage zu Grunde: Welche Informationen gibt man Einzelpersonen mit Vorteil, damit diese (1) in ihren Haushalten Energie sparen und/oder (2) institutionelle Veränderungen herbeiführen, was beides dazu beiträgt, den Energieverbrauch im Haushaltsektor in Richtung Nachhaltigkeit zu bewegen? Wenn man davon ausgeht, dass das Wissen des Endnutzers hierzu überhaupt nützlich ist, welche Art von Information ist dann am wichtigsten, und mit welchen Mitteln könnte sie am effektivsten kommuniziert werden? Eine Schlüsselposition dieser Arbeit ist folgende: Das Engagement von Konsumenten in ihrem persönlichen Bereich und im Prozess institutioneller ökologischer Reformen trägt dazu bei, mehr Faktoren beeinflussbar zu machen, sowohl auf individueller als auch (längerfristig) auf nationaler Ebene.

Der empirische Teil dieser Dissertation besteht, neben einer Auswertung bestehender Studien über schweizerische Einstellungen zur Energie, primär aus der gemeinschaftlichen Entwicklung von Software für die Energiebilanz, die auf dem Theorieteil aufbaut und in Tiefeninterviews angewandt wurde. In einer Pilotstudie wurden 21 Personen interviewt, die Unterschiede in Alter, Einkommen, Ausbildung, Beruf (bei Studierenden: Studienrichtung), Wohnung, Autobenützung, Umwelteinstellung und anderen Variablen aufwiesen.

Die folgende knappe Beschreibung des Interviews fasst auch die Eigenschaften der Software zusammen: Die jeweilige Person gibt Informationen ein, um ihr Status Quo Energieprofil zu

generieren, das direkte und indirekte Energiekomponenten einschliesst, so z.B. Heizen, Wohnen, Essen, Transport. Der Interviewteilnehmer vergleicht sich mit dem nationalen Durchschnitt und mit seinem Haushaltstyp. Er erstellt dann mittel- und langfristige Energiesparprofile. Auf dem Bildschirm für langfristige Entwicklung bestimmt der Teilnehmer die Niveaus verschiedener technischer Parameter – Effizienz in Industrie, Handel, Gebäuden und Transport; Modal Split für Warentransporte; und den Produktionsmix von Elektrizität. Dann beobachtet er die Auswirkungen dieser Parameter auf die Profile und vergleicht seine Sparprofile mit seinem Status Quo Profil unter dem Einfluss technologischen Wandels. Der Interviewteilnehmer wählt unterschiedliche Niveaus für demografische und soziale Parameter in der Schweiz, u.a. Bevölkerungszahl, Haushaltgrösse, Konsum, Auto und Flugverkehr, Anzahl Passagiere pro Auto und Wohnfläche. Er beobachtet die unterschiedlichen Auswirkungen kombinierter Variablen auf den schweizerischen Energieverbrauch und bringt schliesslich eines seiner persönlichen Profile auf das nationale schweizerischen Niveau.

In der anschliessenden Auswertung der Daten unterschieden wir drei Gruppen von Interviewteilnehmern, basierend auf ihrem Status Quo Energieverbrauch, ihrer Bereitschaft zur Reduktion, und mehreren anderen Kriterien. Andere Daten wurden in Bezug auf diese Gruppen sowie auf alle Teilnehmer als Ganzes analysiert.

Nachdem sie sich mit dem Programm auseinander gesetzt hatten, schätzten die Teilnehmer im Durchschnitt – verglichen mit weniger persönlich beeinflussbaren Mitteln – ihre persönlichen Massnahmen als weniger effektiv ein, um den Energieverbrauch zu senken. Andererseits waren kurz- bis mittelfristige persönliche Massnahmen durchschnittlich (und besonders bei den Studierenden) effektiver als grossangelegte technische Verbesserungen (z.B. mehr Effizienz), um den direkten Energieverbrauch in den Sektoren Wohnen, Essen, öffentlicher Verkehr und Flugverkehr zu reduzieren. Die meisten Teilnehmer, v.a. jüngere Berufstätige, gaben ihrer Bereitschaft Ausdruck, bescheidene Anstrengungen zum Stromsparen bei den Sektoren Wohnen und Essen zu unternehmen.

Ein weiteres Ergebnis der Pilotstudie besagt, dass nach der Erfahrung mit dem Programm eine grosse Mehrheit der Interviewten die sozialen und demografischen Variablen als wichtiger betrachtete als die technischen, sofern das Ziel eine Verringerung des nationalen Energieverbrauchs ist. Darüber hinaus war die Mehrheit der Teilnehmer der Ansicht, dass die schweizerische Gesellschaft in der Lage ist, das Niveau ihres Energiekonsums kollektiv zu bestimmen und dass daher die vorantreibenden Kräfte nicht unumkehrbar oder unbeherrschbar sind. Auch hier bedeutet die Fähigkeit aber noch nicht die Bereitschaft, dies auch zu tun.

Wenn man alle Gruppen zusammen betrachtet, sagte eine knappe Mehrheit aus, sie könne nicht dazu beitragen, strukturelle oder gesellschaftliche Elemente im Zusammenhang mit dem Energieverbrauch in Richtung Nachhaltigkeit zu verändern. Einige Teilnehmer glaubten, über einen gewissen Einfluss zu verfügen, aber nur wenige beriefen sich auf ihre Rolle als Konsumenten und Bürger in einer Demokratie. Einige Studierende der Ingenieurwissenschaften und Architektur sahen sich selbst als potentiell einflussreiche Entscheidungsträger in ihren zukünftigen Berufslaufbahnen.

Die meisten Teilnehmer waren der Meinung, das Programm könne, u.U. nach gewissen Vereinfachungen und Veränderungen, für Informations- oder Ausbildungszwecke bei einem allgemeinen Publikum nützlich sein, eventuell auch im Gymnasium und/oder einer anderen geeigneten Schulungssituation.

Die Software und Interviews zur Energiebuchhaltung, deren Konfiguration hier beschrieben wurde, verknüpften auf dynamische Weise technologische und soziale Systeme mit dem individuellen Verhalten von Haushalten. Die Benutzer bekamen durch diesen innovativen Ansatz Gelegenheit, selbst herauszufinden, wie nuanciert und wandelbar die Grenze des Beeinflussbaren ist, je nach

individuellem Lebensstil und verschiedenen Aggregatsebenen. Die Teilnehmer aller drei hier untersuchten Gruppen werteten Veränderungen von oben nach unten als etwas effektiver. Dennoch konnten sich die Teilnehmer am Ende des Interviews nicht mehr mit gutem Gewissen der persönlichen Verantwortung entziehen und sich der Wirksamkeit individueller Massnahmen verschliessen.

Die drei analytischen Gruppen zeigten deutliche Unterschiede in Bezug auf ihren Energieverbrauch bei Apparaten und Dienstleistungen und auf ihr direktes Energiesparpotential. Ferner bestanden Unterschiede hinsichtlich der Wahrnehmung, dass Faktoren weiter oben in den Ketten und Netzwerken von Produktion und Konsum eine Rolle spielen, sowie der Bereitschaft, zur „Ökologisierung“ dieser Ketten und Systeme beizutragen. Je nach Lebensstil würden vermutlich verschiedene Gruppen gewisse Interventionen beim Konsum mehr oder weniger anwenden oder unterstützen als andere Strategien. In den Interviews wurde beleuchtet, welche Chancen die Schweizer Teilnehmer Konsumenten zuschreiben, zur ökologischen Modernisierung des kollektiven Konsumverhaltens und/oder desjenigen von Produzenten und Lieferanten beizutragen. Um diesen Ansatz auszuweiten – besonders für mehr themengebundene und politische Zwecke – bieten sich Fokusgruppen mit ihrem gesellschaftlichen und partizipatorischen Rahmen an. Der Einfluss verschiedener Werthaltungen, besonders in kulturellen Untergruppen, könnte ebenfalls untersucht werden.

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## List of Abbreviations

D.E.P.	<i>Democratizing Environmental Policy</i>
DSM	<b>Demand-side management</b>
E.E.L.	<i>Energy in Everyday Life</i>
EM	<b>Ecological modernization</b>
ETH	<b>Swiss Federal Institute of Technology</b>
GNP	<b>Gross national product</b>
LCA	<b>Life cycle assessment</b>
PC	<b>Public communication</b>
RC	<b>Risk communication</b>
SCOT	<b>Social construction of technology</b>
SST	<b>Social shaping of technology</b>
STS	<b>Science-technology-society</b>



# Chapter 1

## Introduction

*“God, give us grace to accept with serenity the things that cannot be changed, courage to change the things which should be changed, and the wisdom to distinguish the one from the other.”*

The Serenity Prayer, Reinhold Niebuhr

### 1.1 Background, perspective, and aim

In 1998 Switzerland’s main technical university launched an overarching program whose stated goal was a dramatic reduction in the nation’s energy use. The Swiss Federal Institute of Technology (ETH)’s 2000 Watt Society promoted the pioneering vision of “a sustainable society that can manage with a third of its current energy demand without having to forego its present standard of living and comfort.”<sup>1</sup> 2000 watts<sup>2</sup> is the current world average per capita energy consumption; it was the level in Switzerland in 1950; it is some three times less than current Swiss usage; and reaching that level again is considered necessary for stabilizing global carbon dioxide emissions in the future, given projections about world population growth and exploitable energy resources [Imboden 1999]. As an ETH researcher at the time, I had the opportunity to participate in several projects connected to this effort to rechart Switzerland’s energy future.<sup>3</sup> The study this dissertation describes came directly out of the confluence of these projects. It became a journey in the theory and practice of communication for sustainable consumption.

Widening the focus to consumption in general (beyond just energy consumption) followed naturally from the 2000 Watt Society challenge, especially because the 2000 watt target includes both direct and indirect (“grey” or “embodied”) energies. Most program participants acknowledged that achieving 2000 watts per capita in a reasonable time frame, even by 2050, would require a range of far-reaching institutional, technological, and social initiatives, not just an efficiency revolution (perhaps a “sufficiency” revolution as well). The daunting scope of innovation and reform hypothetically needed led quickly to a re-constriction of the practical research to the areas naturally and traditionally strongest in engineering universities: furthering energy-oriented innovations in engineering and science, and applying conventional techno-economic tools to energy analysis and policy. In taking up the original challenge, my training, experience, and philosophy lead me to draw a wider circle to consider both science and social science, which turned the inquiry into a sustainable

---

<sup>1</sup> [http://www.novatlantia.ch/ge\\_index.html](http://www.novatlantia.ch/ge_index.html).

<sup>2</sup> 2000 watts corresponds to 64 billion joules per year or 17,600 kilowatt-hours per year.

<sup>3</sup> These pre-projects included a small evaluation project for the 2000 Watt Society [Goldblatt 1998] and work on communicative indicators of energy consumption for the public as part of the Alliance for Global Sustainability’s Indicators Project.

consumption exercise. Appropriately, I have conducted this study as both a researcher at the ETH's Centre for Energy Policy and Economics and as a student in the Department of Environmental Science. Sustainable consumption is perhaps best approached through a multi-disciplinary lens in which sociology figures highly. This is in fact the lens I have employed.

Sustainable consumption is one of the most difficult of the key issues for sustainability first officially raised at the 1992 United Nations ("Rio") Conference on Environment and Development. It has been slow to be taken up by scholars and policy makers, not least since in its maximalist forms it usually leads to questioning assumptions about wants and needs, the consumerist basis of Western economies, and even the economic growth imperative (it tends to talk "out of paradigm" [Princen 1999]). In expanding the field and defining the issue so broadly, and considering a wide range of factors and institutions as relevant, I may have opened the floodgates to a torrent of controversy and criticism. The reader can judge how well I have weathered the storm.

I should be specific about my environmental perspective and transdisciplinary aims from the outset. (Although it will be argued that furthering environmentally friendly consumption is not always necessarily, or even primarily, best gone about using explicitly environmental or energy criteria or units.) Simply identifying consumption as a problem or using terms like overconsumption may imply a normative stance, and we must be careful to note this.<sup>4</sup>

Differences in values as they relate to environmental change and quality strongly influence one's view of consumption vis-à-vis the environment. Specific valuation of the natural and physical environment, especially as opposed to human capital and the services it provides, determines whether or not environmental "change" is seen as "harm" or "damage" [Stern 1997b]. When judgments are made about the environmental change associated with consumption trends, "different interpretations of sustainability and environmental quality yield different answers to the question of whether past and present household metabolism {and other consumption} rates are in overall compliance with sustainability objectives" [Uiterkamp 1998]. At issue is not whether increasing consumption has negative environmental consequences, but rather whether the environment is being degraded beyond certain biophysical and ecological thresholds and, if so, whether the benefits of the present consumption trajectory outweigh this [Uiterkamp 1998].

At a more basic level, values intrude into the assessment of the reliability of environmental data as well as the legitimacy of environmental standards and targets like the 2000 Watt Society. A collection of facts marshaled in support of one position is easily countered by another collection supporting a contrary view [Tatum 1995]. Although environmental scientists hold a strong consensus about the severity of worldwide environmental degradation, and adduce ever-greater and more comprehensive bodies of supportive data, these data are usually insufficient to command general agreement in civil society about past and present

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<sup>4</sup> However, we should not forget that the ideological standard-bearer for business-as-usual, neo-classical economics, has embedded in its theories just as much in the way of normative assumptions as other social science disciplines or philosophies [Goodwin 1997b].

environmental conditions, let alone likely future conditions, and even less so policy responses. Whose data is one to believe and act on? My reliance on the consensus of the community of environmental scientists on the depth of the environmental crisis and the specter of global climate change reflects a normative element in my choice of information sources, albeit an increasingly scientifically compelling one.

The communicative dimension of the study developed, as mentioned, from my previous work on indicators and exposure to several software programs for household energy accounting (especially Dürrenberger and Hartmann's Personal ECO<sub>2</sub> calculator,<sup>5</sup> which we would enhance and deploy in the main empirical part of the study). These types of programs had become popular, and have since further gained in popularity, with agencies and NGOs working with the public to stimulate awareness and resource conservation in the home. The Center for a New American Dream's recent Turn the Tide campaign<sup>6</sup> is typical of (American) environmental NGOs' exhortative, bottom-up approach to involving the public in general conservation efforts. By accessing a web-based computer program, the public are shown nine simple steps they can take in their own homes to better the environment: reduce car travel; substitute for beef and shrimp meals; eliminate junk mail; replace standard light bulbs with energy-efficient compact fluorescent lights; move the thermostat (down in winter or up in summer); eliminate lawn and garden pesticides; install efficient showerheads and low-flow faucet aerators; and inspire friends. Notably, four of these involve direct energy conservation, and at least another two indirect, embodied energy. The web site calculates the environmental benefits of the individual user's taking these actions, and it also shows the collective impact of the steps members say they have taken.

Aiming at the householder's direct behavioral change, these software programs are commendable tools as far as they go. (Turn the Tide's incorporation of a collective dimension by tracking the combined effort of its members is especially progressive and crystallizes the attempt to grow social units to a critical mass, at least in cyberspace.) But the energy versions of these sorts of programs for Switzerland, like ECO<sub>2</sub> – which take advantage of energy's convenient property that its use in society is a reasonably comprehensive surrogate for general environmental insult and that therefore energy consumption rates are arguably (environmental) sustainability indicators – showed that virtually no end-user, no matter how conservationist or technologically advanced in her household, could presently approach the 2000 watt standard in her daily life in Switzerland. Grey energies alone usually pushed the user over the limit. Other factors, constraints in available or useable technology as well as social and cultural forces, were clearly at play. How could we retain the focus on the lay householder but involve the greater universe of factors driving Swiss energy use?

I hypothesize in this study that the individual, direct behavioral orientation in traditional energy information approaches and tools is an inadequate response to the following issues:

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<sup>5</sup> Gregor Dürrenberger and Christoph Hartmann, *Der persönliche ECO<sub>2</sub> Rechner*, Interview-version 2.0, 2001, ETH Zürich. Henceforth referred to as *ECO<sub>2</sub>* or *ECO<sub>2</sub>-interview version*. Despite the name the interview version included energy but not CO<sub>2</sub> accounting, since this would have overburdened lay users with information and was considered unnecessary for the interviews' aims (see Chapter 5).

<sup>6</sup> <http://www.newdream.org/turnthetide/>

- 1) The high levels of Northern<sup>7</sup> (energy) consumption, as represented by Switzerland's 6000 watt per capita, and pointing to the severity of environmental problems in the world;
- 2) The complexity of ways in which the household sector in the North drives environmental problems and the transformations and innovations necessary to stem them;<sup>8</sup>
- 3) The untapped sources of lay intelligence, knowledge, and capability in apprehending the problems and contributing creatively to their solutions. This includes the potential for a richer scope and variety of involvement of the public in confronting these problems and participating in processes of social and technological innovation that ameliorate them.

This study, then, is partly a response to the conventional laudatory but limited kind of energy/environmental information approach for the public. It uses perspectives and computer programs characteristic of Turn the Tide as worthy starting points to explore the further limits of information approaches as a lever for changes, on a variety of levels, that support ecological reform. What emerge as an outgrowth are theories, tools, and empirical experiments in energy consumption "monitoring" that provide greater transparency for individual and collective social drivers for unsustainable consumption. Along the way – through literature, theorizing, and interviews – we examine both expert and lay opinions (and sometimes tensions between the two) on the extent of householders' discretionary powers; the relative efficacy of behavioral, technological, social, or economic measures for saving energy; and the extent of different agents' role and responsibility in addressing energy and environmental problems.

## 1.2 Method, structure, and content of the dissertation

Chapter 3 and the first part of Chapter 2 are partly general background to Chapter 2's problem specification and question formulation and the theoretical (Chapter 4) and empirical chapters (Chapters 5 and Appendix A) that follow. The dissertation's theoretical sections (Chapter 3 and 4) are longer and more extensive than usual, perhaps, but the synthesis and advancement of the theory in this study is almost as important as the empirical research and experimentation, and the latter is naturally based heavily on the former.

**Chapter 2** lays out the study's perspective, aims, questions, and hypotheses. The chapter introduces the personal and societal "discretion continuum" or "range" as one of two theoretical constructs to be elaborated in Chapter 4. Research questions and hypotheses concerning an expanded notion of knowledge and information for householders' energy conservation (hinted at above) are offered. After each hypothesis I also list associated questions that

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<sup>7</sup> Following [Whiston 1990], industrialized nations are often collectively referred to here as the *North* and developing nations as the *South*. This is notwithstanding Australia and New Zealand's southern location and the fact that nations of the North contain relatively underdeveloped sections, while developing nations may have an upper and increasingly "middle" class whose technologies and consumption lifestyles resemble those of developed nations.

<sup>8</sup> e.g. at the least radical technological change and substantial, if more incremental, institutional change

the proposed energy information approach, and the reconfiguration of the energy software used in the interviews (Chapter 5), allow end-users to pose and answer, at least partially.

**Chapter 3** is a wide-ranging, critical review and synthesis of literature on consumption from multiple disciplines. Section 3.2 discusses consumption issues important for framing the study, while section 3.3 surveys a variety of views on consumption's driving forces, dynamics, and policy suggestions.

Chapter 3 is extensive and in-depth in order to provide a full background on the consumption problem and on factors constraining the end-user, which we will term non (or less)-discretionary determinants of end-use (energy) consumption. It is also an "expert" account of these factors, drawn from scholars' publications in many fields, which we compare with lay perspectives in the course of the empirical work.<sup>9</sup> (The hurried reader can, in lieu of reading Chapter 3 in its entirety, consult the outline and abstract given in Appendix B.)

**Chapter 4**, the final theory and literature-based chapter, extends the development of the discretion construct and introduces another dialectic, Energy-Revealing vs. Social-Revealing. The chapter critically surveys literature on energy "knowledge" and shows how my two theoretical constructs or frameworks are useful both for the analysis of energy consumption and for letting the end-user work with volitional and non-volitional aspects of his energy consumption. Section 4.3 places the proposed extended knowledge-information approach in the context of risk communication theory and section 4.4 sets the stage for the software development and interviews of Chapter 5. Along with Chapter 3, Chapter 4 constitutes a contribution to a theory of sustainable consumption, especially the theory of the ecological modernization of consumption.

**Appendix A**, to be read optionally at this point, makes an excursus to report on relevant findings from a canvassing of past Swiss studies. Two large studies of Swiss views on energy, one involving interviews and the other focus groups, yield interesting data that speak to some of the issues and hypotheses of my own study.

**Chapter 5** is the heart of the dissertation's experimental section, and it is also the longest and most complex. It describes the novel re-configuration of pre-existing energy accounting software, combining personal and national modules to illustrate various conservation and intervention possibilities and other issues from the perspective of the end-user. It reports on the deployment of this software in in-depth (pilot) interview sessions with a cross-segment of laypeople; and it thematically presents the results of a thorough data analysis. Among other things, this empirical work constitutes a pioneering look at several basic issues in the theory and practice of "monitoring" for (householder involvement in) the ecological modernization of consumption.

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<sup>9</sup> In this comparison we should bear in mind Giddens' admission that "Much that is problematic in the position of the professional sociologist, as the purveyor of expert knowledge about social life, derives from the fact that she or he is at most one step ahead of enlightened lay practitioners of the discipline" [Giddens 1990]. How common in other fields are such admissions of modesty and perspective on the limitations of the discipline?

## Chapter 1 Introduction

Note that the populations drawn on most often for examples in the theoretical chapters 3 and 4 are American (US), Swiss, and Dutch. This reflects the quantity, quality, and availability of English studies from these countries (although some German and French sources were also consulted) as well as the author's own personal experience living in each of these cultures. The empirical chapters 5 and Appendix A are naturally based on Swiss subjects (and primary sources in German, French, and English), since the research and modeling work was done in and for Switzerland. As noted in Chapter 3, however, the theory and communication methods developed are meant to be fully applicable to most Northern industrial societies, since many of the basic driving forces for consumption are increasingly homogenized across the developed world or even globalized.

The concluding **Chapter 6** discusses achievements and implications for theory, research, policy, and future energy information programs and initiatives, either in the planning process or still hypothetical.

## Chapter 2 Room to Maneuver in Energy Use:

### Problem Specification and Hypotheses

*"Philosophy is nothing but discretion."*

John Seldon

#### 2.1 Introduction

One of the themes that sound repeatedly throughout this study is the difficulty of changing household consumption. In industrialized countries it seems that a significant portion of householders' resource and energy consumption is resistant to change. Individuals either cannot change their domestic routines and behaviors, or to the extent they can, it would do relatively little to reduce associated draws on energy or resources. This is because technology, culture, and various institutions frame fundamental broad-scale patterns of consumption. Technology becomes entrenched or "locked-in" and thereby limits consumer choice within internally propelled systems of commodities, infrastructure, social practices, and institutions and within technological trajectories ([Røpke 1999], see Chapter 3 section 3.3.3.2). The prevailing socio-economic-technical framework tends to limit the element of individual choice in consumption.

In the 1980s the marketing researchers R.R. Dholakia and N. Dholakia presented a macro-micro model of energy consumption behavior as a series of nested and interlocking choices, in which "macro choices delimit and define the scope of micro choices." "Household energy use is ... not just ... the result of a choice among behavioral alternatives but ... the production of these alternatives is also viewed as the result of a social choice process. In other words, energy use and energy conservation behaviors must be seen within the context of a broader *consumption pattern* which is socially determined" ([Dholakia 1983], emphasis in the original). The Dholakias used the term *discretionary*<sup>10</sup> to characterize the individual's scope in making micro choices; the implied term for the constraining macro consumption pattern, as it relates to the individual, would be *non-discretionary* or *less discretionary*. Many factors – economic, technological, social, and others – shape this non-discretionary consumption. Predominantly techno-economic factors include technological innovations, their consumer applications and diffusion; technology and efficiency standards; energy carrier prices and

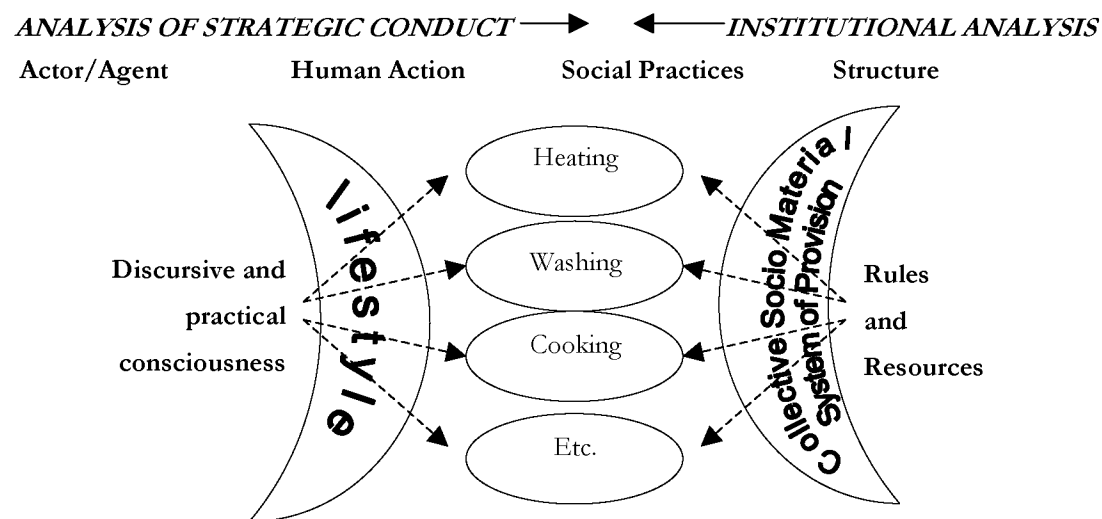
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<sup>10</sup> *Discretion*: 1) The quality of being discreet; circumspection. 2) Ability or power to decide responsibly. 3) Freedom to act or judge on one's own (*The American Heritage Dictionary of the English Language*, Third Edition, 1996, Houghton Mifflin). Another version of 3) is freedom to act according to one's own judgment; unrestrained exercise of choice or will (*Webster's Revised Unabridged Dictionary*, 1998, MICRA). All three meanings are relevant to this usage of the term *discretion*. The third meaning is the one most directly intended. Yet the second, the ability to make responsible choices, is closely related. We also hope to foster a societally "discreet" use of energy and other resources.

government energy taxes and subsidies; corporate choices of technology and efficiencies; global market imperatives for growth and product innovation and obsolescence. Other factors are social and cultural in nature, for example ever higher standards of “comfort, cleanliness and convenience” [Spaargaren 2000b] or overarching trends towards individual and private, rather than collective and public, forms of motorized transportation. Many factors are multi-dimensional, and some are deeply ingrained, like the systemic bias towards satisfaction of needs through commercial markets rather than by non-purchase means. A number of these factors are explored in detail in Chapter 3.

In sociology, Giddens’s structuration theory seems to come closest to this framework [Giddens 1984]. When knowledgeable and capable individuals act in a social context, they draw on a virtual set of social rules and resources, but in doing so they *instantaneously* reproduce (perpetuate, or “instantiate”) these rules and resources. Social (and socio-technical) structures are both enabling and constraining of individuals [Spaargaren 2000a]. Some part of a person or group’s energy usage, for example, is more highly discretionary, but a *collective’s* “room to maneuver,” its degrees of freedom, are really only discernible through empirical historical study [Spaargaren 2000a]. Figure 0.1 summarizes this actor-structure concept as applied to the ecological modernization of household consumption.<sup>11</sup>

**Figure 0.1: A Conceptual Model for Studying Consumption Practices [van Vliet 2002], [Spaargaren 2000b]**

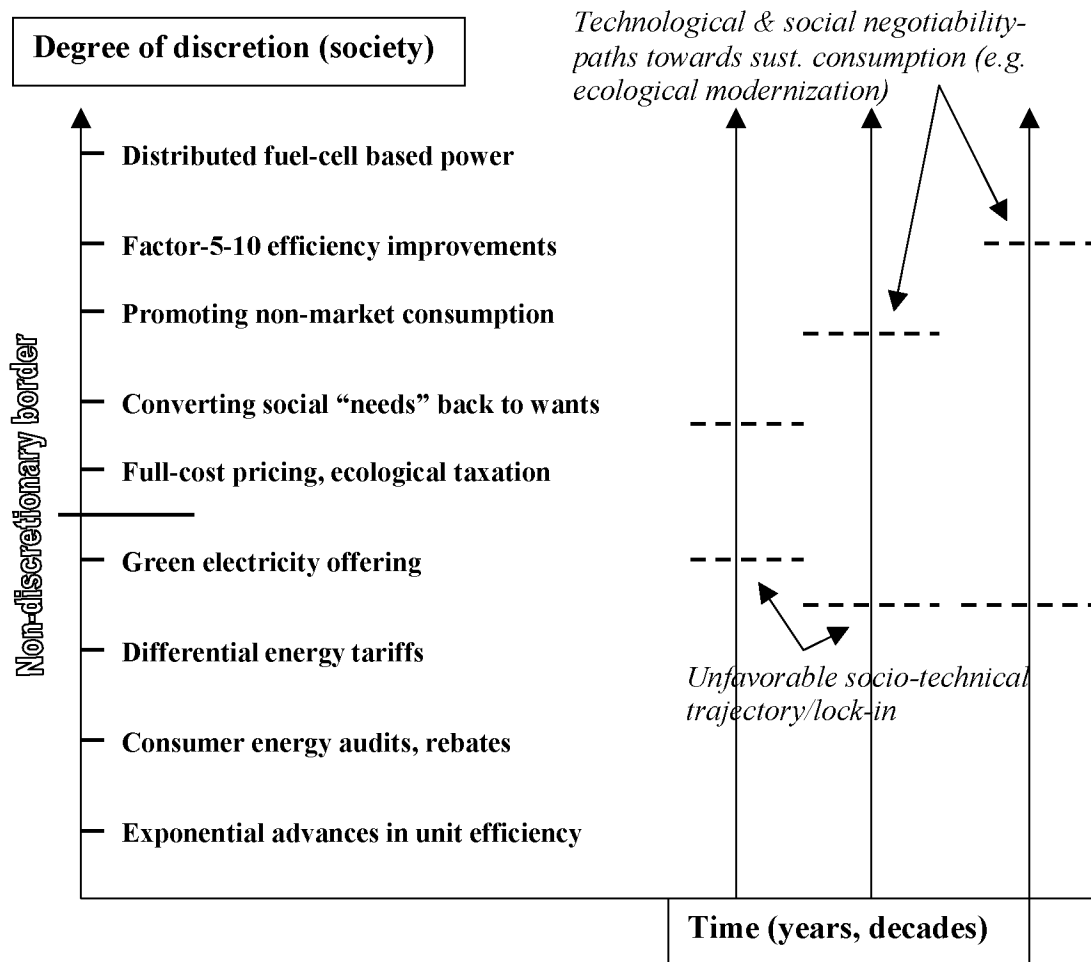


<sup>11</sup> “On the left side of the model, human actors – aiming at a reduction of the environmental impacts of their lifestyles – are dependent on the environmental innovations made available to them through the systems of provision. On the right side of the model ... agencies involved in the development of more sustainable goods and services are dependent on human actors. They have to recognise environmental innovations as relevant ‘tools’ that fit their lifestyles and their internal domestic organisation as well as their specific standards of comfort, cleanliness, and convenience” [Spaargaren 2000b].



As a thought experiment, we can imagine a discretionary continuum for society based on hypothesized requisites for sustainable consumption (Chapter 3), using what it has achieved thus far as a measure of the minimum the collective deems currently possible or discretionary. We know that current potential for end-use energy efficiency development, for example, far exceeds what prevails in the marketplace, and we can hope that actual social and economic potential also exceeds past and current achievements. Figure 0.2 portrays Northern society's current discretionary range vis-à-vis resource and energy use, with examples of institutions arrayed on both sides of the discretionary/non-discretionary threshold (those above represent institutional or technological innovations it does not or cannot yet achieve (some are described in Chapter 3)). The vertical lines to the right sketch possible directions for future trajectories.

Figure 0.2: A depiction of society's current discretionary continuum for resource or energy consumption, with future alternative trajectories

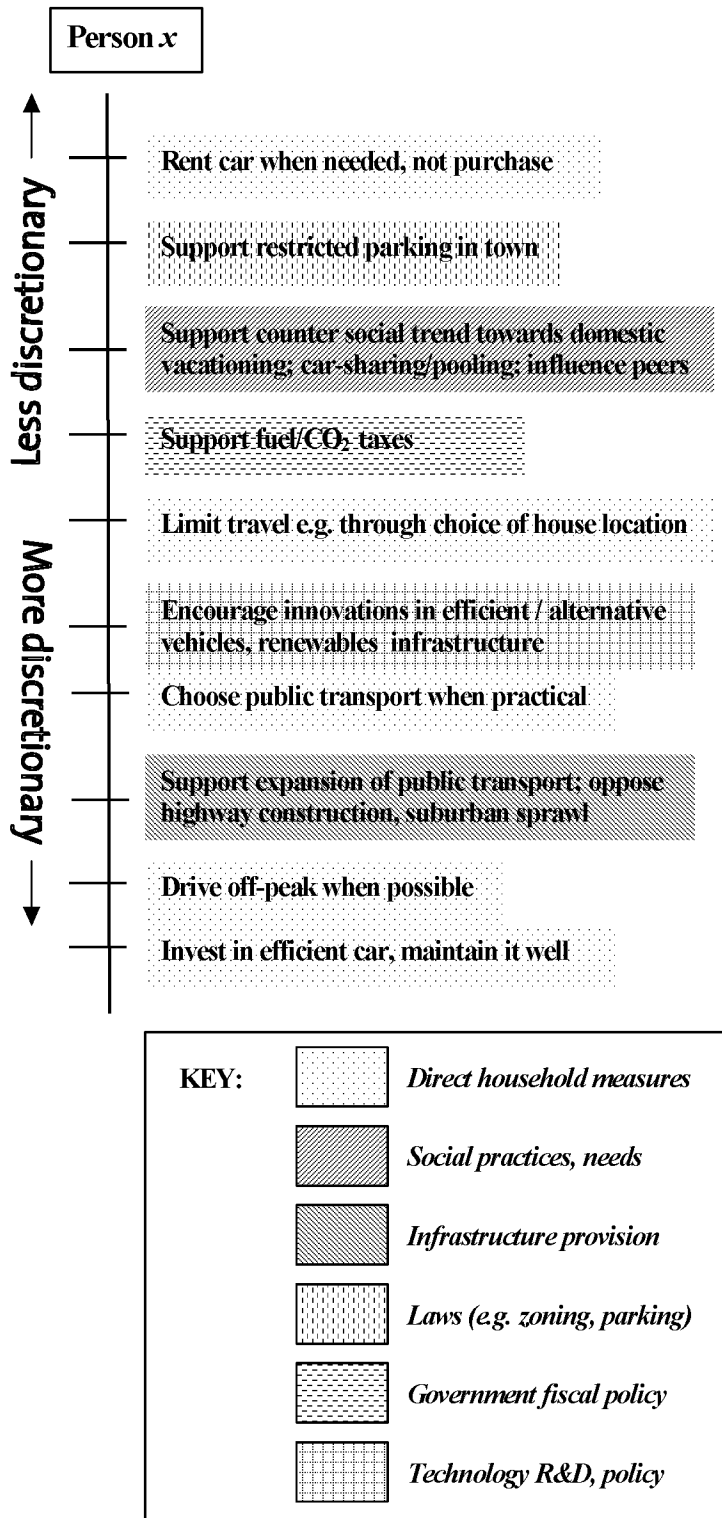


Research and policy for energy use in households often concentrate on the evidently discretionary end of the range for *individual* actors. Acquisition and use of relatively energy-efficient equipment is to some extent open to choice and has often been the focus of direct poli-

cies meant to reduce household energy use. Daily domestic practices are to a large extent routines, which can – with the right impetus – be actively de- and re-routinized in less consumptive, more environmentally friendly ways [Spaargaren 2000a]. To a lesser extent, selection of one’s “lifestyle” – particularly during early adult years when defining career, social group, and family decisions are made – is amenable to individual influence. A lifestyle factor is said to account for variations in energy consumption within groups of similar income, culture, and other attributes. Within a given income, social or lifestyle group, individual decisions to purchase and especially use a product or service – for instance frequency and distance of leisure plane travel – vary significantly: these decisions appear to be those most open to the exercise of individual choice, i.e. subject predominantly to personal or individual-situational, rather than external macro, constraints. Personally constrained – but relatively *unrestrained* – consumption behavior accounts for a significant part of the continuously growing activity levels, and in many cases corresponding energy use, in many household activity sectors.

Yet these personal-situational constraints are also variably negotiable, or discretionary, for the individual. The precise contours of an individual’s discretion continuum or range, or the point at which discretionary becomes non-discretionary for any single *person*, is murky and requires the use of psychological, sociological, or philosophical devices to characterize. A combination of influences – especially psychological, situational, and economic – shape what an individual regards as achievable and desirable measures. Figure 0.3 offers a graphical representation of a lower portion of a sample person’s discretion continuum for “mobility,” with intervention types also indicated. The order is highly personally idiosyncratic: another’s graph would look different. Direct behavioral household measures may appear at both the bottom and top end of the y-axis of personal discretion: for example, since this individual, for whatever combination of circumstances and preferences, places a high value on owning his own car, albeit a relatively fuel efficient one, foregoing ownership and renting when needed is a much less discretionary option for him. Chapter 4 draws on literature from environmental psychology to expand somewhat on these ideas, and the interviews in Chapter 5 probe the sometimes subtle border between capability and willingness or preferences. The analytical and trans-disciplinary implications of both continua, society’s and the individual’s, are taken up in greater depth in Chapter 4.

Figure 0.3: Excerpt from a hypothetical individual's discretionary continuum for the "mobility" activity, with intervention type (pattern key).



## 2.2 Research questions and aims

One of the aims of this study is to expand opportunities for the public's involvement and participation in environmental decision making, public deliberation, and possibly resource provision. Environmental decision making is understood here not as the province of a few key environmental agencies or polluting companies but in a broad sense as pertaining to a wide spectrum of technological, social, and economic conditions and developments that impact environmental sustainability. Ecological modernization theory as well as risk society and reflexive modernization theory argue that a broader range of actors at different levels – including companies, consumers, social groups, and communities – should have a larger role in spurring changes for environmental protection and reform [Mol 2000, Phung 2002].

To put this in an energy policy context, noting the small economic potential for energy efficiency improvements in a world of low energy prices, and the increasing tendency (especially in the United States) to leave decisions concerning energy technology and emissions reductions up to businesses and energy companies under a regime of voluntary standards,<sup>12</sup> we propose that the end-user take a greater and necessary compensatory role in pressing companies and governments for environmental reforms. At the same time, despite the current absence of economic signals and social mechanisms inducing personal restraint, the user should also look to his own home and practices for reduction potentials. How much of the one and how much of the other? Providing or generating information and knowledge may help people find the appropriate balance and further lay involvement. One concrete result of this study is lessons for the design and use of improved information and communication tools for domestic energy conservation.

The core of this study looks at laypeople's understanding, and researchers' risk-communication, of the universe of factors that influence (energy) consumption along the discretion continuum. Ours is a comprehensive, dual approach to social practices that allows end-users to make both a left-approaching "analysis of strategic conduct" (according to Figure 0.1) as well as a right-approaching "institutional analysis." (We focus especially on people's actions on the left side in light of their greater knowledge of the right side.)

It is proposed here that laypeople need better information on the array of factors and their interactions that influence energy consumption and by extension environmental sustainability. This aim requires different approaches to the provision of knowledge than conventional information approaches; and, as a testable hypothesis, it benefits from different communication tools. In contrast to the conventional provision of energy information, then, is it helpful to (let the end-user) confront the duality of, and examine the shifting border between, the discretionary and non-discretionary, e.g. between the behavioral and structural, in energy consumption.

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<sup>12</sup> This does not leave matters up to the "free market," as firms, again particularly in the US energy sector, operate in conditions far removed from perfect, fully competitive markets.

What kind of information is best communicated to individuals to help them (1) conserve energy in their households and (2) stimulate conducive institutional changes – to further the effort to bring the household sector’s energy consumption more in line with sustainability dictates? That is, assuming that an end-user-targeted, information-knowledge approach is at all useful to this end, what sorts of knowledge sets (presumably comprising both expert and personal elements) are most important, and what might be useful and effective means of instilling, communicating, or encapsulating them?

An increasing number of studies of direct and indirect household energy consumption purport to enhance environmental awareness by providing information on the energy and emissions consequences of consumer behavior (see Chapter 4). Is this the right approach, or would it help to add information about the interaction of less discretionary driving forces? What kind of information and presentation actually best show the nature of such interactions and facilitate or motivate people to support some level of intervention to moderate their energy consumption, or their consumption in general? For example, are simple, non-differentiated indicators appropriate for most sectors of the public, or do some respond better to a more complex presentation of a complex reality? Can we treat energy like any other type of consumption and focus on the general forces underlying consumer society? To what extent?

As noted, in general this type of analysis and agenda has a close affinity to the sociological theory of the ecological modernization of consumption, especially monitoring for enhanced consumer-citizen involvement at various levels in the production-consumption chain. This theory, as far as it bears on our research agenda, will also be elaborated on in Chapter 4.

A broader accounting of the factors influencing end-users’ energy-consuming devices, services, and practices may help facilitate their role in managing and shaping them. In the first place, it may induce personal or household conservation measures. In the second, a broader accounting might encourage end-users’ contributions at positions higher up in the production-consumption chain. For example, it might enhance citizen-consumers’ input into governmental and corporate technology policy choices or their support of environmentally favorable changes in social practices or norms. On a political level, such an (information) approach might possibly serve the aim of helping developed nations break free of the chicken-and-egg problem (Chapter 3, section 3.3.4.1) of mustering basic support from the electorate for institutional changes to restore signals for restraint. Expert modeling, in combination with explanatory discussion and interviews, is one way of providing such an accounting. This application is the subject of the study’s main empirical part, described in Chapter 5.

## **2.3 Hypotheses and Questions**

This section lists the original research hypotheses and brief annotations. In the course of the empirical research, the hypotheses generally framed or directed the inquiry, strictly or loosely depending on the hypothesis. However, a number of other related themes were also explored and are reported on in the empirical chapters. Following each hypothesis or hypothesis cluster, one or more associated questions are formulated from the perspective of the end-user. As described in Chapter 5, these questions steered the restructuring of the

original ECO<sub>2</sub> software application into the “interview version” (that is, we redesigned and combined modules in such a way as to enable the user to explore these questions), and they were raised and addressed in the course of the interviewees’ interactive use of the software. The hypotheses, then, will guide the analysis and presentation of results from previous Swiss studies reported on in Appendix A, while the specific questions will only be reintroduced in Chapter 5 where the computer program and interviews are discussed.

**A. Discretionary exists:** Some (significant) elements of an individual’s energy consumption are highly discretionary, even within the constraints of a particular “lifestyle” group.

The formulation of this introductory framing hypothesis suggests that a portion of such consumption is also non- or less discretionary. But at the same time it also implicitly challenges the supposition (prevalent in some sociological schools of thought) that nearly everything is structurally determined.

Individual characteristics and circumstances certainly influence what a person regards as discretionary. In opposition to the binary discretionary/non-discretionary dialectic, we have suggested a range or even a variable continuum of levels of choice in consumption for an individual and across individuals, using rather the terms *more* or *less discretionary*. (Cf. [Kaiser 1999] whose models show how the exercise of choice in a particular ecological behavior can be ranked in difficulty against choices of members of a social group.)

At the level of large groups or society, however, general or universal constraints found at the extreme high-end of the continuum can be considered almost wholly non-discretionary (see Figure 0.2). These may apply to as yet technologically impossible choices or ones essentially unavailable in a given place. They also apply to social norms and related prior technology choices – like historical trajectories for technology and infrastructure (e.g. lock-ins) – that highly shape the choice sets and lifestyles in place today. Strongly individualistic or technically adept people might overcome some of these latter constraints, but most must conform to some extent to their operation in social and professional circles.

**B. People distinguish:** Laypeople are capable of making a distinction between aspects of energy consumption they can directly control and aspects that are decided for them.

This adds the element of the end-user’s recognition of the distinction between discretionary and less discretionary. Falsifying findings could be either individuals who are unable to make the distinction when by all accounts it exists in their case; or those who feel all aspects are either one or the other; i.e. that they have either zero or unlimited degrees of freedom.

Capability of distinction is separate from the exercise of one’s discretionary powers (specifically, in a direction of restraint) or, to cast matters in an ethical light, recognition of discretion does not necessarily suggest a willingness to embrace the responsibility implied by the freedom of choice.

**Questions:**

1. Which personal or direct household variables (e.g. behaviors, practices, appliance purchases and use in heating, traveling, leisure time, etc.) do I think I could rather easily change? In what time frame? Which am I unable to change?
2. Of those I am able to change, which would I be willing to change in a direction of lower consumption; which not, and why?

**C. (Non)Discretionary accounting:** People relatively open to communication about energy use in society and interested in examining their own individual energy consumption benefit from a greater clarification, and personal assessment, of which determinants of their consumption they can change easily on their own (discretionary), which parts they have less direct influence over (less discretionary), and why.

**D. (Mis)Perception of non-discretionary:** It may be useful (for energy conservation purposes) to further the accurate understanding of this distinction, i.e. to replace perceptions of the degree of discretion with a more accurate rendering of the actual distinction in specific cases like housing, transportation, or leisure.

These basic hypotheses assume a certain level of motivation and engagement with the issues, which was true of most of the subjects recruited for the interviews. (The problem of higher engagement among the sample set than the general population is common to this sort of research experiment.)

Two components mentioned above are clearly differentiated here, a general or universal clarification of non-discretionary factors (achieved in the ECO<sub>2</sub> software module involving technological, demographic, and social factors), and a separate personal assessment (achieved in the household module). The latter involves both more clearly discretionary direct variables as well as personal “situational” non-discretionary constraints.

**E. Communication about Non-discretionary:** Including information about higher-level technological, economic, and social decisions, constraints, or determinants of household energy usage – along with information having to do with a specific individual’s or household’s energy utilization – is beneficial and effective (for our transdisciplinary aim).

This hypothesis is at the heart of the research outlook and effort. It is another formulation of the premise of the utility of non-discretionary variables for the end-user and is not technically independent of hypotheses C and D.

Expanded, it asserts the following: Communication to the public about energy consumption and its related problems is effective insofar as it presents in some way the multiplicity – and unavoidably, complexity – of factors at work in determining their consumption. Thus, although simplicity of presentation and indicator formats may be desirable for communicating certain ideas to laypeople, simple, non-differentiated indicators are not always desirable for highly complex problems, especially when trying to portray potential “solution” or intervention points to the public.

Such communication can be made highly specific when discussed in the context of local or national politics; the program and interview do not usually contextualize to such an extent, leaving that largely for future extensions.

However, implicit in this description is the desire to consider certain social structures not as fixed non-discretionary variables but as central parameters amenable to influences from both actor and structure [Spaargaren 2002], i.e. to shift the collective's discretionary border over time (cf. the upper trajectory in Figure 0.2.) Expert and consumer views on consumer-citizen involvement in this process are explored under this hypothesis and question 7 below.

The issue of what is a proper measure of "effectiveness" of such communication is an especially difficult one and was not empirically resolved in the interviews. "Beneficial" results of this sort of risk communication could consist of increased levels of awareness, intention, behavioral changes in household consumption, and/or changes in consumer or political action (see Chapter 4). But we could not necessarily expect any of these results to follow from participation in a single interview session, no matter how compelling or in-depth. Nor could we rely on interview follow-up questions regarding participants' intentions to take action. The best we could do was to extract this measure indirectly through various techniques in the interview, and primarily to try to assess the degree of learning the subjects experienced in the course of the interview sessions.

**Questions:**

3. What are the most important factors beyond my direct, immediate control constraining my energy use (in housing, travel, diet, etc.)?
4. What is the nature of the factors beyond my direct control? Technological? (e.g. prescribing or constraining availability of options, efficiency levels)? Demographic? Social (e.g. prescribing types of consumption/activity levels) Economic/institutional (e.g. establishing patterns of business and commerce that inflate the embodied energy of goods or set incentives for trends in the development of the other variables listed here)?
5. How significant would be the effects of changes in broad-scale social or technological variables on my energy consumption in comparison with the effect of independent personal changes I might be willing to make? I.e. How does the impact of "bottom-up" personal change compare with that of socio-technical change from the "top-down"?
6. What combinations of technological and social choices keep down future national energy use?
7. How easily and through what pathways can the determining technological, social, or demographic variables be changed, who are the decision makers involved, and what could my role as an end-user be in these processes?

Hypotheses F through H largely relate to the better construction of energy (risk) communication tools like ECO<sub>2</sub>. They are specific and more technical than the preceding hypotheses. Again, they take (existing) information-communication approaches as a starting point and, following the orientation of the hypotheses A through D, posit certain improvements.



**F. Aggregate data comparisons:** It is useful and instructive to present comparisons of an individual's energy utilization, in total and across categories, to the national average and those of various aggregated (e.g. household or lifestyle) groups.

Aggregate data comparisons were already facilitated to some extent in the earlier version of the ECO<sub>2</sub> software. An extension of this idea (realized in the newer version) makes explicit links between the individual and the aggregate level, especially in helping visualize a flow from the former to the latter, by allowing the user to answer question 8. (This is the reverse of the effect of movement from the broad-scale level to the individual in question 5, for example.)

**Question:**

8. What would national energy use be if everyone consumed as much as I do now or in the short- or mid-term? In combination with other broad-scale technology changes?

**G. Past and cross-cultural comparisons:** Presentation of cross-cultural and/or inter-temporal comparisons is understandable and useful (for stimulating thought on alternative socio-technical pathways). That is, identifying and elaborating on past political, economic, and social conditions as constraints on household energy use, and showing contemporary situations in other countries, is helpful in the accounting.

**H. Separation of the social from the technological:**

1. Presentation of information about specifically social, cultural, and/or value drivers of energy utilization is important for communicating about non-discretionary factors.
2. Clear separation of technological or efficiency factors from non-technological determinants of household energy utilization is useful and important. That is, indicators in this context should separate specifically social, cultural, and value drivers of energy utilization from "purely" technological factors.

The contrary, favored by the Social-Revealing approach (introduced in Chapter 4), recommends that the two types of driving factors not be separated and that one consider their interconnections, as in the interlocking evolution of technology and social norms or in rebound-type effects.

**Questions:**

9. How do I react to/am I willing to confront non-technological determinants of household energy use like social, cultural, and normative drivers?
10. Do I prefer a clear separation between these and technological variables or a combined approach?
11. How do I react to presentations of historical or cross-cultural comparisons of energy use and their explanatory variables?

## Chapter 3

# Northern Consumption: A Critical Review of Issues, Driving Forces, Disciplinary Approaches and Critiques

### 3.1 Introduction

This chapter takes a step back to review recent literature from various disciplines in an attempt to answer the questions how and why consumption, consumerism, and consumer societies in the developed world are implicated in accelerating environmental degradation; and specifically, how these phenomena and their driving forces might be influenced to ameliorate negative environmental consequences.

As noted in the introduction, the identification of consumption as problematic involves elements of choice, judgment, and values: the study is explicit about these elements (sections 3.2.1 and Chapter 1). Data and studies documenting negative environmental effects of Northern consumer societies are encyclopedic; this chapter does not attempt to summarize them but rather takes them as a starting point. The chapter takes pains to justify its focus (3.2.2) and particular bent (3.2.6.2), especially when this emphasis lacks consensus, even among environmental researchers and activists. Apart from that, 3.2 serves to specify objects of inquiry and define terms (3.2.3), give historical and philosophical context (3.2.4, 3.2.8), present common approaches (3.2.5), and describe related societal conditions and developments (3.2.7, 3.2.8).

Section 3.3 examines factors, driving forces, theories, critiques, and recommendations from various disciplines, cross-disciplines, or trans-disciplinary approaches that see (mis- or over-) consumption as problematic, most for environmental reasons but also for social, psychological or other reasons. The disciplines examined range across the behavioral and social sciences, including psychology, sociology, anthropology, economics, and ecological economics, with necessary forays into political science, especially towards the end. An ethical treatment would also be relevant but was not pursued for reasons of space and scope.

The chapter discusses the general phenomenon of consumption (and sometimes consumerism), while often drawing examples from the field of energy analysis. In this way energy consumption, which is more often dealt with independent of other types of consumption, takes its place in the broad spectrum of consumption types, appropriate since energy use responds to many of the same general driving forces, is shaped by many of the same social practices and norms, and can be viewed through some of the same lenses that analysts use to study general material or service consumption. The obverse approach, treating material consumption as indirect, embodied energy, is also useful and plays a large role in the main empirical chapter, Chapter 5.

Throughout the review, themes are grouped into categories, tightly organized and presented, as far as possible, in an orderly progression. However, given the number, complexity,

and inter-relations of many of the themes, issues raised in brief in one section may be taken up in greater depth, and in light of new themes, in a neighboring section. The resulting blending is sometimes, to use a musical analogy, imitative or even slightly contrapuntal. The exposition is, in the end, both comprehensible and somewhat comprehensive.

## **3.2 Issues**

### **3.2.1 Is (over-)consumption a problem?**

Consumption of goods and services is the lifeblood of modern economies and the accepted primary source of welfare. Economics does not consider consumption problematic. Although neoclassical microeconomic theory of the consumer deals with utility maximization, for various reasons economics has taken as its de facto aim the maximization of the individual's consumption rather than his or her well-being. Economics posits no natural sufficiency point for the consumer: while the graph of an individual's consumption of a single commodity contains a finite "bliss point," there is no built-in limit to the type and number of commodities he or she may desire, and greater consumption of an ever-greater variety is always the aim [Goodwin 1997a]. Insatiability is axiomatic among mainstream economists and, translated to the macroeconomic sphere, this premise underlies the belief in the inevitability, and desirability, of unending economic growth [Princen 1997].

Mainstream economics does recognize that specific patterns of consumption or excessive consumption of certain resources may have undesirable economic and non-economic side effects. Economic-environmental consequences of consumption include, indirectly, the impacts of waste products of economic production, distribution, and consumption, and the effects of production processes on natural resources [Stern 1997b]. Localized "over-consumption" vis-à-vis these effects is possible for specific products in certain cases, especially when price signals are distorted by subsidies or, generally, cost externalization. For the individual and in the aggregate, however, over-consumption is not possible.

Although problematic consumption and over-consumption have been addressed largely outside of the discipline, some economists have, in response to criticism, taken up the defense. Others, some of whom are presented below, have departed from the mainstream to consider parts or the whole of the system as a problem, for ecological, social or other reasons [Goodwin 1997b]. The evidence of growing, pervasive environmental damage from economic activity connected to consumption and production has caused several prominent economists to voice alternative views. Galbraith, for example, asserts that the consumer society is for the fortunate few; its extension to all the poor of the developing world (at an American level of resource consumption) would endanger life on earth [Galbraith 1997].

Galbraith's concern is typical of environmentalists, who generally see a link between high consumption levels in developed countries and future (and to some extent present) economic poverty or, at the extreme, disaster. Accordingly, overly high consumption produced via environmentally damaging methods will degrade the natural production base and reduce future output capacity. In time this will "roll back" the successes of industrialism [Goodwin

1997a]. Ecologists and proponents of sustainable development often assert that Northern-style consumerism is unsustainable: Six billion people cannot live at the material and energetic standard of today's richest countries, let alone the nine billion or so expected by the middle of the 21st century. Agenda 21 states: "The major cause of the continued deterioration of the global environment is the unsustainable pattern of consumption and production, particularly in industrialized countries" [Agenda 21 1992]. Yet even within these circles, specifically Northern patterns and levels of consumption and their link to environmental problems have only started to be more widely acknowledged since the Rio conference in 1992. Since then, the need for modifications in consumptive lifestyles has been more frequently cited in environment and development publications [Røpke 1999].

Consumption is the source of many benefits, and consumption of certain sorts and magnitudes is the cause of many problems: many arguments on multiple levels can be brought to bear for and against it. Individually, psychological and moral arguments make perhaps the strongest case against excessive Northern consumption or consumerism. Lowering consumption may reduce the pressures of the "rat race" and the "busy life" and may ward off excessive individualism and materialism. On a collective level, social and environmental factors stand out as the most compelling reasons for addressing consumption [Goodwin 1997]. However, in this study, psychological, social, economic, and ethical problems stemming from consumption will only be addressed insofar as policies directed at them (or arguments concerning them) may be effective in reducing or altering consumption and alleviating the attendant environmental problems. The environmental problematique surrounding consumption, and not the array of other potentially related problems, is of central interest here.

### **3.2.2 Consumption or production: which is the better focus for addressing environmental problems?**

To what extent is consumption responsible for the environmental predicament, rather than production dynamics and processes and their related economic, institutional, or technological features? Where should the emphasis be placed and the remedial effort applied?

Commonly cited general driving forces for environmental change include population growth, economic growth, technological change, political-economic institutions, and attitudes and beliefs [Stern 1997b]. This chapter focuses on consumption growth, and to some degree the attitudes and beliefs that underpin and propel it.<sup>13</sup> It is worth examining the arguments for concentrating on forces associated with the producer side rather than, or at most along with, the consumer side, since consumption and production lie on either side of the economics equation that defines economic activity.

To make concrete the consumer approach, against which the producer emphasis is balanced, the Dutch HOMES concept of the household can be taken as a unit of analysis. (The

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<sup>13</sup> Ultimately it will be concluded that consumption cannot be addressed independently on a micro or meso level, and that policies independent of changes in political-economic institutions would prove largely ineffective. This is discussed below in sections 3.3.3.3, 3.3.4.1, and 3.3.4.2.

1990s HOMES program studied the diagnosis, evaluation, and changes in household metabolism – the flow of energy, material, and waste through households in the Netherlands.) The HOMES study identifies households as an increasingly important segment of Western societies for their aggregate environmental impact. Households are considered the smallest consumer social units. (The authors suggest a small but significant modification of Ehrlich's IPAT equation (Impact = Population \* Affluence \* Technology) [Ehrlich 1972] to read Impact = Households \* Affluence \* Technology.) Households consume a complex and changing mix of goods and services, yet different households' general lifestyles have differential environmental effects. Individuals in households have a large influence on the type and quantity of goods and services produced, and, through the pressure of their demand as individuals or consumer groups, they may affect the environmental characteristics of their manufacturing processes [Noorman 1998b].

A general criticism of the household emphasis is that government, corporate, and organizations' decisions about consumption have much greater environmental ramifications than individual householders' choices. The assumption that most consumption in industrialized countries stems directly from individuals and households may be incorrect in many cases. In many countries in the North, corporate and government activity is directly responsible for the majority of energy consumption, pollution, and other environmental damage. Business, organizations, the military, and the government's acquisition and use of products and services often constitute a very significant proportion of total consumer demand (Of course, this demand can be accommodated in a wider definition of consumption. And arguments can be made, on the basis of economic if not political theory, that household consumer behavior indirectly drives a large part of corporate and government decisions in Western industrialized nations) [Stern 1997b].

The next level of criticism of the individual or household approach is that it neglects the control that business, government, and organizations have over decisions that more directly affect energy and material consumption in the economy, such as fostering certain technological paradigms, setting official and de facto efficiency standards, offering product lines, and using specific industrial production methods [Stern 1997b]. Matthews and Hammond emphasize that poor production methods along with exponential increases in demand are at the root of the liquidation of renewable resources (while at the same time they stress that rising consumption demand for basic needs from developing countries, and not only resource-intensive lifestyles in the developed world, is driving the bulk of this demand) [Matthews 1999].

The focus on production and in particular producers' power over consumers has older precedents [Schnaiberg 1980]. Schnaiberg held that consumers' demand in industrialized countries has been determined primarily by producers; and ameliorating environmental damage must focus on producers, production and the politics supporting private business interests. According to Schnaiberg's treadmill of production, high levels of consumption are necessary for producers' profits: business and government use various means to keep consumption levels high. Consumer choice is limited to producer offerings, once a lifestyle is chosen. The power of business and political interest groups on government, especially prominent in the United States, has dictated infrastructural decisions that have "locked-in"

many aspects of consumption. For instance, in many areas in the US public goods like transportation and related infrastructure have been limited or hobbled by the influence of such groups, while private business interests (like trucking and mining) are subsidized and consumers are locked into car use and the attendant lifestyle [Schnaiberg 1980] [Ponting 1991].

In defense of an emphasis on the consumer, the past several decades of enormous growth in household resource demand and consumption in Western countries show that there is still a large area of “system-discretionary,” producer-independent, environmentally significant household behavior that can be influenced at the level of the consumer. Of Schnaiberg’s general argument it can be said that he does not make a good case that changes in production practices and institutions alone are sufficient to halt the environmental damage from resource consumption, especially given the continued enormous growth in consumer demand, nor that Northern consumption rates, for many resources, could continue to be satisfied along with basic needs in the South, even with such better practices.

Thus in policy circles, demand-side measures to reduce consumption are now more commonly considered in addition to technological or regulatory means for transportation, water, and waste management. Driving this emphasis is the perception that utilization growth has overwhelmed unit efficiency improvements in many cases, and that wastes associated with consumption now often exceed waste emissions from manufacturing processes [Measuring Changes 1998]. The joint consideration of production and consumption patterns has been embraced by many analysts and represents a consensus focus of the UN Workshop on consumption and production. Reportedly, such an approach permits examination of both economic and behavioral social policies, spotlights the full-use lifecycle, and encourages examination of the distributional effects of these patterns [Measuring Changes 1998].

Common analytical uses of consumption, such as one which identifies consumption with overall economic activity, are often actually disguised production approaches, or they conflate consumption with other concepts like materialism, maldistribution, population or technology, losing or obscuring the ecological aspects or driving forces [Princen 1999]. Princen calls for a consumption focus, but one defined in an ecological economics manner that permits a focus on non-purchase, non-commercial [cf. Cogoy 1995], or non-material responses to needs; material provisioning; and material decision chains [Princen 1999]. However, treating environmental problems from such a consumption perspective can generate great analytic and policy resistance: “The reason is that to talk about consumption levels {see 3.2.6.2 below} and consumption patterns is to talk ‘out of paradigm.’ It is to eschew the production perspective and to raise analytical questions that conventional analytic tools – price determination, cost-benefit analysis, even life cycle analysis – cannot comfortably address. It is, ultimately, to raise question of purpose.” [Princen 1999].

### **3.2.3 Consumption definitions and environmentally significant consumption**

If the consumer side is indeed a useful intervention point, what sort of consumption is worthy of study in this context? What kind of consumption is environmentally significant, i.e. potentially environmentally deleterious?

Economists' treatment of the environmental impacts of consumption traditionally extends to waste products of various types of economic activity and to some degree to the impact of economic activity on natural resource stocks and productivity. Economics emphasizes the value added from technology, but Daly emphasizes the importance of that which is added to, i.e. the natural, low-entropy resources. This latter quantity is "consumed" in human consumption [Daly 1996a]. From a physics perspective, all consumption consists of entropy-increasing transformations of matter and energy. This entropy increase may be environmentally significant because it degrades the quality of the stock or ecosystem in which the transformation occurs [Stern 1997b]. The entropy-related understanding of consumption is characteristic of ecological economics, in particular the pioneering work of Georgescu-Roegen [Georgescu-Roegen 1971].

If consumption is human transformation of materials and energy, then environmentally significant consumption is related to a transformation that "makes materials or energy {stocks} less available for future use, moves dynamically stable biophysical systems toward a different state or, through its effects on those systems, threatens human health, welfare, or other things people value" [Stern 1997b]. Such a definition emphasizes the biophysical effects of human social and economic activity in general, and it makes clear that although consumption lies at the "interface of social and natural sciences," appropriate units for environmentally significant consumption are "physical and biological, not economic or social" [Stern 1997b].

Broadly defined, environmentally significant consumption can be a form of ecologically damaging misconsumption on the individual level,<sup>14</sup> harming single groups of resources and/or people who depend on the resources, or it can be overconsumption on an aggregate level. "Overconsumption is that level or quality of consumption that undermines a species' own life-support system and for which individuals and collectivities have choices in their consuming patterns"<sup>15</sup> [Princen 1999, 2001]. Aggregate consumption concepts are treated in 3.2.6 and later in 3.3.3.3, "Restraint and sufficiency."

In social science settings, economic units are used for consumption as a matter of convenience and familiarity. This use will often be followed in this chapter, where final or end-use consumption is discussed as a surrogate for biophysical transformations. In an economics context, the concept of final consumption assumes a clear distinction from production, whereas it is also possible to view human consumption as an input to labor, in which case there is no such thing as final consumption. However, this is appropriate mainly at the level of fulfillment of basic needs and not at the much higher levels of consumption found in developed countries [Røpke 1999]. Similarly, household metabolism is often measured with economic and energy units, while pointing to the direct and indirect physical and biophysical consumption of natural resources [Noorman 1998b].

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<sup>14</sup> The misconsumption may also be physically, psychologically, or economically damaging to the one doing the consuming.

<sup>15</sup> Collective overconsumption is also an ethical issue "because it inheres only in those populations or species that can reflect on their collective existence," and it can become a political problem when "the trends are toward collapse, power differences influence impacts, and those impacts generate conflict" [Princen 1999, 2001].

### **3.2.4 Development paradigms and the North-South relationship**

#### **3.2.4.1 Disparities, resource constraints, and development paradigms**

This study concerns itself primarily with current consumption in the Northern industrialized countries. The history of the development of the consumer society in the North, and the corresponding more recent history in the developing world, are largely beyond its scope. Nevertheless, a certain amount of discussion of the North-South interplay and the evolution of development patterns is necessary. This section highlights some of the relevant issues, a number of which are taken up later in different contexts.

The enormous disparity in resource consumption and waste generation between the North and South is a subject of frequent discussion and contention in international environment and development forums. As of the mid-1990s, the developed countries, with 25% of the world population, had 85% of world income and accounted for over 80% of global resource consumption, according to gross estimates. These countries generated more than 75% of the world's municipal and industrial pollution and had been responsible for about 80% of the cumulative anthropogenic CO<sub>2</sub> emissions since 1950 [Symposium Sustainable Consumption 1994].

For many resources, a line cannot easily be drawn between developed and developing countries. Complex production-consumption chains wind through both worlds, ecosystem damage occurs in both, and both developed and developing countries will experience resulting economic and social impacts. Consumption of three indicator resources – cereals/meat, wood fiber, and fish – is rising everywhere. Demand is not just from excessive “lifestyle” demands of the wealthy Northern countries, but also from people’s basic needs such as housing and nutrition [Matthews 1999]. Yet for those resources for which there is no easy substitute, there is no doubt that high levels of resource consumption in North leave less (or already, as in the case of many fish stocks, virtually none) for people of developing countries. Industrialized countries' huge, disproportionate draw on the stocks of resources brings the stocks near their limits or system thresholds faster and sometimes to the necessary exclusion of people elsewhere or in the future. The distribution of carbon emissions can be viewed similarly, with the stable absorption capacity of the atmosphere the relevant threshold. The effect of consumption patterns and lifestyles in the North on the future consumptive and productive possibilities in the South was a commonly raised concern at the 1992 UN Conference on Environment and Development [Measuring Changes 1998]. What countries' or people's relative share in global resources should be is the subject of ethical and other types of inquiry and is beyond the scope of this study. (Uniform per capita apportioning of rights to natural resources is the most commonly chosen distribution in ecological footprint and rucksack analysis [Wackernagel 1997], [Schmidt-Bleek 1999].

The prevailing liberal economic paradigm does not fully recognize inherent limits on productive or absorptive capacities of renewable resource stocks and ecosystems, or it trusts technology to overcome them. The debate on the means to reduce the North-South disparity – reducing Northern consumption levels or attempting to bring Southern levels up to those of the North – illustrates a basic philosophical, and normative, divide. The one side argues



that the manifest limits on certain vital resources, limits that cannot be or have not been overcome despite prevailing technological optimism, make it futile and dangerous to embrace the second path. This side insists that affluent countries must leave enough for Southern populations to meet their needs, even at basic levels (for example, see [Haavelmo 1992]). The prospect of large growth in world population in the near to mid-term strengthens their convictions [Lintott 1998]. While both sides agree in theory on the necessity for vast improvements in the methods and efficiency of resource utilization, the other side is committed to universal growth as the solution to Southern poverty and inequity. This growth paradigm predominates as the model for development in the North and most of the South.

#### **3.2.4.2 Example for the populace in the developing world and the lower strata within the developed world**

While the growth paradigm, as embodied in the political goal of increasing GNP and personal expenditure, has penetrated the vast majority of governments and political parties the world over [Jackson 1999], the final level has been the large-scale emulation by lower social strata in the developing and the developed world of Western high consumption lifestyles. The modern consumption practices and habits of the educated global urban middle class (the “affluent class” by Durning’s classification [Durning 1991]) have become the example for lower social strata to imitate within Western countries (e.g. Spanish Valencia [Garcia 1998]) – and, promoted through aggressive advertising relayed through modern communications media, increasingly in developing countries. The global aspiration to highly energy and material-intensive Western lifestyles alarms many for its environmental implications [Measuring Changes 1998], and, constituting a form of “anti-environmental modernization” ([Garcia 1998] the opposite of that predicted by the environmental Kutznets curve<sup>16</sup>), is already credited with accelerating environmental degradation. Were the current US per capita consumption of non-renewable resources, for example, to be imitated by the world population today, according to Daly’s estimates, total consumption would be on average at least seven times as large as presently [Honkasalo 1998]. Nevertheless, consumer aspirations and lifestyle emulation are actively encouraged by the market and advertising system. The environmental consequences of a universal proliferation and high-level homogenization of consumption patterns seem to present a serious challenge to the liberal expansionist world-view.

#### **3.2.5 Patterns of Consumption**

Three broad types of consumption, and implied intervention points, have been referred to explicitly or implicitly in the discussion thus far: patterns of consumption, suggesting qualitative changes in mixes of products and services and lifestyle profiles; consumption of highly energy and material-intensive goods and services, pointing specifically to technological efficiency improvements (partly a subset of the first and partly a supply-side intervention); and

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<sup>16</sup> which contends that countries’ environmental quality starts to increase once national income exceeds a certain threshold

levels of consumption, suggesting, at least at the aggregate, a focus on quantitative reductions, for instance in material and energy throughput. There is a divide in research and policy circles between those who seek a change in patterns only, along with necessary changes in production, and those who insist that in addition, absolute levels of material consumption are too high in developed countries and must be reduced. A somewhat intermediate view is that in addition to changing patterns, rates of increase of consumption should be lowered (since S-curve inflection points have not been reached in many cases), but not necessarily absolute levels. These issues – consumption patterns, efficiencies, and levels – will be considered in turn in this and the following section.

As noted, Agenda 21 implicates unsustainable patterns of consumption and production in global environmental decline [Symposium Sustainable Consumption 1994]. To the extent that changing the forces driving unsustainable consumption patterns have been discussed in the environmental community, suggestions have focused mostly on technological innovation and correcting faulty price signals.<sup>17</sup> The general aim has been to change the type of consumption, not to reduce it. To this end, the United Nations Development Program, for example, has recommended promoting technological innovation, improving information and awareness, removing perverse price subsidies and adding ecological taxes, ensuring universal minimum (basic) consumption, and other related measures [Michaelis 1999].

Altering consumption patterns is a viable and necessary policy to reduce consumption's environmental impacts. In the United States in particular, industrial productivity increases since WWII have gone largely towards increasing income (rather than leisure), and a relatively large proportion of this expenditure has been devoted to the consumption of goods and services with a comparatively high material and energy intensity [Röpke 1999]. The reasons for this are complex and not fully understood, but it is clear that if the pattern of this expenditure could be directed towards lower-intensity goods and services, the environmental impact per dollar spent could be much reduced.

This is a conclusion of a Dutch study on direct and indirect household energy consumption [Vringer 1995]. The large differences between the energy intensities of various consumption categories indicated that total household energy requirements could be reduced if the consumption mix were changed. The considerable variation among the total energy requirements of households within the same income category provided more support for this conclusion. An English study of the embodied energy of food in diets reached similar conclusions [Coley 1998]. Significant reductions in embodied energy are possible from a qualitative shift in diet (i.e. choosing alternative foods) without lowering caloric intake and, incidentally, without government-lead changes to agricultural, transportation, or retail practices. The implied assumption of both studies is that, provided the functionality and service remain the same, consumers can be encouraged to change the qualitative mix in an environmentally favorable direction. Given the necessary information and motivation, consumers could presumably initiate change on their own. Expecting consumers to accept new diets as

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<sup>17</sup> This harks back to the classic environmentalist feud on the root of the problem in which Commoner emphasized technology and the economic system while Ehrlich and Holdren in their IPAT identity considered affluence and population at least as important [Commoner 1971, Ehrlich 1972].

long as they receive an equivalent caloric intake is perhaps unrealistic, and social and psychological theory (discussed in 3.3.3 below) has much to say besides about the forms and strength of non-utilitarian meaning that consumption has for many people. These studies are nevertheless helpful for analysts and policy makers (see also [Weber 2000]).

Similar effects can be achieved by substitutions in the broader product and service consumption mix. The American Union of Concerned Scientists used an economic input-output model to estimate the environmental impact of the components of American households' consumption baskets [Brower 1999]. They found that the majority of environmental degradation in the United States – in terms of greenhouse gases, air and water pollution, habitat disruption, and several other criteria – could be associated with only seven consumption categories: automobiles, meat, produce and grains, household appliances and lighting, home heating and cooling, home construction, and household water and sewage (Table 3-1). Autos and meat consumption dominated in the list of environmental culprits, leading them to conclude that even modest reductions in driving, driving cleaner or more efficient cars, or partly substituting grains and produce or even poultry for red meat could yield significant environmental benefits.

Table 3-1: The seven most environmentally harmful consumer activities in the US: Share of total impact<sup>18</sup>

<i>Type of Consumption:</i>	Global Warming	Air Pollution	Water Pollution	Habitat Alteration			
	GREENHOUSE GASES	COMMON TOXIC	COMMON TOXIC	WATER USE	LAND USE		
Cars and light trucks	27%	22%	46%	6%	13%	1%	13%
Meat and poultry	3	3	1	20	6	18	26
Fruit, vegetables, and grains	2	5	3	3	5	30	6
Home heating, hot water, A/C	16	11	5	3	1	1	0
Appliances and lighting	15	13	2	5	4	2	1
Home construction	3	4	2	6	6	1	23
Household water and sewage	0	0	1	11	0	5	0
<b>Total</b>	<b>66%</b>	<b>58%</b>	<b>60%</b>	<b>54%</b>	<b>35%</b>	<b>58%</b>	<b>69%</b>

### 3.2.6 Levels of consumption

#### 3.2.6.1 Efficiency and dematerialization

Promoting technological efficiency improvements is a primary concern in engineering and economics and is a mainstay of environmental policy. The theory and practice of increasing energy and material efficiencies of manufacturing processes, equipment, and consumer

<sup>18</sup> [Brower 1999]

goods and services are treated at great length in the literature; a summary from the latest World Energy Assessment [Goldemberg 2000] is offered next.

Improvements on current levels of efficiency are possible at many points along the chain of energy production and use, from extraction and treatment of primary energy resources, generation of primary energy, its conversion and distribution to produce final energy, final energy's conversion in turn to useful energy, and useful energy's transformation into energy services. This last step, involving end-use energy efficiency—reducing the energy needed (and lost) in providing services like lighting, cooking, and transportation — holds large but neglected potential for improvement through the development of new technologies. This potential's size depends on how the time horizon and boundary assumptions are specified. Variations in these parameters produce various potentials like theoretical; technical (using best available technology, regardless of cost considerations); market trend (for a given year, assuming realistic prices and consumer preferences); economic (using the most energy-efficient technologies that are cost-effective, assuming well-functioning markets and the elimination of barriers); and others. Estimates of the economic potential for improving the efficiency of household energy service provision by 2020 – assuming year 2000 prices and constant utilization rates – are, in Europe, for new buildings: 20-30%; residential electric appliances: 35-45%; trains and railways: 20%; and aircraft: 25-30%. In North America some examples for 2010 are electrical appliances: 10-33%; cars: 11-17%; railways: 16-25%; and aircraft: 6-11%. Estimates of the long-term potential by the end of this century exceed 80%, based on expected improved energy efficiency, use of new materials, increased recycling, substitution of natural raw materials for plastics, and so on [Goldemberg 2000].

In general it should be much easier, technically and economically, to implement options that increase the efficiency in the delivery of services than those that lower absolute material and energy consumption levels [Uiterkamp 1998]. Relative dematerialization has occurred in certain industrialized countries, driven by shifting consumer preferences for services, reduction in new infrastructure, increase in material efficiency, material substitution, recycling, and reuse [Goldemberg 2000]. Yet in view of the technical potential and the need to ameliorate environmental effects, the general performance record is lacking.

Each of the new techno-economic paradigms to take hold in developed countries since the industrial revolution has led to a transformation of infrastructure, production, and consumption patterns and lifestyles. The current fifth paradigm, high technology and information, following the era of mass production and motorization from the late 1930s through the 1980s, may hold the technological potential for a relative dematerialization of the general economy. The necessary social and cultural changes in new paradigms are invariably slower to develop than the enabling technological innovations. Factor ten or greater efficiency improvements have sometimes historically occurred over short time periods, but generally only in response to strong technical or economic pressures and in suitable institutional settings [Michaelis 1999]. This may help explain the failure in dematerialization thus far in the industrialized countries. Other basic obstacles to improved energy efficiency include a poor perception of the potential by diverse and heterogeneous groups of manufacturers and consumers. The invisibility of efficiency improvements and investments is a liability for politicians who usually choose more image-enhancing measures. For their part, householders in

Western countries – lacking knowledge, know-how, or technical skills – “under invest” in energy-efficient appliances or demand short payback periods and high rates of return [Goldemberg 2000].

Real dematerialization of the economy has yet to materialize. In most cases increases in per capita consumption have consistently outpaced increases in unit efficiency of materials and energy use [Goodwin 1997a]. The change from heavy industry to a service-oriented economy in the United States, underway in the 1970s, did not produce a reduction in the aggregate material and energy demand of the economy, in large part because services themselves were large resource consumers [Schnaiberg 1980]. Today, American intensities of resource use, per capita or per GNP, are declining only for certain resources, and are increasing for paper, plastics, many chemicals, and, in several sectors, for energy [World Resources 1995]. The apparent de-coupling of energy from GNP observed in the US after the 1970s energy crises may have in fact belied a continued close correlation [Tatum 1995]. Much of the recent spectacular rise in end-use consumption observable in affluent countries is material and energy-intensive, as seen from increases in such indicators as square meters housing per person, number of automobiles and distances traveled, air travel, ownership of appliances, spread of air conditioning, and the like. Indicators for inputs and outputs like paper, electricity consumption and waste generation are generally moving in parallel with these indicators and also support this conclusion [Röpke 1999].

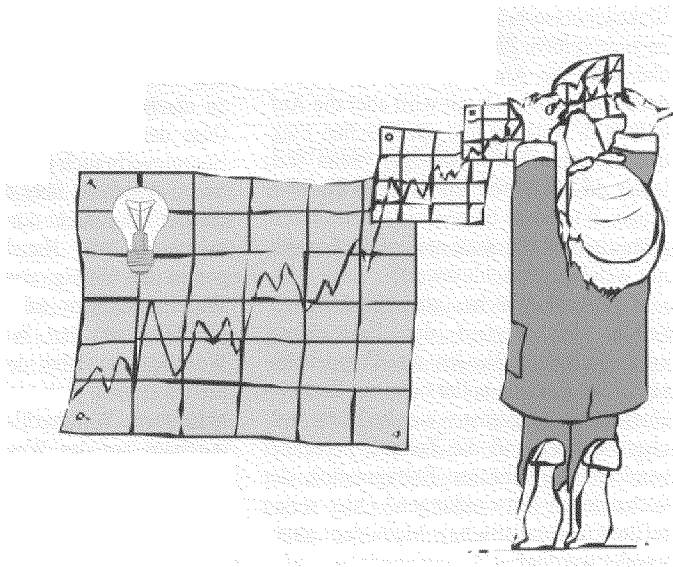
### **3.2.6.2 The case for scale: aggregate sufficiency, not just increased efficiency**

A phrase adopted at the 1994 Oslo Symposium is often used as a working definition of sustainable consumption: “The use of services and related products which respond to basic needs and bring a better quality of life while minimizing the use of natural resources and toxic materials as well as the emissions of waste and pollutants over the life cycle of the service or product so as not to jeopardize the needs of future generations” [Measuring Changes 1998]. Each clause of this definition is problematic. It is the satisfaction of continuously expanding wants-turned-needs, not basic needs, that is the object of a significant fraction of Northern consumption; the definition of quality of life is highly subjective and can be linked just as easily to consumerism as to environmental quality; and it is not clear that enhanced eco-efficiency and toxics reductions are sufficient to overcome the effects of constantly increasing consumption. The first two clauses are a subject of discussion in section 3.3 of this chapter, while the third clause forms the subject of this section.

The preceding subsection asserted that large efficiency increases and dematerialization are certainly possible and may be highly desirable but that they have not occurred to a great extent. Even if great strides were to be made in material and energy efficiency, would this be enough to contend with the environmental consequences of the consumption explosion? Many doubt it would be sufficient.

[Measuring Changes 1998] questions whether eco-efficiency is sufficient to produce a reduction in total or per capita resource use. Spangenberg (1995), emphasizing the enormous size of the necessary reduction in resource utilization, insists that both an efficiency and a “sufficiency” revolution are required. A 1991 Dutch government study (cited in [Uiterkamp

1998)) concluded that additional measures will be necessary to maintain adequate environmental quality if production and consumption continue to increase as they have done. "If the technological options for adaptation become exhausted within the limited time available, then a fundamental revision of our expectations in regard to the nature and the extent of 'economic' growth will be unavoidable." Many others have noted the potential for rebound and scale to overwhelm eventually even the most resource-efficient economies, given the growth in world population and the proliferation of resource-intensive consumer lifestyles [Whiston 1990], [Durning 1991], [Spreng 1994], [Harris 1997], [Michaelis 1999]. In affluent countries, efficiency gains in one area often stimulate demand for the product or service itself by rendering it less expensive, or they lead to the development of new products and areas of consumer demand [Michaelis 1999].<sup>19</sup>



A simple use of Ehrlich's IPAT equation demonstrates that given projected population and consumption growth over the next 50 years, technological efficiency would need to improve by a factor of 16 to keep overall environmental impacts from increasing. If population and consumption growth were to be limited to the South, technology would only need to improve by some 79% over this time period [Ekins 1993],

a target, as noted, that comes close to the estimate for the long-term economic potential for energy efficiency improvements.

The scale of the macro-economy in relation to the natural world is of central concern in ecological economics and especially in the work of Daly.<sup>20</sup> Accordingly, aggregate national and global consumption must not be out of proportion to ecosystem capacities for regeneration and waste absorption. When the economy has reached an optimal size in relation to the biosphere, growth, defined in terms of total material appropriation or throughput, should cease [Daly 1996a, b]. The actual maximum threshold level of throughput is a function of both ecological systems and technology and cannot be definitively determined because of uncertainty and complexity. The precautionary principle recommends keeping throughput within some safe margin below the threshold value [Honkasalo 1998]. Development and

<sup>19</sup> Source for illustration: [Schwarz 1996].

<sup>20</sup> Lintott notes the absence of consensus within ecological economics for the need for absolute reductions in throughput to reach a sustainable scale, although he brings good arguments in favor of such a consensus [Lintott 1998].

maintenance of stocks at lowest cost should then be the goals of economic activity, producing an economy in steady state with respect to its capital, both natural and manufactured [Daly 1996a, b] (see also [Jaeger 1994]).

The evidence for the swamping of efficiency increases is clear to many: “There are few, if any, examples where attempts to ‘save’ energy or resources actually led to an overall reduction in the *total use* of that energy or resources” [Princen 1998] (emphasis added). Whiston (1990) asserts that the increasing scale of Northern consumption and the South’s present emulation mean that conventional pollution control and energy efficiency only chase a moving target. Similarly, Daly claims that the severe environmental degradation in many places and across many media provides good evidence that the global economy has already reached, and probably surpassed, its optimal scale [Daly 1996a, b].

The HOMES study directors admit that increases in the efficiency of service delivery alone will probably prove insufficient to reduce sectoral household metabolism, forcing consideration of means to reduce unit household consumption levels. They note that on a sectoral level, technological progress has been offset by large increases in the number of households, population growth, household dilution, incomes, and investments in distribution grids for access to energy and water. Indirect household energy consumption has been growing irregularly since the 1970s. In the 1970s this increase seems to have come about from growth in the volume of consumption. Growth leveled off after the 1979 oil crisis, as did indirect energy requirements. After 1984 the volume of consumption rose again along with indirect energy demand. Notably, change in the structure of consumption patterns (e.g. shifts in purchase trends from one production sector to another) did not significantly change total indirect energy demand [Noorman 1998b, van der Wal 1998, Wilting 1998]. Thus, in the environmentally progressive Netherlands, efficiency increases and changes in patterns of consumption have both been wholly inadequate to contain the growth of household energy use and the implied environmental consequences.

A study of Spanish Valencia [Garcia 1998] [New Consumers 1999] brings home the inadequacy of focusing on patterns and efficiencies alone:

Valencians became “new consumers” at the end of the seventies, after a period of intense industrialization. Since then, the model of consumption {homogeneous mass consumption and consumerism} has remained basically unchanged, but it has increased its social and environmental costs. In its capacity to meet needs, it does not differ much from the 1980s system. However, it requires a growing (physical and economic) effort to keep “fit”. ... It needs more power, produces more waste, and exerts a greater pressure upon the ecosystems.

### **3.2.7 Description of consumer society**

To conclude section 3.2 on general issues, and as a prelude to the theory and discipline-oriented discussion of consumption in 3.3, we offer a brief description of the consumer society



as an object of study. The next section provides an overview of related empirical trends in developed countries.

Western society has been completely transformed from more than a century of enormous increases in production and consumption. World industrial output is more than fifty times greater than in 1890, most of the expansion having occurred after 1950 [Ponting 1991, Pfister 1996]. Several fundamental preconditions for this mostly Northern industrial and economic growth should be noted. The extensive use of fossil fuel resources permitted a huge increase in material and energy throughput and labor productivity. At the same time environmental and social costs of fossil fuel use were externalized, permitting material and energy use efficiencies largely to be ignored. Had the system internalized these costs, it would have emphasized improved resource productivity, which would have meant a lower material standard of living (and fewer environmental problems) [Røpke 1999], [Ponting 1991]. The second major enabling factor has been an enormous transfer of resources from the South. Division of labor, urbanization, competition, and other features of capitalist industrialization are also mentioned as enabling factors for the growth of consumption [Røpke 1999].

Accounts differ as to the causal direction of industrialism and consumption and, as discussed, the prime cause of the associated environmental problems. Some historical studies, for example, have identified higher demand for consumer products as the enabler of the Industrial Revolution in 18th century England (referred to in [Uiterkamp 1998]). The social phenomenon of consumerism is associated with the 20th century, especially the post-World War II period. The consumer society has risen in tandem with the development of mass production, the attendant decline in home production, and the increased consumption of ready-made and time-saving products [Gatersleben 1997]. Consumption has been “enriched” by “the increased variety and many-sidedness of the consumption basket resulting from the higher amount of discretionary spending and leisure” ([Uusitalo 1982] as quoted in [Gatersleben 1997]).

Consumerism presupposes large opportunities for consumption – availability of goods, materials and services; accessibility; relevant, available information; and a stable price system – all of which have increasingly obtained in Northern economies. Prices have continually decreased relative to income, and opportunities to purchase on credit have been widely introduced [Gatersleben 1997].

The social changes facilitating the consumer society, including the decline of community and isolation of the individual [Lintott 1998], have perhaps been even more marked than economic changes. Like other social systems, the consumer society has required the service, or creation, of cultural attitudes to support the system. Five “cultural factors” are used in consumer societies to perpetuate consumption: social pressures, advertising, shopping culture and infrastructure, government economic policies, and mass production that largely replaces household production [Durning 1991].

The consumer society makes the possession and use of an increasing number and variety of goods and services a main aspiration and source of happiness, status, and success. In particular, it links self-respect to one's level of consumption as compared with others (“positional consumption”) [Goodwin 1997b]. Consumerism has become deeply rooted in

the psycho-cultural fabric of life in the developed countries, most obviously in the US, but increasingly in other developed (and, where possible, in developing) countries as well. Advertising and marketing encourage boundless wants, and through consumption people also attempt to satisfy non-material wants such as forming an identity (see section 3.3.3.1). “Perhaps more than any other activity, consumerism has become the lynchpin of modern economic, political, social, and personal life” [Schor 1995].

Four dimensions of consumption-type societies are relevant for comparison with alternative systems:<sup>21</sup> Welfare is measured by the provision of goods and services; economic performance depends on the quantity and rate of increase in output per person; work is important primarily to maintain consumption; and standards of living are compared on the basis of per capita GNP [Segal 1994]. A further taxonomy of consumption-oriented societies has been suggested. A *consumerist society* holds the development and consumption of new consumer goods to be a central aim and emphasizes positional consumption; in a *mass consumption society*, the majority of the population consumes at high levels, and national success is measured by aggregate consumption indicators; and a *non-sustainable consumption society* degrades its environment through consumption and pollution and can thereby endanger its survival. These are not mutually exclusive, and in fact all three are applicable in the US currently [Segal 1994].

### 3.2.8 Developments and trends in Northern societies

This review of consumption trends will focus on households in the developed countries, with supplementary mention of specific trends in several Western European nations.

To place the developed countries' householders in a global context, the majority of them are members of the global “affluent” class. As of the early 1990s, this segment of humanity used some 80% of world resources while constituting only one-fifth of the population (as noted, their numbers are growing with rising incomes and emulation by sectors in the developing world). As of 1992, they consumed on average three times as much water, ten times as much energy, and nineteen times as much aluminum as the average of the other two classes. In addition, they accounted for the large majority of industrial pollution, hazardous, and nuclear wastes. The “global middle class,” which comprised three-fifths of the world population, has historically consumed relatively moderately, often sustainably: Durning holds them as a model for the rest. The remaining group lives in destitution [Durning 1991] After a decade of further globalization, Conca observes that the “sustainable middle,” especially in the Southern emerging markets, is being “squeezed” on either end, globalization drawing some into the ranks of over (“new”) consumers while marginalizing and impoverishing the rest [Conca 2001].

Until the 1970s, typical European and Japanese lifestyles were significantly less materially and energetically demanding than the US model, and less so than at their present levels. Goldemberg claims that those former lifestyles could have been sustainably imitated by

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<sup>21</sup> See also the concluding part of 3.3.4.2.

developing countries [Goldemberg 1987]. Current European lifestyles cannot be so imitated, and the attempt is greatly accelerating the ecological decline.

The HOMES study of household consumption yielded much data on direct and indirect energy consumption in the Netherlands, much of which is representative of trends in Western countries as a whole. The study focused on the specific household functions that account for the majority of Dutch material and energy flows: Heating and mobility from the category of infrastructure/housing; white goods appliances from durable household goods; and water, gas, and electricity from non-durables.

As noted in the section on scale, gains in technological efficiencies have tended to be offset by large increases in the number of households, population growth, household dilution, rising incomes, and expanding infrastructure [van der Wal 1998]. Although transition paths towards optimal patterns of resource use might be accompanied by the inefficient use of resources, (squandering as an “inevitable feature of evolutionary processes” [Uiterkamp 1998]), many parts of household systems do not yet show signs of saturation and future stabilization at sustainable levels.

Demographic and social changes have driven a large increase in the number of households in Western countries: In recent decades the number of households has grown faster than the population. The steady increase in households is connected to steadily rising quantities of goods and services provided by the infrastructure. Overall demand for goods and services has increased [Noorman 1998b]. Between 1960 and 1990, the population of Europe (excluding the Soviet Union) increased by 18%, from about 430 million to over 500 million. At the same time, the number of households increased at double the rate, implying a general shift from larger to smaller households. Households of five or more people decreased in number and continue to decrease. The proportion of one-person households increased the most in Sweden, the Netherlands, and Switzerland. In the last, this proportion had increased to 32% by 1991. In general, the largest decreases in household size, changes of more than 20% over 30 years, occurred in Scandinavia, Switzerland, and the Netherlands [van Diepen 1998]. Household dilution impacts resource use not only from the increase in the number of separate dwellings but also from economies-of-scale effects. In energy and electricity use, household scale effects are common: larger households are relatively more energy efficient and produce less waste per member than smaller households [van der Wal 1998].

Household dilution and other demographic changes reflect social transformations in values and lifestyles. Self-fulfillment, personal development, independence, and other hallmarks of individualism have increased in social value. Religious and political institutions have correspondingly decreased in importance [van Diepen 1998]. Traditional family households based on marriage have lost their dominant position in Europe: Family dissolution by divorce and cohabitation is widespread. Most countries have thus removed the notion of family and kinship from their official statistical definition of household, instead defining household operationally as a unit of people who share some “moments or attributes of consumption of some kind” [van Diepen 1998]. In a related trend, European countries' fertility rates have declined from 1970s, reaching 2.1 or less (replacement or below replacement rates) in the late 1980s. Divorce rates have increased, reflecting trends towards non-marital unions:

rates are 10% in southern Europe, 30% in central Europe, and 40% in Scandinavia and the UK [van Diepen 1998].

As for economic trends connected to resource use, real prices for energy have fallen over the years and are likely to have stimulated demand. Possession rates of many domestic appliances have increased. Energy per service unit of appliances has declined, while the number of services and appliances has increased. Automobile use has increased steadily, and both the average number of cars per household and their use for private purposes have increased. Real fuel prices have fluctuated but have not markedly increased over the decades despite the two oil crises in the 1970s [Linderhof 1998]. These price trends represent part of the increasing opportunities and abilities that have brought about increasing household consumption. Other contributory factors include the increased availability of goods due to income, advertising, leisure times, and the cognitive and physical capabilities of individual consumers [Uiterkamp 1998].

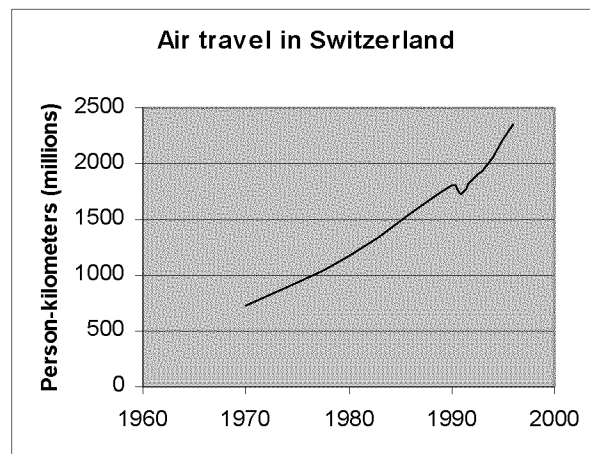
The following are some of the prominent Dutch-specific trends: The general fundamental conclusion of the HOMES study for the Netherlands is that household metabolic rates have increased rapidly since the 1950s, and that with a view towards the driving forces, Dutch householders are continuing on an unambiguously non-sustainable path, at least in the short-term [Uiterkamp 1998]. From 1969 to 1988, the total sectoral energy requirements of households increased erratically, dropping hugely from 1979 but rising again after 1984. The number of households climbed continuously, causing energy per household to drop since 1969 [Wilting 1998]. The 1980s saw a decline in the explosive rate of growth in consumption of previous periods and may have resulted from temporary oil price increases and concerns about future shortages of fossil fuels and the environment [Uiterkamp 1998]. While Dutch energy demand for heating has dropped back to the level of the 1960s, electricity consumption per household has risen mainly because of increasing numbers of appliances. Penetration rates of refrigerators, washing machines, and televisions increased from almost zero to over 100% [van der Wal 1998]. The “enrichment of Dutch consumption patterns” is marked by an increased use of goods related to entertainment and personal development over the last twenty years. New goods like CD players and video recorders are constantly produced and bought and old or outmoded products discarded. Another aspect is increased time and money spent on vacation, as well as increased private car ownership and distance driven per capita [Gatersleben 1998].

An empirical study of Dutch household consumption behavior and attitudes [Gatersleben 1998] was highly revealing. Income and household composition were found to be the most important variables influencing consumer behavior. High-income groups and families of three or more possess and use more (per person) than lower-income groups and couples or singles. Interestingly, members’ level of education seems to have almost no effect on household consumption. The study examined which goods people owned in past and which they expect to own in the future. Younger consumers expect to own more of most categories of goods in the future, and already possess more than older respondents. Young consumers who do not own specific goods look to buy them as soon as they can afford them. As commonly noted in psychological studies, when respondents come into possession of a good, they grow to perceive it as a necessity for their household. The researchers also studied to

what extent people think the possession of household goods contributes to their quality of life. The most important qualities so enhanced included health and social relations [Gatersleben 1998].

A similar study of the consumption habits and outlooks of households in the United Kingdom yielded data on the phenomenal expansion of consumer purchases there from 1954 to 1994. The overall increase in purchases during that period was 100%, while the single largest increase for a category was recreation and entertainment at 400%. The acquisition of goods within the sub-category of durable entertainment goods like television, radio, video, and sound systems increased by 3500%! Corresponding rates for domestic appliances, communication, and travel were 385%, 341%, and 293%, respectively [Jackson 1999]. The researchers concluded that much of the increase in expenditure stemmed from attempts to satisfy non-material – social and psychological – needs, but that these needs were not thus served on the whole and, in some categories, were even actively hindered by increased consumption [Jackson 1999]. This line of research is taken up in greater depth in several parts of section 3.3.

As for trends in Switzerland, per capita heated floor area for residential housing doubled between 1960 and 1997, even while technical improvements steadily reduced the unit energy consumption to 500 megajoules/square meter. Apart from heating, per capita electricity consumption tripled between 1960 and 1997, despite efficiency improvements of 20-25% since 1973, because of household dilution, higher levels of service utilization, and diffusion of appliances and new services [Aebischer 1998]. For example, an estimated 11 times more electricity was used for lighting in the household sector in 1990 than in 1950 [Schwarz 1996]. For another example, the percentage of Swiss households equipped with at least one computer more than tripled between 1990 and 1998 (to 51%), while 7% owned two or more [Swiss Federal Statistical Office 2002]. In the transport sector, average personal surface travel increased from 9400 km per capita in 1970 to 14,300 km in 1990. Cars consume some 60% of the energy used in the transport sector, and their number now exceeds the number of households. Car ownership is highly unevenly distributed: a quarter of households do not own a car while 30% own more than one. An average of 50% of trips by car are for leisure, and leisure time has gone up steadily [Aebischer 1998]. Air travel has also risen sharply although unevenly across the population (see graph [Swiss Federal Statistical Office 2002]).



### **3.3 Driving forces, disciplinary analyses, critiques, policies, and alternatives**

#### **3.3.1 Disciplinary approaches and analytical possibilities**

Section 3.3 considers consumption factors, driving forces, issues, and policies from a wide variety of disciplinary and interdisciplinary perspectives. Given the complexity of the factors and driving forces behind consumption, there are many ways of organizing and presenting the discussion. Treatments could be presented by ascending or descending collective levels, e.g. society, household sector, household, and individual. Factors suggest quasi-disciplinary groupings themselves: Technological, biophysical, economic, spatial, behavioral, social-institutional, and so on. We have chosen a disciplinary/critique grouping, partly suggested by the literature encountered.

Expanding consumption has been the subject of research in all social science fields and in many humanities, yet on the whole the diverse theories to emerge have not proved robust enough adequately to explain or predict the phenomenon [Wilk 1999]. The lack of an adequate interdisciplinary conceptual framework has also hindered the development of effective policies for sustainable consumption [Michaelis 1999]. Alternative consumption theories have not been subjected to much empirical testing [Schor 1995].

Household consumption and the efficiencies of consumption are functions of biophysical, technical, economic, spatial, and behavioral aspects, and specific social institutions and administrative policy measures. The constraints of each of these domains determine the potential for changes in household metabolism. As the HOMES researchers put it: "Designing effective and socially acceptable policy instruments to reduce the rates of household metabolism (and their negative environmental impacts) requires a thorough understanding of the determinants of household consumption and their mutual relationships, as well as detailed information on possible differences between the 'lifestyles' and resulting consumption patterns of different segments of the population" [Noorman 1998b].

Household behavioral and social functions are dynamically linked to physical and social structures and these links show time delays, different time horizons, and different spatial connections [Uiterkamp 1998]. For example, the Needs-Opportunities-Abilities (NOA) model of individual consumption behavior is embedded in a societal context of technology, economy, demography, institutions, and culture (the TEDIC complex) [Gatersleben 1998]. At higher levels, still broader matrices are necessary: "The environment and ecology problem at both the national and global level are the outcome of complex socio-historical, valuative, and cultural developments. Any lasting global solution has to recognise that underlying matrix" [Whiston 1990].

#### **3.3.2 Types of consumption critiques**

Many insights into consumption and innovative policies for ameliorating its environmental effects come from disciplinary critiques of various aspects of the consumer society: "A cri-

tique of non-ecological aspects of social organization is fundamental to every kind of environmental protection" [Cogoy 1995]. This section gives an overview and sample of the approaches and types of critiques in the literature, which are examined in greater depth in the upcoming sections.

There are a number of older, long-standing critiques of growth-oriented economies, which question conventional linkages between economic growth and human development, social equity, and/or environmental sustainability, or between personal income and happiness [Jackson 1995]. The review in section 3.3 of this chapter focuses on some of the newer literature, assuming partly for the sake of space that these better reflect recent developments (This is not uniformly true, as shown by the neglect of the classic critique of planned obsolescence [Charkiewicz 1999]).

As described above, there is a "divided discourse" on consumption from isolated academic departments, making results limited, difficult to communicate outside the discipline from which they arise, and embedding assumptions of the discipline in the research. Academic proponents and critics of the consumption basis of capitalism have each taken a moral position on what is good or bad for society, and they have taken it "ontologically prior" to their research on consumption [Wilk 1999]. Thus many theories contain implicit embedded critiques. Wilk insists that many of the diverse theories of consumption can be "correct" or applicable under the right circumstances. He calls for the "develop[ment of] meta-theoretical guidelines specifying which models are useful in which empirical situations," resulting in a "heterodox multigenic theory, which accepts that there are multiple determinants of consumption..." [Wilk 1999].

Schor suggests four theoretical bases for critiques of consumer society [Schor 1994]:

1. Schor's own approach (described below in 3.3.3.3, "Break the work-and-spend cycle"), which stresses market failure in which workers may not choose the length of their work hours and opt for greater leisure time and instead work long hours for higher salaries, which accustom people to correspondingly continuously increasing consumption levels.
2. Failure to price natural capital and environmental externalities, and ecological economics criticism (e.g. Daly).
3. Damage to community and social values such as integrity, honor, responsibility, trust, caring, and sharing.
4. Effect of social interaction on consumption; e.g. positional consumption means that aggregate growth in consumption or incomes can never increase overall welfare or happiness (also described below in 3.3.3.3 "Decoupling consumption and welfare").

A grosser classification divides critiques into two camps, those that emphasize one or more of the various underestimated costs of consumption or over-consumption (critiques two and three in Schor's taxonomy) and secondly those that question the extent of presumed benefits of that consumption. Since costs may be seen as dis-benefits, these two types converge at some level of analysis. Practically, however, the two approaches emphasize very different things.

The traditional critiques of consumption and consumer society “stress the costs of consuming – in terms of environment, time, community, and quality of social interactions” [Schor 1994]. Moral critiques add ethical or spiritual costs. More recently critics, especially practitioners of ecological economics, have suggested that the environmentalist case against consumption rests on a much firmer base if it questions the benefits of consumerism (decouples welfare from consumption), and not just emphasizes the costs. In addition, the environmental costs are subject to uncertainty and therefore popular rejection and political manipulation [Lintott 1998]. For instance, modified (e.g. green) consumption still holds consumerism as the goal, accepting its implicit assumption that it goes hand in hand with welfare. This implies that if sustainability requires consumption reductions for the long-term benefit, it must reduce welfare in the short-term, a politically difficult goal. Reductions in consumption are much more plausible if the consumerism-welfare connection is questioned [Lintott 1998].

Some have sought to combine consumption policies with employment and environmental issues in which consumption is intertwined: The “three-legged stool” of arguments in favor of less consumption, less work and less environmental damage combines a critique of consumption, an environmentalist critique, and a critique of current work-related issues: “Combined with income and work sharing, this could be a strategy for simultaneously dealing with problems of environmental cost, welfare, and unemployment and poverty, in a way that current policies have failed to do” [Lintott 1998]. Many of the critiques implicitly or explicitly involve several aspects of society.

### **3.3.3 Disciplinary treatments and approaches in the social and behavioral sciences**

#### **3.3.3.1 Psychological/behavioral**

##### **Studies of behavior**

Much of the discussion of consumption issues in section 3.2 took a macro-perspective. This section samples concepts and recent findings from micro-oriented, individual behavioral and cognitive studies in psychology.

Although consumption is in some way a part of most human behavior, and behavioral and psychological mechanisms underlie household consumption patterns, the behavioral underpinnings of consumption are largely unknown and unexplored [Princen 1998]. Moreover, since it is defined largely with respect to a system's capacity (e.g. the biosphere), the problem of *overconsumption* is a specifically meso- or macro-phenomenon. Within systems of appreciable size, *overconsumption* does not have a definite meaning at the individual level, since the effects of individuals' consumption behavior are clear only in the aggregate [Princen 1998]. Its inverse concept of sufficiency, examined below in the economics section 3.3.3.3, “Restraint and sufficiency,” works at the level of the individual or small group.



The “Needs-Opportunities-Abilities” (NOA) construct, mentioned in 3.3.1 above, is an example of a recent conceptual model of consumer behavior. Opportunities represent factors and conditions stimulating consumption behavior while abilities such as financial means are constraining factors. Needs and opportunities feed into the motivation for consumption, while opportunities and abilities make up the “behavioral control” necessary for the purchasing action [Gatersleben 1998].

The empirical study of Dutch household consumption behavior described above in 3.2.8 on trends also produced interesting findings on the now more often studied relationship between environmental awareness and consumption behavior. Most Dutch consumers, it was concluded, are well aware of the environmental impacts of their behavior – at least those stemming from the use of products (e.g. direct energy expenditure), if not their production and acquisition (grey energy) – but this understanding does not motivate them to change their consumer behavior. Moreover, most respondents agreed that it was necessary and even possible to change many household consumer behaviors, except for reducing driving (necessary but only slightly possible) and living in a smaller house and taking vacations closer to home (neither necessary nor negotiable). Those who were aware that they were inflicting greater environmental damage were not more willing to change their behavior than others. In short, the Dutch show neither gross ignorance nor denial of their role in environmental damage but a combination of inability (e.g. the car) and unwillingness (e.g. far-flung vacations) to change their behavior patterns (to “cramp their lifestyles”) [Gatersleben 1998].

Lutzenhiser has written a large review of what literature there is on behavioral and social aspects of household energy use [Lutzenhiser 1993]: The reader is referred to his study for detailed references. He calls for an interdisciplinary, open-minded effort to develop “an over-arching model that can simultaneously capture group dynamics, body use, cognitive processes, and human-machine interactions.” Some of the more interesting studies he reviews investigated patterning of behavior and energy use; self-awareness and accounting for energy consumption; bi-directional influences of consumption behavior and attitudes; and differential adaptation to price increases across different family types.

Specifically, behavior and end-use consumption are highly patterned and therefore stable over time periods within a single household. Bernard (1988) proposed classification of household energy use as (1) structural consumption that occurs when the building is unoccupied; (2) habitual consumption that occurs from routine conscious and unconscious management; and (3) daily variation consumption from unusual events like holidays, vacations, sick children, and visitors [Bernard 1988]. Unconscious habit plays an important role in energy use, although little research on it has been done. Habitual, unconscious behavior, uncertain consumer knowledge and endemic reporting errors weaken conventional energy analysis.

The “limits of human cognition” may prevent an accurate self-assessment of consumption practices. For example, average rather than marginal costs are usually perceived in personal energy accounting.

Linz and Heberlein (cited in [Lutzenhiser 1993]) found that once certain Midwest American household residents had gained experience with peak electricity rates that were

quite high compared to non-peak rates and with peak periods that were as long as twelve hours, they developed a sense of social obligation to shift consumption away from peaks. Thus (economically driven) behavioral changes can produce new energy attitudes, rather than conservation attitudes necessarily preceding behavior. Of this Lutzenhiser, a sociologist, says that energy rates and billing arrangements are embedded in, and come to be accommodated by, pre-existing social institutions.

Finally, different types of families were found to respond differently to rapid energy price increases in the US. Lower income families made lifestyle cutbacks across nearly all end-uses; higher income households maintained consumption and/or used tax credits and incentive programs to invest in energy-efficiency improvements in buildings and equipment.

### **Needs and wants, identity and meaning**

Consumption in consumer societies of the North is often contrasted with consumption in subsistence economies, a large portion of the populace in the latter said to be preoccupied with satisfying "basic needs," and those in the former with fulfilling ever greater "wants." However, beyond the level of absolute subsistence, the psychology of needs within societies and the connection between needs and wants is much more complex than such pat contrasts suggest.

The relationship between economic consumption and the satisfaction of needs is often exceedingly complex and non-linear and has not been resolved [Jackson 1999]. Many different theories of needs have been proposed, including hierarchical needs theory and Rokeach's (1979) theory of eighteen instrumental and eighteen terminal values. The latter has been related to means-end theory in describing and defining consumer behavior and consumer lifestyles [Gatersleben 1998].

Many critiques of consumption associate its huge increase, particularly in certain categories like durable goods, with attempts, often largely unsuccessful, to fulfill through consumption various underlying psychological needs that are no longer being fulfilled through other social forms and mechanisms. Advertisers play to these underlying needs by associating products like cars with social status, sex, personal power, recreation and leisure, and freedom and creativity. Mobility itself is not a need; people travel in order to fulfill other needs, like subsistence, protection, participation, affection, and freedom [Jackson 1999] (although travel can itself become a pleasure or "want" as subject no. 7 in Chapter 5 testified). Clearly, economic theory to the contrary, consuming market goods and services is not necessarily the same as satisfying human needs and wants; it is only one culturally specific means to that end, and not necessarily the most effective.

"The concept of needs, their relationship to desires, and the ethics of satisfying or denying them, is a subject of ongoing and perhaps irresolvable debate in the social sciences" [Michaelis 1999]. The relationship of luxuries to necessities, and the transformation of the one to the other, is an important area for consumption and sufficiency research. Goods newly on the market are often considered luxuries, while older goods have been deemed necessities [Schor 1995]. Yet the longer and the more any such goods people possess, the more important they deem them for maintaining their quality of life [Gatersleben 1998]. [Wilk 1999] has

much to say about the relationship and process of transformation between needs and desires in a social context (presented below in 3.3.3.2 “Anthropological/sociological treatments”).

Neoclassical economics asserts axiomatically that wants are insatiable as a whole, i.e. that the accumulation of wants is unending. Yet sociology, anthropology, psychology, and Eastern philosophies take it as fundamental that wants are pliable and that therefore “scarcity” is a function of the level of wants [Goodwin 1997b]. Leiss challenged the notion of insatiability on psychological grounds: People often do not know if and how goods satisfy their wants; thus they cannot continuously generate new wants [Leiss 1978].

In the course of evolution of the dominant economic development paradigm, consumption has come to rival or in some cases replace work as a source of individuals' identities. The blossoming of mass consumption and advertising after WWII was important to solidifying this transformation. Consumption thus acquired a new and important function in the bestowal of self-identity. With the strength of individualism and the loss of community bonds and well-defined social roles comes the necessity for the individual's sense of identity to be forged actively. Consumption plays a role for many in the process of building and maintaining identity. Similarly, to some extent people use consumption as a substitute for the reduced meaning they find in work and other activities, affiliations, and institutions [Kiron 1997]. Others claim that this process is exaggerated and that social contexts and other factors come into play as well. For instance [Michaelis 1999] points out the establishment of ties to specific communities of consumers as important with the erosion of more traditional communal associations. Overall, the identity, sense of community, and other forms of meaning that consumption provides in a culture or era otherwise seemingly lacking in these things deeply entrenches consumption in the psychological fabric of Western life. It is thus all the harder to dislodge.

The practice of positional consumption, consumption done in competition with others in one's class or group and in emulation of those above for the satisfaction of “relative needs,” is said to account for a significant portion of consumption in the US and other countries. It is explored in the social sections below.

This chapter does not explore the fields of environmental awareness and public attitudes (leaving part of that for Chapter 4), but in connection with the discussion of material wants, the debate on materialist/post-materialist evolution is worth mentioning. Through generational cohort analysis, Inglehart concluded that generations who grew up under difficult economic conditions and deprivation become more materialist in their values, while those generations who grew up in post-war prosperity are more non- or “post-materialist.” Dominance of attitudes among generations makes the pace of change of materialistic values quite slow. Also cross-sectionally, post-materialist values are more highly associated with higher occupational status and higher income. Yet economic conditions have some affect on the

strength of these values. Long-standing economic downturns fuel the growth of materialist values, and upturns their relative inhibition<sup>22</sup> (as cited in [Schor 1995]).

Inglehart's post-materialist theory shares the common conclusion of the literature on "environmental modernization." There, the most modernized groups, those with higher economic and educational levels, are presumed more likely to develop post-materialist, environmentalist values. Yet there is empirical evidence that whatever their values, the relative environmental impacts of the consumption lifestyles of the more modernized – e.g. the demands on the infrastructure of their diet, housing, living, and mobility – are often greater than those of lower classes or the less developed, pointing to Garcia's "anti-environmental modernization" described above in 3.2.6.2 [Garcia 1998], [New Consumers Conference 1999].

### 3.3.3.2 Social

#### Culture, society, and lifestyle

Society and culture are important influences on consumption of all kinds. As demonstrated in historical and psychological work, consumption and consumption growth have become deeply embedded in cultural norms and values, such that many people's sense of well-being, and others' perception of them, depend largely on their earnings and possessions [Gatersleben 1998]. The encouragement of uninhibited consumption is a salient feature of the prevailing Western culture (the "culture of capitalism") [Robbins 1999].

Cross-cultural studies of materialism reveal systemic cultural differences in the meaning ascribed to consumption. Interestingly, although all cultures officially denigrate or condemn materialism, paradoxically members of all societies have high consumption aspirations. Individuals view their own consumption as good and justify and legitimize it in various ways [Røpke 1999].

Culture is responsible for resource constraints in an important way, and not just as a result of actual anthropogenic depletion or degradation. "The threat of scarcity is a socially manufactured, permanently entrenched characteristic of any society that connects the satisfaction of needs to consumption of goods, and this threat will not be diminished by increases in the supply of goods. {Yet} the threat of {actual} scarcity has returned as a significant economic issue as mismanagement of industrial waste products begins to pose global environmental threats" [Leiss 1978].

Sociologists and anthropologists insist that technological systems and the patterns of life they serve are highly socially constructed or shaped [Lutzenhiser 1993, Tatum 1995]. Yet once those systems and patterns are in place they tend to become entrenched (sometimes until some point after the next major technological revolution), and individual choices are then to some extent bounded by the socio-technical framework. Individual new commodities

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<sup>22</sup> This is contradictory, since upturns are partly related to more consumer spending and confidence, suggesting perhaps a type of negative feedback loop between macro-economic conditions and the strength of materialist values.

or consumption fads become integrated into internally propelled systems of commodities, infrastructure, social practices, and institutions and within technological trajectories [Røpke 1999]. If they reach a certain critical mass and fit the existing structure well, they induce further modifications of the system to serve them. Alternative consumer choice becomes scarcer and increasingly difficult as the technology or consumption pattern becomes “locked in” (see also [Unruh 2000]). The automobile is a classic example. Change requires the penetration of an alternative, often in the service of a different social need [Michaelis 1999].

Durning, an economist who finds fault with the consumer economy for environmental reasons, holds that its remedy is to be found in such cultural change [Goodwin 1997b]. There is a large cultural component in the definition of success, and it is probably larger the higher the national consumption lies above subsistence levels. Similarly, well-being, above a basic level, is largely open to cultural definition. This definition can be changed, especially if it becomes dangerous [Goodwin 1997b]. If the proper social structures can be created, betterment can be (re)defined in non-material, perhaps qualitative ways [Lintott 1998].

In local, social groups of ecologically-minded individuals (like Gershon’s Eco-teams), people’s interaction and engagement with co-members has been found to lead to reflexivity on an individual and collective basis: Membership in such a community leads to self-reflection on preferences for consumer goods [Georg 1999]. The feasibility or potential of such local social “islands” for inducing society-wide change is discussed in 3.3.4.1.

The prevailing cultural norms are heavily weighted in favor of quantitative consumption, particularly of the competitive, positional sort. The pursuit of material goods in status-based competition with others for the latest item on the market or the most exotic vacation guarantees non-satiability: More purchases are always necessary to keep up with the “Joneses” on the latest trend, which leads to endless “ratcheting up.” Surveys show that the amount of money thought needed to sustain an average-sized family in reasonable comfort in the US (adjusted for inflation) has consistently risen over the years, is always close to income (“needs” follow income), but is always considered somewhat over the amount the median family actually has, all suggesting positional consumption is at play [Schor 1995]. This results in chronic dissatisfaction and frustration, as well as ever-increasing environmental stress.

In *The Overspent American*, Schor argues that the great majority of Americans now aspire in their spending styles to those of the wealthiest upper quintile of society. While it used to be that people strove for the standard of living of the next one or two income levels above them, now the reference group is those with incomes three to five times their own. Large levels of consumer debt is one result [Schor 1998]. Television fuels Americans’ high consumer aspirations, not only because of advertisements but also the lifestyle of the rich portrayed on the screen [Uchitelle 1998]. Robert Frank’s *The Winner-Take-All Society* and *Luxury Fever* shares many of Schor’s findings, but suggests that consumption emulation is still more limited to the consumer levels just above the individual’s level<sup>23</sup> (cited in [Uchitelle 1998]).

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<sup>23</sup> Brooks’ recent investigations would suggest that Schor’s sort of high aspirations are much more characteristic of “Blue America” than of the “Red” half. See [Brooks 2001].

Human behavior in a social context is apparently just as important in energy consumption as it is for consumption in general, although it has been neglected in traditional energy analysis [Schipper 1997], [Lutzenhiser 1993, 1997]. Contrary to the assumptions of the physical-technical-economic model, residential energy use and associated practices of residents vary tremendously with cultures, social networks, communities, and families [Lutzenhiser 1993, 1997]. A US Department of Energy study of changes in household energy use in the US from 1979 to 1987 suggests that social and behavioral factors played an important part in restraining sectoral energy consumption over that period. Differences in gender, division of labor, and social work roles have been found to play a part in energy conservation attitudes and energy-relevant activities [Lutzenhiser 1993].

Lutzenhiser and Hacett's study of reactions to changing the incentive structure in residential apartments from master metering to unit metering found variations in consumption as large as 300% among very similar apartments, due to differences in family size, length of residence, income, ethnic culture, and the like. On a building level, consumption varied considerably between two neighboring complexes otherwise nearly structurally and socially identical, reflecting "locally evolving standards of behavior" [Lutzenhiser 1993]. Surveys showed that households that consumed significantly less energy in response to changed signals did not do so because of stronger conservation ethics or environmental sensitivity. "Rather, they had different ethnic and cultural manners of behavior and household organization. Thus cultural practice and collective restraint can produce highly variegated and lower-than-expected consumption levels among households that by economic reasoning should be likely to exploit common property resources"<sup>24</sup> [Lutzenhiser 1993]. Investigating how to reproduce the conditions for this group phenomenon over a wider area is a crucial part of restraint and sufficiency research (examined below).

For decades energy analysts have favored the term *lifestyle* to describe different patterns of behavior and consumption characteristics of various social groups. In one of its best usages, lifestyle is similar to the anthropological concept of culture: The "totality of practices, meanings, beliefs, and artifacts of a social group," [Lutzenhiser 1993] although the term and concept have been used in many different ways. Lifestyle analysis has the advantage of capturing certain aspects of social behavior not well defined by traditional economic or demographic means. For example, recent lifestyle studies in energy research have examined groups defined on the basis of common clusters of household composition, hardware, activities, schedules, and beliefs. Lifestyle groups so defined cut across more than one demographic grouping (age, income, ethnicity) [Lutzenhiser 1993].

While related in certain ways to psychological and other micro-behavioral studies, most lifestyle-type research has been conducted by social scientists and marketing researchers. Social scientists account for consumption differences among demographic categories by appealing to class and sub-cultural differences and constraints. Marketing researchers identify clusters of consumer characteristics and attitudes associated with differences in pur-

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<sup>24</sup> The notion of (studying) restraining consumption through social or cultural means, rather than just by showing environmental costs and consequences in order to build up environmental consciousness, is posited in the Social-Revealing approach, discussed in Chapter 4.

chasing behavior, i.e. lifestyle-based market segments. A major weakness of lifestyle segmentation schemes is that they are mostly descriptive. They do not help to establish how lifestyles are created or how the relationships between lifestyles and the social structure are shaped. Lutzenhiser suggests combining social science and marketing approaches in lifestyle analysis to explore lifestyle origins, freedom of choice, dominance of certain lifestyles, boundaries, and possibilities for change with aging of cohorts and general socio-economic change [Lutzenhiser 1993]. More recently he has highlighted the growing importance for energy analysis of the system of status-graded lifestyles dependent on social class, which seems to be predominantly a function of wealth: The poorest consume energy only modestly, while the wealthy tend to use large amounts of energy [Lutzenhiser 1997].

Income is strongly positively associated with the consumption of resources, as measured by indirect energy, for example. Yet there seem to be non-linear, semi-qualitative thresholds between the social classes in terms of the environmental effects of their respective lifestyles: The environmental impact of the lifestyle of the higher groups seems to be disproportionately larger than would be predicted simply by their greater spending ability [Garcia 1998].

Vringer and Blok [Vringer 1995a] studied differences in total energy requirements across income groups in the Netherlands. In general, there are appreciable differences in energy intensities within and among household consumption categories. Moreover, for each group, the energy requirements of the majority were found to be within plus or minus 25% of the average value. They took this figure as an estimate of the potential for short-term reductions in household energy expenditure. This deviation from the average is similar at any income level (*ceteris paribus*), suggesting that on top of the income driver is another uniformly acting factor. This may be a "lifestyle" factor [Wilting 1998].

In general the HOMES researchers consider the study of emerging and diverging lifestyles and their relative impact on resource use to be the next important step in household research [van Diepen 1998]. As described in 3.2.8, the general gravitation towards more individualistic lifestyles since WWII has driven such environmentally significant trends as smaller households, larger and better-equipped houses, and increased car ownership.

### **Anthropological/sociological treatments of needs, wants, and restraint**

The discussion now returns to a consideration of necessities and luxuries in the context of sociological and anthropological treatments of needs and wants. A social context, rather than a purely individual psychological perspective, permits a deeper understanding of the societal transformation of wants to needs and their embodiment in norms, as well as a view to the social and technological constraints on individual choice and on attempts to hold "needs" up to question.

The expression of individual and social identity in terms of cultural consumption rather than experiences related to productive activity has been cited above. The growth and expansion of leisure and "luxury" consumption, and the corresponding expensive tastes and expectations, have become particularly pronounced in recent years. In developed countries the luxury goods market has gained in size at the expense of cheaper goods as wealth dis-

parities have increased. The market for highly resource-consumptive utility vehicles in the United States, for example, has quickly grown to represent half of all new vehicle sales.

Wilk's anthropological theory of needs and wants goes far in explaining the growth in "luxury" consumption and offering suggestions for ameliorating it [Wilk 1999]. According to Wilk, consumption is a complex balance between diverse forces that are multigenic and dynamically, multiply, and complexly linked. Consumption also involves constraints, restraints, and limits, most of which, except for income, are not recognized in the literature. Including restraints or inhibitions recasts consumption as a balance of needs and wants between these inhibiting factors and other promoting factors.

Wilk conceives of *needs* as accepted social standards of living, whereas *wants* are consumption desires that are generally considered beyond those standards. Needs may not, and in developed countries for the most part do not, conform to the definition of basic human needs. In modern societies, wants are commonly, and now increasingly rapidly, transformed into (perceived and accepted) needs, and consumption is the process of filling them.

Social standards of consumption, like other social rules, are taken for granted and not questioned. They can only change if they are brought from the realm of the "unconscious habitus into the discursive sphere of heterodoxy where they are subject to manipulation, evasion, and multiple interpretation" [Wilk 1999]. That is, needs may follow a cycle consisting of conscious questioning or challenging (movement from the habitus to heterodoxy), and their re-framing as "wants." If the challenge is successful, the needs are identified as wants and placed out of the realm of universally socially accepted standards. If not, they become reestablished in the habitus as legitimate needs.

Two processes control the rate of expansion of needs and the production of new needs. Naturalization consists of forms of social control that maintain the status quo by keeping needs inscribed in the habitus and not letting them be questioned, asserting that the existing order is natural and that other practices are unthinkable. Cultivation is the "opposite process of opening existing needs to question, discussion, and debate" [Wilk 1999].

Changing societal behavior thus involves changing the habitus, inducing reconsideration of one or more of the practices that are taken for granted daily and never questioned by bringing them into the realm of discourse where "needs" can be reconverted to "wants." This is what policy tools must target that seek long-term solutions to the environmental problems from consumption. Tools and strategies must follow the cycles of cultivation and naturalization. Unfortunately, Wilk notes, "at this point we have little systematic knowledge of the social, psychological, and communicative practices that naturalize new practices and understandings" [Wilk 1999].

This kind of targeting holds particular promise for discretionary<sup>25</sup> energy consumption, for example not that which is forced on people by pre-existing technologies and development patterns (e.g. the need in most cities in the US to use a car for shopping and commuting), but consumption that at least until recently was regarded as luxury, like driving in sport utility

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<sup>25</sup> See Chapter 2.



vehicles or frequent flying to far-off vacation sites. An example of bringing an established consumption behavior out of the habitus back into heterodoxy is the anecdotal development in parts of Scandinavia in which it has come to be considered socially stigmatizing to drive alone in an auto to a neighbor's house for a social call.

Along these lines,<sup>26</sup> Georg notes that, in general, "environmentally informed modes of behaviour" have not spread into the mainstream (habitus) of the public, financial institutions, and governments. "Norms for environmentally sound behaviour appear to be at a stage of pre-institutionalisation. Whether these will be institutionalised as a norm depends on whether a broader consensus about the importance of these behavioural patterns is built." De-institutionalization of current unsustainable norms may be hastened by political and social pressures, of which eco-groups (discussed in [Georg 1999]) are one sort. The existence of "eco-towns" undercuts "the more deterministic accounts of the pervasiveness and stability of the existing institutions" [Georg 1999].

A cross-cultural study of differences in energy use between the Japanese and the Norwegians [Wilhite 1996] provides good examples of the dependence on particular cultures and societies of the contents of the habitus. The study compared behavior and attitudes of the two populations to residential heating and cooling, lighting, and clothes and dish washing.

Traditionally, Japanese heat only the part of the dwelling in use at the time. Recently the Japanese have substantially moved away from the traditional use of the energy-efficient kotatsu (a common heating unit under the dining table covered with a common comforter) as families spend less time socializing and more time in individual activities. In addition, air conditioning is increasing as a status symbol or an indicator of a socially appropriate Japanese home. Norwegians have historically heated most of the living area most of the time. The colder northern climate is one explanation, historically low energy prices another. Yet space-heating demand was quite inelastic in the face of price increases in Norway in the 1980s. This may be because space heating in Norway and air conditioning in Japan have become "cultural energy services," i.e. they have taken on "symbolic attributes which make them integral to the culture and presentation of the home," [Wilhite 1996] and price has thus lost its incentive power, although earlier it may have played a role in solidifying the place of these energy services in their respective energy cultures.

The Japanese bathing routine is another example of a long-standing energy-intensive habit that is culturally deeply rooted in the habitus. Similarly, Norwegians make intensive use of (incandescent) lighting and energy-intensive space heating to maintain "coziness" in the home [Wilhite 1996]. Changes in these parts of the respective habitus of Japan and Norway will require the sort of internal dynamic Wilk describes, perhaps directed by appropriate public policies. In the meantime, the best short-term conservation means is the promotion of technologies that use less energy to satisfy the same cultural energy need. For example a new efficient bulb in Norway must provide identical light quality, and this feature must be emphasized along with the economic savings.

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<sup>26</sup> But following a more strictly Environment-Revealing approach (Chapter 4)

As another example, Japanese cultural attitudes towards hot water for cleaning are very different from Western attitudes. In Norway, clothes are washed at 50 or 60°. Although cleanliness and good hygiene are highly valued in Japan, hot water use is not cognitively connected to cleanliness or hygiene. Instead, hot water is used for comfort. Thus is explained the Japanese practice of washing clothes in cold water, and often even cold used bath water, while when washing dishes, the Japanese will often let hot water run, rather than use tubs, because they use the hot water as a means of warming the person washing the dishes. As opposed to the parts of the habitus described above, Norwegian clothes-washing habits and Japanese dish-washing habits are not so culturally important to their respective cultures. These could be more easily changed through reeducation [Wilhite 1996] – e.g. shattering the Norwegian hot water hygiene myth or teaching the Japanese not to keep hot dish water running, perhaps both by presenting the other culture's successful practice as a counter-example.

### 3.3.3.3 Economic

#### **De-coupling consumption and welfare**

The issue of the link between consumption and welfare, or the lack of it, is an appropriate subject with which to bridge psychological/social treatments and economic ones, since it involves needs and wants and positional consumption. The de-coupling attempt has already been cited as an approach that questions the benefits, rather than emphasizes the costs, of high levels of consumption (3.3.2). It is also one that can be based mostly on economic arguments.

Psychological studies in Britain and the US have shown that much of the enormous increase in material consumption is connected to largely unsuccessful attempts to meet non-material needs, as described above [Jackson 1999]. Other studies on positional consumption point up the large relative aspect of personal welfare. Increasing consumption has long been enshrined in economic and government policy as the major tool for personal and aggregate welfare enhancement. Yet each of these kinds of studies, one on the individual level and the other in the aggregate, challenges the underlying assumption that welfare is necessarily served by increasing consumption in the developed world. This section examines these critiques, evidence for the divergence of national welfare and consumption, and a few counter-arguments.

The lack of a straightforward equivalency between increased consumption and improved individual welfare, contrary to economics' operationally imposed objective, has been described above. "The economic success of the prevailing system has derived from its ability to expand and create new markets for new material products. But the relationship between these new, mass-produced material products and the satisfaction of underlying human needs is no longer clear; for the very reason that the remaining needs are not really material needs" [Jackson 1999]. A large portion of individual expenditure has been found to be an attempt, through mostly high material consumption, to satisfy non-material needs (e.g. affection, participation, etc.), but these needs are largely not so met, and therefore such con-

sumption may provide only a pseudo-satisfaction of non-material needs and at worst may inhibit their satisfaction [Jackson 1999].

When transferred to macro-policy, such critiques question whether traditional forms of economic development that rely on constantly increasing material consumption can maintain or further long-term aggregate welfare. The message of the strongest critiques is that far from furthering national welfare, existing patterns of consumption in most developed nations, and the patterns that are being exported to developing nations, fundamentally threaten it. Reduction of material profligacy in the aggregate can directly improve human welfare, quite apart from environmental and global equity arguments in favor of reduction. "Revisioning the way we satisfy our non-material needs is not the bitter pill of eco-fascism; it is the most obvious avenue for renewing human development" [Jackson 1999].

The majority of environmental and ecological economists remain closer to the mainstream. Many support the conventional economic aim of maximizing consumption but insist that this consumption account for environmental costs in its pricing, as in green accounting. Since the goal is still consumption maximization, and conventional economic aims remain unquestioned, the consumerism-welfare disconnect is not addressed [Lintott 1998]. Scale effects, which defeat attempts at marginal amelioration of the environmental effects of unit consumption, also remain. Dematerialization approaches can be similarly criticized (see 3.2.6).

Perhaps the least ideological argument against a consumption-based national welfare policy is that if consumption has a large positional component, as it indeed seems to have, then it is impossible to raise aggregate welfare by increasing consumption of this sort. Once absolute (basic) needs are met, individuals' increase in consumption often has more of a positional element. The empirically noted rise of expectations and standards of happiness with rising incomes, discussed in the social sections above, supports the theory of the relative basis of welfare [Easterlin 1995]. Easterlin's economic model predicts that increases in aggregate income do not increase overall happiness since the relative disparities remain, and happiness seems to depend largely on perceptions of relative conditions of betterment [Easterlin 1995]. Others point out that for the society as a whole, positional consumption is a zero-sum game: An increase in total welfare from positional consumption is "definitionally impossible." In fact, one may generalize that any type of consumption that increases individuals' welfare only relative to others (i.e. psychological welfare, image) cannot, in its expansion in the aggregate, provide any aggregate increase in welfare [Lintott 1998].

Empirical evidence seems to support such arguments about the absence of a continuing link between consumption and welfare in developed countries. Careful polling and measurements in many studies of populations in the US, Europe, and Japan over the past few decades confirm that people's sense of happiness does not increase with increasing per capita income [Goodwin 1997b], [Easterlin 1995]. Despite greatly increased spending over the post-WWII decades, Americans do not report significant and corresponding increases in happiness [Durning 1991]. "There is little evidence for substantial increase in needs-satisfaction in ... categories {of consumption} and considerable literature suggesting modern society is increasingly suffering from varying degrees of poverty in relation to them" [Jackson 1999].

Application of Daly and Cobb's (1994) Index of Sustainable Economic Welfare to several developed countries and at least one developing country all show a leveling-off or decline in aggregate welfare by the mid-1970s or early 1980s and thus a divergence from continued GNP growth from that point forward [Jackson 1999]. As explanation, Max-Neef posits a threshold hypothesis whereby economic growth, initially an unmitigated good for the national economy, eventually incurs enough environmental and social costs to reduce net human welfare. The environmental bads experienced consist of depletion of natural resources and infliction of various other kinds of damage on the natural environment, largely because economic growth has been, and continues to be, so closely coupled with growth in material and energy throughput [Jackson 1999]. There is tentative empirical evidence for the existence of an inflection point in national welfare versus consumption graphs – or at least a leveling-off point – at much lower levels of aggregate consumption than those of North America and Western Europe [Lintott 1998].

As counter-evidence to the attempt to de-couple consumption from welfare, several studies have shown that on average people in affluent countries are happier than those in poorer countries. Others have found a small but consistent correlation between income and happiness within developed countries [Gatersleben 1998]. Evidence aside, the great difficulty in getting political support for measures to reduce (growth in) consumption must be confronted, particularly when profit is linked largely to sales volume. Still more difficult are the social and psychological complexities of the relationship of consumption to the satisfaction of needs. Even granted that the neoclassical view is too simplistic, the critical view, arguing that beyond a certain point an increase in aggregate consumption does not increase overall welfare, may underestimate the importance of consumption. Consumption is “woven into everyday life, the activities that are decisive for the quality of life and the images of the good life, so consumption is difficult to isolate as something that can be reduced without diminishing the quality of life” [Røpke 1999]. The degree to which people rely on household goods for their perception of quality of life, as evinced by the Dutch psychological study of consumption (see 3.3.3.1, “Needs and wants, identity and meaning”), must certainly complicate simple attempts to separate consumption from perceptions of welfare.

Daly and Cobb's and Max-Neef's graphs point suggestively to an identifiable point of national aggregate *overconsumption*. Is there a sufficiency point, an optimum level of consumption beyond which well-being stays level or decreases? How can it be defined? Although inimical to the dominant cultural regime, there have likely been, and could yet be, societies that operate according to the rule of sufficiency [Goodwin 1997b]. The concept of sufficiency in a socio-ecological context and the associated concept of restraint are taken up next.

### **Restraint and sufficiency**

Restraint is a resource management concept with important implications for socio-economic structure and policy. Sufficiency, its macro-level analog, has obvious economic relevance. Princen's notion of restraint is grounded in both ecology and social science; it has appropriately been described in *Ecological Economics*, among other journals. Princen's restraint and

sufficiency are discussed here, while further micro and macro-economic implications are explored in the following subsections.

Princen is concerned with how to translate global ecological constraints into signals and mechanisms apparent at a micro-level in everyday life. In principle, social limits to consumption may be imposed by material and energy availability, the lack of need or demand, external constraints like government regulations, and constraints internal to individuals or groups like religious or cultural proscriptions. The first three mechanisms are inadequate to establish sufficiency, while the fourth, internal constraints or restraint, has the greatest potential [Princen 1998]. Wilk's dynamic cycle of needs and wants (3.3.3.2, "Anthropological/sociological treatments" above) is an example of such an internal societal mechanism that can both constrict and enlarge the notion of "enough." Another potential mechanism is the environmental Kutznets curve, but in several places we have raised counter-arguments to the theory that people or nations adopt environmentally friendlier (values and) lifestyles as their wealth or income increases.

Princen emphasizes that individual and social restraint is not "evolutionarily novel behavior." Human beings have long had to contend with, and adapt to, resource limits. Restraint has been de-emphasized by modern society that defines progress overwhelmingly in terms of material consumption [Princen 1997b]. While environmental restraint is by no means innate in human beings, successful civilizations have cultivated it in order to manage their common resources within natural constraints [Ponting 1991], probably often by assertion of ownership, either individual or communal [Ridley as cited in Princen 1998]. To instill restraint in the use of a resource, it is necessary and sufficient – absent education, coercion, and incentives – to receive feedback from resource consumption as to the consumption's impact on the resource stock. Negative feedback concerning the security or stability of the resource illustrates for the consumer the risks of his behavior to his economic security or survival.

Restraint is the "deliberate reduction in immediate consumption for material benefit in return for nonmaterial benefit." Technically, it is an individual's consuming less than possible at present. Examples of nonmaterial benefits are group acceptance, reduced uncertainty, improved reputation, and ethical fulfillment. A simple example of restraint is desisting from eating seed and waiting until the planted seed yields crops. Restraint is not altruism. Altruism cannot be depended upon as a societal mechanism, particularly when large-scale social change is necessary. Conservation, of energy or wildlife for example, comes closest to the concept of restraint. "Yet restraint is done not to help alleviate a known problem but for reasons of self-management which arise internally and systemically" [Princen 1997b].

Because exercise of restraint yields non-material benefits, it is largely out of the scope of normal economic reasoning. Restraint occurs at all levels of income and material wealth. This also contests the implication of the environmental Kutznets theory that a certain threshold of aggregate material wealth must be surpassed before people can concentrate on "conserving." Whenever people choose a non-material pursuit (e.g. volunteering) over a resource-consumptive one, they are, at least temporarily, exercising restraint [Princen 1997b].

Princen places restraint and substitution at either end of a spectrum. Substitution puts the consumption of one thing in place of that of another, with ambiguous effects on the overall resource base. Restraint reduces consumption in return for an increase in non-material benefits of some kind, with unambiguously lower resource consumption [Princen 1997b]. This characterization of the difference between substitution and restraint on a micro-level goes to the heart of the difference between macro-consumption policies that favor changes in consumption patterns and those which favor reductions in consumption levels, differences discussed at length in 3.2.5 and 3.2.6 above.

The practice of restraint among social groups determines and maintains points of sufficiency. In general, sufficiency can be defined with respect to human welfare and happiness (the most common economic type) or with respect to environmental sustainability [Durning 1991]. Defined with respect to the environment, the sufficiency point is that time and level at which consumption of a resource stops growing and levels off or declines. The collection of sufficiency points for all resources feeds into the notion of an aggregate material (and energy) sufficiency point for society as a whole. Such a quantity is Daly's elusive aggregate throughput limit. In principle, "if sufficiency is reached on all critical resources and the associated level is regenerative, a sustainable economy is achieved" [Princen 1997b].

While many concerned with overconsumption expect it to be remedied either by imposed limits from governments or naturally (and potentially catastrophically) by encountering biophysical limits, the notion of social restraint suggests other policy avenues to pursue along with the traditional economic or regulatory measures [Princen 1997b]. Wilk agrees that as a policy tool, supporting natural constraints or social inhibitions for consumption may be more fruitful than incentives, addition of new constraints, or changing desires or perceptions of need [Wilk 1999]. Policy makers should look for ways to foster restraint's favoring non-material consumption over material consumption. This requires research into the question of which conditions lead restraint to become dominant and not submerged, as it is currently in the face of the dominant system of technologically-driven economic growth [Princen 1997b]. These conditions are explored in the remaining economic subsections. Specifically, Princen's theory of work-induced restraint and the structural economic changes necessary for reintroducing restraint (e.g. lessons from common property research) are discussed below in, respectively, the subsections "Breaking the work-and-spend cycle" and "Structural economic factors."

### **Breaking the work-and-spend cycle**

Princen has argued that there are natural restraints inherent in the traditional organization of work, restraints in both personal labor input and in the scale of output produced [Princen 1998]. The labor-limiting restraint mechanism operates by workers' limiting their needs and desires in order to reduce the amount they need to work in the economy to satisfy those desires. The mechanism is linked to the oft-dismissed notion of the backward-bending supply curve, according to which at some point on a scale of continuously increasing wages or earnings, workers cut back the amount they work, *if they are given the opportunity*. Thus there is natural sufficiency in laboring: It is universally true that when people can control their

work conditions and quantity, they adjust and limit them; they “minimize externally directed and compensated activities and maximize internally satisfying productive activities.”

The key condition is italicized: Workers must be able to limit their hours, but this is generally not the case. Labor efficiency can be improved in two ways: More output for a given input or less input for same output. The first is almost always chosen and is the hallmark of the growth economy. More things (and more things to tax) have been popularly and politically more appealing than greater amounts of leisure, so Princen speculates. Thus, while the quality of work in industrialized countries has often deteriorated with the mass production of goods, and the work ethic and status of work have also decreased, work hours have not consistently declined [Kiron 1997].

Working from a different economic perspective, Schor has reached the same conclusion as Princen regarding the need to empower workers to limit their work time [Schor 1991, 1995, 1998]. For some time in the US, Japan, and many European countries, employers have chosen to relay the gains of higher productivity mostly as higher wages instead of reduced hours. Employers stipulate work schedules for most of their employees, and the workers conform. Workers use their increased monetary compensation to increase their consumption (or, by investing, their future consumption) and with time, they may become accustomed to this higher level of expenditure (or addicted to it), such that they would be unwilling to reduce spending in return for less work and more leisure, even were it newly offered to them. Thus their preferences adapt and reinforce the environmentally undesirable systemic arrangement. Schor calls the result the “work-and-spend” cycle, and for social and psychological reasons as much as for environmental ones, she urges change that breaks the cycle.

Despite their conditioned desire for increased consumption, polled workers in all segments of the workforce across the US and Europe display a desire for less work and more leisure time. Many show a willingness to trade consumption for more leisure [Schor 1995]. For the successful but long working, harried employee, leisure time is indeed one of the most coveted items that money cannot buy. Although some large companies such as Volkswagen in Germany have instituted flexibly-chosen part-time work for a large portion of their workforce (which can therefore be larger than otherwise), most companies frown upon part-time work. Long hours and overtime are often unavoidable or expected as a sign of worker devotion in higher-level work. The trend towards corporate downsizing has resulted in even longer hours for employees retained.

Many others, including Durning (1991) also view policies that encourage consumption, particularly materially intensive consumption, at the expense of leisure as among those most in need of change. Of course, many popular forms of leisure activities are now highly material and energy intensive; for this, different sorts of policies and signals are necessary (see “Structural economic factors” below). Schor summarizes the call for change in the following: “Commitment to an expanding *material* standard of living for everyone – or what Galbraith has called the “vested interest in output” – entails our continuing confinement in the ‘squirrel cage’ of work and holds the potential for ecological disaster. Or, we can ... realize the promise of free time which lies before us” [Schor 1991, italics added].

In addition to time limits on a personal level, Princen suggests that scale limits on a collective level are natural to the self-management of work and can be either encouraged or inhibited by policies and institutional arrangements. Princen's general concept of restraint in resource use just presented requires ecological feedback to the exploiter on the state of the resource. In short, this implies that conditions favorable to restrained use include "exclusive, small group use of an essential and well-defined resource," and probably generalist rather than specialist control [Princen 1998]. The modern global economy is characterized by precisely the opposite conditions – a high degree of specialization and enormous separation of the use of resources from the consequences, dispersed through innumerable levels of ownership and production. Such structural problems are explored further in the following subsection.

### **Structural economic factors**

While sociologists and anthropologists claim that culture is the greatest obstacle to sustainable consumption and therefore in the greatest need of change, some critics with a more political-economy bent insist the root of the problem lies with the structure and workings of the global economy. Since the economy can be viewed as an expression or outgrowth of the social order, there is no contradiction in this. Yet whether or not sustainable consumption can be fostered without a cultural shift, significant institutional change is indispensable. This section draws policy lessons about some of the economic and institutional barriers discussed in the previous sections and reviews certain larger economic issues. A complete treatment is not possible here and would require its own study of at least commensurate size.

Basic economic driving forces for consumption include persistent productivity increases, driven by competition, some forms of which are intended to attract customers; product innovation, which has become even more important than process innovation in competition; functional obsolescence; product diversification and specialization; advertising, especially the general selling of the idea that all of life's problems have a solution in a product or commodity; and the growth of easy credit for purchasing [Røpke 1999]. Parts of the logic of the consumer economy are fundamentally at odds with sustainability of the strong variety and conflict potentially with the weak as well. Even according to weak sustainability, the consumption level should be lower than that permissible in the absence of significant environmental degradation, since more man-made capital must be added to the capital stock to compensate for declining natural capital [Lintott 1998]. Consumerist logic dictates the consumption of an ever-greater quantity and variety of goods ("macro-insatiability"). The vested interests in maintaining this growth are enormous, and the growth momentum is still greater in the integrated global economy. If scale is a concern (see 3.2.6.2), then government measures amount to "add-ons" that "at best ameliorate degradative trends associated with an infinitely expansionist economy" [Princen 1998]. Such measures are particularly inadequate for controlling overconsumption whose costs show up much later or far from the locus of activity.

Structural aspects and political decisions in the industrialized economies significantly limit the element of choice in consumption; alternative choices are bounded by the socio-eco-



nomic-technical framework [Røpke 1999] (also see section 3.3.3.2, “Culture, society, and lifestyle”). Consumers are thus limited in their latitude to respond to appeals for change. “Understanding how our present choices are self-defeating is a crucial step in the process of change, but so too is understanding how the social and political context makes such self-defeating choices seem almost inevitable...” [Wachtel 1983]. Sustainability seems to require specific redesign of elements in the consumption and production economy, rather than evolutionary change [Uiterkamp 1998]. Whether the pressure for change should come from the top or the citizen-consumer level is considered in the concluding part below.

In keeping with his emphasis on restraint, Princen finds that the resolution could come from changes in the political economy to restore an “ecological” type of constraint [Princen 1997a, b]. Decision makers in the economy must be in a position to receive and react to ecological feedback (analogous to individual workers' adjustment of kinds and levels of work in response to direct biophysical feedback) [Princen 1998]. Thus establishment of property rights is an effective policy intervention since certain forms may allow for direct feedback from consumption. Self-management induces restraint to increase long-term personal economic security [Princen 1997b]. In modern economies, however, decision makers function at a great distance from the loci of resource extraction, use, deposition, and direct ecological consequence [Princen 1998]. Business strategy and government policy are oriented around the search for market frontiers whose exploitation generates large indirect costs. Separating consumption and production decisions across large distances of geography, culture, and agencies (“distancing”) generates large gaps between benefits and ultimate full costs, costs which are also further systematically obscured (“shading”). The distancing and shading of commerce must be reduced to reestablish the possibility of restraint-inducing feedback [Princen 1997a, 2001].

Cogoy's recommendations for structural change follow from his view of consumption as a process having both market and non-market inputs [Cogoy 1995]. The economy strongly favors (specialized) market inputs at the expense of non-market ones: Products that can be produced industrially consistently fall in price compared to products that cannot be so produced. This happens by increasing the division of labor and substituting capital for labor, both of which are enabled by a system that permits externalization of the social and environmental costs involved [Røpke 1999]. The position of the border between market and non-market production and consumption can be influenced institutionally. Environmental protection may require shifting the border more towards non-economic consumption, even though this shift would imply changes in the existing power distribution [Cogoy 1995].

The shiftable border between market and household consumption decisions is well illustrated by both household energy conservation and home power production or co-provision. Household energy conservation returns some of the skill and planning in consumption from market enterprises to the householder. Cogoy assumes that failures in household conservation efforts have much to do with an inadequate institutional definition of the market/non-market border [Cogoy 1995]. In the case of the American home power movement in which participants generate their own electrical power, the shift towards private production and control over consumption has in many cases reduced environmental damage and increased personal and community control. Home power users seem to internalize almost all of the

environmental and social effects of their energy choices by the generation and highly controlled use of their own power [Tatum 1995]. Similarly, successful application of environmental taxes, in transportation for example, requires that the social structure provide flexibility and facilitate innovative consumer responses that may lie outside conventional market choices [Cogoy 1995].

The need for full-cost pricing and the removal of enormous government subsidies for resource extraction, depletion, transport, and related activities is a common prescription of eco-efficiency. Less commonly heard, but perhaps just as important, are fundamental points like those discussed above, as well as older critiques of the consumer economy like planned obsolescence [Charkiewicz 1999]. Grappling with the scale problem requires not only the eco-efficiency goal of increased efficiency of resource use but also determining which goods and services are dispensable, redundant or largely discretionary [Daly 1996a]. Even further, sustainable consumption may require breaking out of the near-universally accepted, linked imperatives for consumers, producers, and financial institutions that “consumption-must-grow, because production-must-grow, because money-must-grow and jobs-must-be-provided.” This would require reforming not only the public finance system – including shifting the tax base from employment to resources and eliminating perverse resource subsidies – but also the monetary and financial system, reducing the high levels of debt that compel enormous production and consumption to service them [New Consumers Conference 1999]<sup>27</sup> and even changing the status of money as a primary external goal of economic activity [Jaeger 1994].

Many consider it illusory to think such significant changes will be wrought voluntarily. Yet environmental realities will eventually register in the prices of some resources as they are severely degraded or depleted: This may force producers to reduce the associated resource throughput per unit of production. If this happens on a scale sufficient to lower aggregate resource throughput, monetary policy and other economic macro policies and institutions will have to change [Goodwin 1997c]. Charting directions for such changes is an important area of research.

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<sup>27</sup> Whiston identifies high debt levels and the structure of the world economy as a central reason for the South's severe environmental problems. It is in the service of their own and the world economy that many of the Southern states are largely geared around disastrously ecologically damaging activities such as single-crop production or mining. More specifically, Northern countries are directly at fault for purchasing these mineral or agricultural products at prices that do not account for the huge environmental and social costs they inflict in the countries of origin; and the North is indirectly culpable by setting terms of trade that force the South to liquidate natural resources in order to pay for products of the North – products that they are unable to produce themselves, partly by forced specialization, and that they covet, partly by the force of the Northern example and deliberate marketing [Whiston 1990].

### 3.3.4 Conclusion: Policy syntheses and political agendas

#### 3.3.4.1 Altering consumption: top-down or bottom-up?

This section examines a theme important to the synthesis of the various approaches and critiques in policy recommendations; namely, which of the two broad types of incentives to alter consumption, internal “bottom-up” or external “top down,” are the most motivating and most durable; and the related question of whether individual behavior change alone can be effective, or whether cultural-societal change is necessary. The scholarly response to these questions depends again on disciplinary orientation. Most consumption critics see the need for “changes on a society-wide level, to enable and support individual lifestyle changes, away from the behaviors associated with a consumer society.” They often assume a large role for government in this, and they assume that “in a democracy, such government action may – or should – require a shift in relative values within the population as a whole” [Goodwin 1997c]. In policy circles, to the extent consumption has been given attention, responses have often been limited to the “top-down” approach of informing and educating citizens about the necessity of making changes [Georg 1999]. This task is vitally important, as described in the next section. Yet isolated attempts to prompt such changes often fail, in part because consumption is multiply determined, as has been amply illustrated. Effective policies must simultaneously target several barriers at once [Stern 1997a]. But which sort of barriers on which levels are most important?

The free-rider (social trap) problem is said to stymie individual efforts at behavioral change. Apart from the exceptional few, most people will not act unless everyone acts, while those who act do not make a difference overall [Meijnders 1998]. Georg (1999) claims that free-rider problems can be overcome if new norms of behavior are established and institutionalized. Treadmill-of-productionists doubt that even new norms can overcome deeply entrenched structural problems with the global economy and North-South relations. Advocates of “voluntary simplicity” lifestyles believe change from the bottom up is possible. Yet unanswered is the question of how large such micro and local movements would need to be to affect the macro-economy. Working from the bottom-up, Eco-team programs assume that 15-20% of the population is enough to constitute a critical mass to sustain environmentally friendly changes in society. However, the Eco-team group-session approach is clearly not suitable for such a large portion of the population [van den Burg 2001]. Also at issue is the negative effect the growth of such movements has on the macro-economy of the majority who have not changed from the consumerist paradigm [Goodwin 1997c]. Could such change be accomplished piecemeal, and, in a globally interconnected economy, could it be attempted by individual countries without systemic ripple effects and “punishment” of the diverging pioneers?

Limitations of choice, set by structural decisions, have been mentioned as constraining individuals’ latitude for making lifestyle changes. Why does current sustainability literature, with its oft-repeated phrase *lifestyle changes*, seem to emphasize individual and group practices over social consumerist norms, institutions, or structural economic barriers? No doubt basic political pragmatism is one reason. Yet, while lifestyles in the sense of social practices

are close to the root, socio-economic technological systems that are facilitators and encouragers of these need to be changed; individual alternative practices, absent top-down incentives for new socio-technological pathways, are likely to remain anomalous against overwhelming trends. There are some promising examples of fairly minor adjustments in the institutional framework that have engendered disproportionately favorable responses [Tatum 1995] and brought about greater positive change than anticipated. In general, we conclude that change in a society's consumption trajectory requires personal, social and institutional change. Political or economic incentives in the absence of modification of personal or social practices (or values) are superficial and ineffective; but individual or localized action such as voluntary simplicity alone is unlikely to work societal changes either [Durning 1991].

True to the aim of Wilk and Whiston, establishment of new (or renewal of old) social norms in favor of restraint shows the greater promise of long-term, psychological and institutional durability, in contrast to application of economic instruments without such a change in norms. However, "absent crisis, they may also be the most difficult to implement in the face of a dominant belief system – namely, technologically driven economic growth" [Princen 1997b]. The potential for information to modify consumption behavior and/or enhance environmental and socio-political awareness, and the information's most effective form and means of communication, are discussed in Chapter 4. In the context of this section's themes, however, Princen's caveats bear mentioning. Much environmental education is premised on a perceived lack of information for actors in society. However, many now believe that greater information and public awareness alone will be insufficient to control the pace and scale of environmental degradation. Change of attitudes as an approach to instill restraint is difficult and would not occur fast enough or on a sufficiently wide scale to stem the growing damage [Princen 1997b]. In practice, it has been found that information and education initiatives alone, without further incentives, have had low levels of success [More with Less 1995]. Such information, learning, and economic and social incentives run counter to dominant social forces. Instead, Princen favors focusing on and changing conditions of ecological feedback, institutional arrangements and economic security [Princen 1997b]. While some seek to convey to consumers (or businesses and governments) through information and persuasion the threat that overconsumption in the aggregate poses to their health or security, Princen is arguing for changes in economic and institutional arrangements that bring to individuals' attention the threats micro-misconsumption of their own resources pose to their individual (or corporate) security. But how is one to muster political support for these types of change? Whence comes the political stimulus for the necessary restraint-enabling institutional changes, when only these changes would bring home the reality of personal and organizational threat in time? Like most chicken-and-egg problems, this one has no easy answer. The contribution of innovative information and education efforts towards its solution is an objective of this broader study.

#### **3.3.4.2 Political agendas and alternatives**

Røpke and others conclude that meaningful alteration of the North's consumption trajectory would require a wide variety of measures and the involvement of many. This involvement presupposes a degree of consensus on the need for, or the benefit of, alteration or curtail-

ment: The present consensus is in favor of continued consumption growth. The fundamental economic and institutional means of altering this trajectory may involve changed patterns of trade that reduce the resource transfer from the South and the systemic internalization of social and environmental costs of industrial and consumption growth [Røpke 1999]. But this is a long-term ambition. The immediate aim is to garner public and political recognition and support of the need for change in the direction of sustainable consumption and production, in a time frame that responds to the exigencies of the environmental impacts of consumerism [Symposium Sustainable Consumption 1994, Durning 1991, Whiston 1990, 1999]. Preferences may change on time scales of a human generation or longer: This alone rules out the default course of “leaving change to the market” [Stern 1997c]. Whiston is pessimistic that the public can be persuaded to support the scale of long-term changes that, in his opinion, are necessary for meaningful effect [Whiston 1990, 2000].

For Whiston, the two axes of a solution to global environmental problems, North-South relations and the social contract between government and citizen, must ultimately be compatible, and North-South relations are disrupted by the demands of a northern nation for excessive material wealth. Meeting the real cost of goods and services would reduce the *material* standard of living as defined by the total freedom to acquire goods, travel at will, support functional obsolescence, and the like. Understandably, governments, businesses, and people do not embrace such costs, which could require fundamental changes in society, economy, and geo-politics. Thus our “immediate political task” is Whiston’s ultimate question for Western democracies: How can their governments persuade electorates of the “‘limits to legitimate delivery’; and more importantly how [can] electorates be encouraged to elect such governments?” But to date, this has not happened, and historically, given a choice, radical change has never been embraced by electorates [Whiston 1990]. Instead, governments and electorates in the US, for example, have often pursued “politics of default” in recent years with respect to energy supply and other heavily environment-impacting policies, policies characterized by collective momentum and popular nonparticipation. “Nonparticipation is evident in virtually all consumer behavior... in our generalized acquiescence in accustomed patterns of behavior...” Consumers also tend to practice “technological somnambulance”: In particular, we do not insist that policy makers and technical people seriously explore with us more than one set of socio-technical alternatives” [Tatum 1995]. Yet as Lovins pointed out in the 1970s, there are no alternatives, including “default” paths, that do not involve untried change on a large scale<sup>28</sup> [Lovins 1977]. Business as usual affects our relationship with the natural world and with others in society, often quite negatively [Tatum 1995].

This chapter has traced issues, driving forces, and analyses of consumption and critiques of consumerism; although it has proffered suggestions for types of changes in policies and emphasis, it has not been ambitious enough to suggest full-scale alternatives. To conclude,

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<sup>28</sup> “Population growth, conventional resource depletion, expanding degradation of the environment, and the inevitable implications of carrying on ‘business as usual’... will bring fundamental and far-reaching change whether we like it or not. We do not have the option of preserving our way of life as it now stands” [Lovins 1977].

we offer hints of others' visions of alternatives to consumerist, material growth-dominated paradigms that are still basically consistent with capitalist market systems.

There are several possible uses for the economic growth dividend that has thus far been accrued that are compatible with an absolute reduction in per capita consumption. These include reducing poverty or great inequalities in wealth, reducing working hours (increasing leisure), and increasing public expenditure on public goods and services in place of private expenditure [Goodwin 1997c]. Segal posits two general alternatives, the "graceful simplicity" society and the "creative work" society. A society of "graceful simplicity" embraces the second of the "two possible courses to affluence. Wants may be 'easily satisfied' either by producing much or desiring little" [Sahlins 1974]. In such a society, the economy is meant to satisfy basic needs for health and security; and the good life is enhanced not by an increase in goods and services but by a reduction of work and an increase in leisure; the economy's performance depends on how well it meets "real material needs" and increases leisure time; work is for the purpose of generating income necessary to meet "needs"; and the measure of living standards gauges the level of leisure time and the use of leisure [Segal 1994]. Policies consistent with the work aspects of such an economy include the four-day workweek and a shorter working day, policies that have already been introduced in parts of Europe.

On an individual level, the drive for simplicity inherent in such a society has found actual expression in voluntary simplicity or frugality, often accompanied by anti-consumerism. People practicing voluntary simplicity are sometimes "downshifter" who have voluntarily left high-powered careers or jobs in return for more leisure time, control, and/or meaningful work. They may otherwise be motivated by a concern for the environment, a frugal attitude towards money, unemployment, or large consumer debt, or they may be members of anti-consumerist religious groups [Schor 1995, 1998]. In general, in consumption reduction they perceive an improvement in their quality of life. Some look for ways to give up the stress connected to pursuing increasing consumption while still "achiev[ing] the essential social contracts without it" [Røpke 1999].

The obverse "creative work" alternative economy increases well-being by providing satisfying work; the economy is measured by success in providing this work; and the standard of living depends on the quality of work. The graceful simplicity and creative work alternatives do not necessarily imply increasing output and throughput. However, technological innovation and increased productivity are important in both. Both alternatives require control of the costs of basic needs as well as control of the "continual expansion in the definition of those needs" [Segal 1994]. The creative work alternative would also require radical change to effect; it seems highly unlikely in an increasingly densely populated world of rampant unemployment. In addition, there are no current examples to point to.

The late 19th Century, however, does furnish an example of such a movement in the American economy, based on the producerist ideal rather than the expansionist-consumerist ideal that eclipsed it in the 20th century. Princen and Lasch describe it so: "The producerist ideal thus embodies a profound sense of meaning in work. In fact, it rejects the producer-consumer dichotomy and instead promotes the values of identity, economic independence, and citizenship through self-directed proprietorship. Inherent in such a vision is self-disci-

### Chapter 3 Northern Consumption

pline, striving for purpose, and limits to ever-increasing material throughput..." [Princen 1998]. Princen does not advocate a return to an economy founded on producerist principles, beset as it was by its own sort of drawbacks and problems. Still, such examples enrich the imagination of possibility and furnish elements helpful to the effort to envision and actualize the modern-day alternative of sustainable consumption.

## **Chapter 4**

### **Perspectives on Lay Knowledge of Energy Consumption and its Communication**

#### **4.1 Introduction**

This chapter looks more closely into the focused question of which types of knowledge, in which communicative formats and settings, are most useful to laypeople's efforts to bring household consumption, especially energy use, in line with environmentally sustainable patterns and levels.

For analytical convenience, the study in Chapter 4 is split into two subject areas: 4.2 knowledge and 4.3 communication or, using indicator terminology, 4.2 message (content) and 4.3 transmission (conveyance). These areas are explored here in some depth.

In the process, the chapter develops the overarching constructs of discretionary and non-discretionary consumption by reviewing theories and writings from psychology, sociology, science-technology-society (STS), and other disciplines and schools of thought. In connection with the discretion continuum, and as a guide and frame for the concepts and discussion, two paradigms are introduced and their implications for the course of energy consumption research discussed. As part of the first paradigm's agenda, public awareness, attitudes, and understanding of energy and related environmental issues, primarily climate change, are briefly reviewed. The topics of ecological behavior and knowledge, and then related "knowledges" in their multiple dimensions and complexity, are explored. The evolution of these topics leads into a direct, in-depth treatment of the non-discretionary concept itself. The connection to ecological modernization theory and applications is explored. After discussing message and content, the chapter turns to a review of relevant public communication and risk communication topics and then draws some lessons for the upcoming empirical applications. The chapter concludes with final comments.

#### **4.2 Alternative research approaches and a frame for discussing knowledge in the context of discretionary and non-discretionary energy consumption**

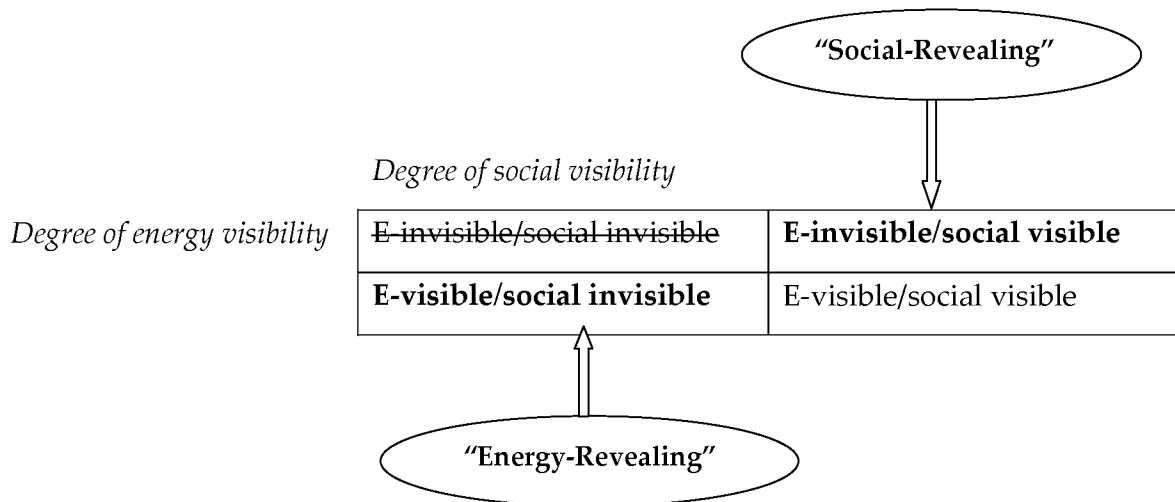
##### **4.2.1 Introduction: Two approaches and two constructs**

This section examines alternative schools of energy analysis and associates the discretionary constructs with one or the other. There is a basic analytical split in examining energy consumption that can be called the visibility/invisibility divide or the Energy-Revealing/Social-Revealing divide. Four possible approaches to analyzing energy consumption are shown in



the “visibility matrix” (Figure 4.1). The alternatives showcased in this chapter lie on the southwest-northeast diagonal: we will call them the **Energy-Revealing/Social-Concealing approach** and the **Energy-Concealing/Social-Revealing approach**, respectively (usually abbreviated to **Energy-Revealing** and **Social-Revealing**). This section will clarify their meanings and the contrast between them.

**Figure 4.1: “Visibility” matrix of research approaches**



Cell (1,1) is a meaningless research option since it keeps everything invisible and illuminates nothing: it can be ignored. (2,1), labeled Energy-Revealing, is the mainstream economic-engineering approach. (1,2), Social-Revealing, is the alternative wider social science approach. Finally, (2,2), suggesting total visibility, could be a combination of the approaches. For example, some researchers include traditional elements of Energy-Revealing such as examining individual’s conscious energy use habits while also looking further into societal aspects (see [Lutzenhiser 1993]). For the sake of brevity and a clearer association with the discretionary/non-discretionary concepts, only (2,1) and (1,2) are examined here.

It is widely recognized that global climate change and many other environmental problems are largely “invisible” to people in industrialized nations, as is the overall environmental impact of energy conservation actions, as well as the connections between the use of technology, energy consumption, and carbon dioxide emissions [Shove 1997]. Energy researchers respond to this invisibility in mainly two different ways, either by striving to increase energy consumption’s transparency or by presuming its invisibility and trying to illuminate its social causes and drivers. The first route (Energy-Revealing) explicitly articulates energy use in the effort to “rationalize” people’s use of it. The second (Social-Revealing) takes embedded energy consumption in products, services, and systems for granted and instead tries better to define and manage services and practices that consume energy [Shove 1997]. In part, the distinction is parallel to the analytic divide between internalists and contextualists among social scientists, for example historians of technology (see [Bijker 1995]).

Energy-Revealing has a larger analogue in the “environment-revealing (visibility)” approach. The following from a paper on environmental education may serve as an example: “Improved quality of life {environment} is only possible if we have an improved perception of our contribution to environmental degradation and of the steps we can take to minimise the damages we cause. This includes, among other items, the products we buy, the policies we endorse, the initiatives we support” [Filho 1998].

Tasks for the Energy-Revealing agenda include cataloging public opinion of energy use, cultivating knowledge of the effects of (conservation) actions, and examining the influence of knowledge on actions (section 4.2.2). Connecting new and existing knowledge and developing and applying most kinds of indicators of energy consumption also fit into this category [Shove 1997].

The Energy-Concealing/Social-Revealing approach, on the other hand, recognizes that “... energy use is shaped in complex systems that often submerge energy and other environmental concerns...” [Wilhite 2000]. For many social scientists, especially sociologists, this submersion or invisibility is not necessarily of concern; rather it is social, cultural, or socio-technical structures<sup>29</sup> that need revealing.<sup>30</sup> This is closer to how most lay end-users relate to energy use: People are interested in the services and amenities energy provides them, not energy per se, and they ignore details about energy except when paying the utility bill, fueling up the car, or buying a large electrical appliance. Most energy analysts and policy makers, however, are used to striving to make energy use explicit and would be challenged to work in the Energy-Concealing/Social-Revealing mode [Shove 1997].

Yet by hiding details of the energy balance, load, and environmental insult in favor of social and institutional explication, Energy-Concealing/Social-Revealing allows one to capitalize on a useful and singular property of energy consumption: by itself, as an undifferentiated datum, energy consumption goes a long way in summarizing consumption in general (especially when it includes embodied energies), environmental insult, economic and security risk, and even social development. In short, energy consumption can be a reasonable surrogate for (environmental or even general) sustainability for a country or a region. This useful feature can get lost in the details when a technical Environment- or Energy-Revealing spotlight rather is cast.

The division between the Revealing approaches is part of a general disciplinary divide between the conventional economic-engineering approach to energy analysis and an alternative societal (sociological, anthropological, or STS) one. Since the Energy-Revealing and

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<sup>29</sup> These include structural economic features of the sort sketched in section 3.3.3.3 “Structural economic factors.” Specifically focusing on these features could constitute a sort of Economic-Revealing approach as a subset or variant of Social-Revealing. This approach is popular in ecological economics and other areas but is not pursued here.

<sup>30</sup> The broader environmental analogue here, in its cultural cast, may be represented by the following statement: “Environmental problems are produced by cultural practices, which are determined by norms, morals, world views, in other words, ideologies. With time cultural practices and underlying ideologies become naturalized, unquestioned and thus invisible. That makes deep structures of a culture very resistant to change {see 3.3.3.2, “Anthropological/sociological treatments”}. In order to make purposeful change cultural practices and associated power relations must first be made visible. Implicit meanings must be made explicit” [Kapyla 1998].

Social-Revealing approaches are this chapter's leitmotifs, it is worth spending some time to explicate and contrast the wider background schools of thought from which they derive.

Conventional energy consumption research (and applied policy) is dominated by an economic-engineering paradigm, particularly the device-centered model. It is most firmly entrenched in the US, and the limited European efforts to expand upon it have not had much impact on theory and policies [Wilhite 2000]. The commonly practiced "barrier analysis" follows from the accepted rational action economic paradigm and is useful as far as it goes. However, barrier analysis does not necessarily contribute much to understanding social change. As a result, the nature and underlying causes of energy demand have been ignored or only superficially explored by researchers and policy makers. Contributions to energy studies from other social sciences that might have helped to illuminate these causes have declined since the mid-1980s [Wilhite 2000]. This is partly because "disciplinary incentives" to analyze energy use from a social perspective are lacking [Shove 1998].

The alternative approach is championed by a group of sociologists and anthropologists including Shove, Lutzenhiser, Wilhite, and Kempton. It is strongly informed by Bijker's social construction of technology (SCOT) theories [Bijker 1995] and the larger science-technology-society (STS) framework. The alternative energy analysis is admittedly iconoclastic because it can call into question social needs or purposes for energy consumption that are nearly always taken for granted in the conventional approach. In addition, it challenges the neutrality of technologies as problem solvers and suggests that they may be part of both problems and solutions [Shove 1998].

These researchers admit that their analytical perspective assumes that significant changes in aggregate energy use (and probably environmental protection) "will be predicated on a significant social transformation" [Wilhite 2000]. The alternative approach departs from the linear theory of technology according to which technologies diffuse according to predetermined goal-oriented trajectories and instead considers the contingent character of technological development and the "possibilities and the constraints of change and choice in technology" [Bijker 1995]. Researchers of the STS (and related social shaping of technology (SST)) school see some possibilities for reversing entrenched technology choices and reopening the field to alternative paths of socio-technical development; whereas most analysts, politicians, and the public (especially in the US) expect solutions through marginal manipulation of economic or technological variables and through general technological development [Wilhite 2000]. (See 4.2.3.1 below for a discussion of closure and reversibility.)

Another major difference in analytical emphasis is the divide between the conventional individual actor focus and the sociological, systems-organizational focus. The derivative Social-Revealing approach considers norms and social institutions as independent variables along with the usual variables of price and consumer awareness [Wilhite 2000]. Actors' interactions at various levels and their motives – competing interests, mutually imposed constraints, situation-specific factors, and varying ascribed social meanings – obfuscate the line from the individual to his impact on energy use. These wide-scale interactions, and not only the energetic or environmental dimensions of individuals' energy use, deserve illumination: "Cultural and socio-technical embedding of energy-related practices"; co-evolution of

norms, practices, and ways of life with energy-technologies; cultural norms and “shared expectations”; the role of institutions and the historical development of infrastructures [Shove 1998].

Such issues and especially the study of demand evolution – processes of change, “meta-energy services” like comfort and convenience, and particularly how energy-intensive lifestyles become widespread and then normalized – represent relatively new ground for energy analysis and go beyond the neo-classical economics approach to demand, which does not examine the history or socio-technical construction of preferences [Wilhite 2000].

The concept of non-discretionary use of energy and the distinction between discretionary and non-discretionary derive largely from this alternative societal mode of inquiry.<sup>31</sup> The economic-engineering approach (Energy-Revealing) tends to focus on individual actors and the possibilities of influencing their direct energy consumption; thus it tends either implicitly to assume most end-users’ energy consumption is discretionary, or it limits its focus to the direct part which is. The alternative Social-Revealing approach permits exploration of less directly discretionary factors that work to constrain individuals’ energy consumption, and this approach is therefore associated with the non-discretionary concept in this study (Figure 4.2).

**Figure 4.2: Association of the discretion continuum with Revealing/Concealing approaches**

Economics-engineering (Energy-Revealing) approach:	Focuses on discretionary energy consumption
Wider social science (Social-Revealing) approach:	Permits focus on less-discretionary factors in end-users’ energy consumption

For clarity, it should be emphasized that the terms **Energy-Revealing** and **Social-Revealing** pertain to analytical approaches; the terms **discretionary** and **less/non-discretionary**, on the other hand, apply to people’s actions, choices, and understanding:

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<sup>31</sup> In truth, some sociologists insist that all human technological artifacts and systems are socially constructed and that therefore, in a sense, all human energy consumption that taps into these systems is capable of being altered, i.e. discretionary. This may be true at the societal level and over suitably long time scales (cf. Figure 0.2). But at the level of the single individual or household, the intended target for energy communication in this study, much of consumption is less discretionary, especially in the short to mid-term. The processes of closure and stabilization provide technological rigidity and social solidity (see the SCOT discussion in 4.2.3.1). On the other hand, another type of sociological reasoning runs that all individual actions are socially and culturally determined or constrained, such that all human actions are non-discretionary and no action is truly discretionary. Bijker prefers a mixture of actor and structure and of change and constancy, a combination of contingency with structural constraints [Bijker 1995]. Similarly, Spaargaren follows Giddens in asserting that domestic consumption practices (and their ecological modernization) are simultaneously actor-driven and system-imposed [Spaargaren 2000]. As described in Chapter 3, we follow this latter view by insisting on a mixture, a variable range or continuum, of levels of discretion for the individual in his or her consumption choices.

**Figure 4.3: Application of Revealed/Concealed and discretionary/non-discretionary terms**

Researchers' analytical approach:	<i>Revealed</i> levels of <i>visibility</i> in energy use and social factors
End-user's actions and choices:	<i>Discretionary</i> extent, constraints, degrees of freedom

The sections in this chapter relate to one or the other energy approach, or they combine elements from both. The subsections on public knowledge and opinion of energy and the environment in section 4.2.2.1 review issues basic to Energy-Revealing, while hinting at related fundamental social questions. The next sections on knowledge and ecological behavior, 4.2.2.2, begin again with central Energy-Revealing/discretionary issues but gradually move into the Energy-Concealing/Social-Revealing agenda, which is taken up in full in 4.2.3 on non-discretionary factors in energy consumption. Section 4.3, public and risk communication, deals with the transmission of information and insights from both perspectives, with an emphasis on Social-Revealing.

## **4.2.2 Selected topics in the Energy-Revealing approach and actors' discretionary energy consumption**

### **4.2.2.1 Public attitude and knowledge of environment and energy/climate change issues**

#### **Public environmental attitude and knowledge**

To begin the sections under the Energy-Revealing/Social Concealing rubric, we take a brief look at the visibility of environmental problems to the general publics in Europe and North America.<sup>32</sup> We trace public opinion and knowledge of general environmental problems and then, in reverse order for the convenience of presentation, public knowledge and opinion of climate change.

Copious survey data and more limited voting and consumer data from the United States and Europe suggest that the public's environmental awareness and concern has increased dramatically over the past few decades. Acknowledgements of environmentalism have become common, especially among the youth (even while the youth's materialism has intensified, by most measures [Kaufmann-Hayoz 1999], [Kempton 1993]). Farhar detected the beginning of a convergence in the late 1980s in American public opinion and policy makers'

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<sup>32</sup> Section B. 36.8 of Agenda 21 on "increasing public awareness" summarizes the official UN charge for environmental visibility: "There is still a considerable lack of awareness of the interrelated nature of all human activities and the environment, due to inaccurate or insufficient information ... There is a need to increase public sensitivity to environment and development problems and involvement in their solutions and foster a sense of personal environmental responsibility and greater motivation and commitment towards sustainable development." <http://www.un.org/esa/sustdev/agenda21chapter36.htm>

environmental priorities (as represented by those in the US Environmental Protection Agency): Fifty-two percent of the public said acting to address ozone depletion and climate change was “extremely important.” Seven percent identified the greenhouse effect as the most serious environmental problem, and this was the third most frequently mentioned problem. Sixty percent were “quite concerned” about global warming in 1989, 1990, and 1991 [Farhar 1994].

In extensive interviews Kempton found high public concern for the environmental protection of local amenities and health protection; deep-rooted concern for future generations and especially children’s environmental welfare; and the identification of environmental protection as one of the primary parental responsibilities [Kempton 1991]. Recent polls show a strong commitment to environmental protection even at the cost of reduced economic growth. However, Americans are generally quite optimistic that this cost need not be paid; in 1999, 83% asserted that a healthy (improved) environment was compatible with continued robust economic growth [Kull 2000].

Critics suggest that the public’s environmental knowledge and consciousness remain superficial, symptom-oriented, and divorced from a holistic understanding of the “environment,” its state, and societal drivers of its decline (see e.g. [Whiston 2000]). While these observers detect a strong element of lip service in Americans’ expression of environmentalism, others cite anecdotal evidence suggesting people are willing to support substantive changes for the environment, although these assertions depend largely on the meaning ascribed to *change*. For example, for additional power generation, city residents have chosen more expensive, more apparently environmentally friendly power sources: Sacramento residents opted for both natural gas and efficiency and renewable energy rather than the pure nuclear option offered them, and Tallahassee residents chose efficiency and renewables over a clean coal option [Farhar 1994].

In Europe, environmental concern has penetrated to the mainstream European public over the decades since it was the province of “middle class radicals.” Concern for the environment is now much more general, widespread, and crosscutting in politics and policy administration. Even so, a rigorous review of environmental perceptions and attitudes in five European countries again suggests this concern is too weak to induce significant political changes in its support [Mohler 1994].

The Swiss display at least as high an increase in environmental awareness and sensitivity as Americans, if not higher. However, their general perception of conditions and their assessment of remedial prospects seem markedly more pessimistic: Two-thirds think that local and regional environments are being degraded, and most think they will worsen. Interestingly, concern, urgency, and environmental pessimism seem to be inversely correlated with age, with about 90% of the youth considering environmental protection urgent [Kaufmann-Hayoz 1999]. About half of the general population considers global environmental issues, including climate change, to be the most pressing sort [Finger 1994].

Attitudes toward and opinion of environmental (and energy) related problems are to be distinguished from the state of actual environmental knowledge. The notion of environmental or ecological knowledge will be explored in depth in section 4.2.2.2, “Knowledge.”

The relationships between environmental knowledge and environmental consciousness, action, and associated social processes are particularly complex. For now, we note only that the public state of “declarative” environmental knowledge, that is factual knowledge e.g. of the workings of environmental systems, is fairly limited, despite the high levels of professed concern.

Measurements from Mohler show that while only one percent of the European public “are completely devoid of {environmental} scientific knowledge, so too are only about one per cent absolutely knowledgeable.” Additionally, in an insight into the connections between environmental knowledge, attitudes, and values, the report found that certain measures that seem to be gauging environmental knowledge may actually be capturing environmental pessimism [Mohler 1994].

While the Swiss are highly concerned about the environment and seemingly highly aware, the public’s knowledge base may actually be shallow and journalistic, since it derives mainly from the media. The Swiss public generally seeks more environmental information, albeit from these same media sources, especially concerning those issues that generate the greatest anxieties: Chemical and nuclear pollution, ozone depletion, and climate change [Finger 1994].

### **Public attitude and knowledge of climate change**

Following that thumbnail sketch of public understanding and attitudes towards environmental problems, this section reviews the state and development of the public’s understanding and knowledge of climate change, specifically, and their attitude towards the issue. Here again, despite high levels of professed concern, the public’s grasp of the basic scientific issues has lagged behind, although there are recent signs of change.

Popular notions of human-induced climate change have surprisingly old historical precedents. Americans and Swiss thus seem culturally primed to believe in the possibility of anthropogenic climate change [Kempton 1991], [Pfister 1998]. While a readiness to embrace the concept is in place, the public’s understanding of the rudiments of the process is just developing.

As of the early 1990s, polled Americans showed concern for global climate change but ignorance of its nature, causes, and science’s predictions of its consequences [Kempton 1991]. Lay causes commonly cited include aerosol spray cans and ozone depletion, general air pollution, and (correctly albeit exaggerated) deforestation [Kempton 1991, Meijnders 1998]. As consequences, interview respondents in the early 1990s mentioned depletion of atmospheric oxygen, breathing of greenhouse gases, warm summers, sea-level rises, and especially the imposition of these problems on future generations [Kempton 1991].

The common public confusion of the problem with stratospheric ozone depletion, and the conception of solutions in terms of conventional end-of-the-pipe pollution controls, highlight the dominance of previously established conceptual categories (“mental models”) when approaching new environmental problems [Kempton 1993]. Although Americans showed a widespread basic understanding of ecological species interdependence, species preservation

was only weakly justified, and mostly for human use. The potential impacts of global warming on ecosystems were barely understood [Kempton 1991].

Most significantly, the public in the early 1990s did not understand energy efficiency's potential role in combating global warming; and even more fundamentally it did not understand the connection between fossil fuel combustion and global warming. (In open format questionnaires, CO<sub>2</sub> generation as a result of fossil fuel consumption was seldom mentioned as a cause of global warming [Meijnders 1998].) Reducing energy use evoked notions of decreasing energy services (cutback and sacrifice). Energy conservation in the US has a sullied image from the 1970s when it was associated with sacrifice and loss of amenities. (Source reduction in absolute material and energy terms seems to have minimal short-term political currency.) In addition, the public conceptualized alternative energy sources more easily than energy efficiency. To increase the public's response knowledge, Kempton laid out the priority needs in public communications concerning climate change: Connecting climate change to energy use; concretizing understanding of energy efficiency; understanding that small changes in the mean global temperature could have huge effects; and realizing the sensitivity of the biosphere to climate change [Kempton 1991].

This apparent public ignorance is not overly surprising. Shove's invisibility premise claims that many environmental problems, including global warming, as well as most aspects of energy consumption, are invisible to the end-user, or at least have large "invisible" components [Shove 1991]. Knowledge is "made and mediated through modeling and measurement," but the end-user, and particularly the layperson, must make a "leap of faith" to accept energy consumption as a fact of reality. Connecting energy conservation actions to aggregate indicators of energy consumption requires yet another leap. The same holds true for connecting ordinary daily use and interaction with technology to individual energy consumption, to CO<sub>2</sub>, and in turn to global warming and other environmental change (especially in the North).

Contrary data from Farhar [1994] suggests that awareness of the link between energy use and global warming had begun to increase by the late 1980s. This may help to explain a 1997 poll which found that a majority understood global warming very well (16%) or fairly well (45%) and still more recent polls showing an overwhelming acceptance of the (potential) reality of the problem, a relatively advanced understanding of the causes, and an acceptance of a certain level of costs for solutions (discussed shortly below) [Kull 2000]. To explain these results, one can speculate that either public understanding truly advanced over the decade of the 1990s, or the polls inflated answers by providing some of the missing basic knowledge as background prompts or through closed-format questions.

Americans' *opinions and attitude* towards climate change have also shown an evolution. In 1991, interviewees reacted very unfavorably to the idea of *adaptation* to the consequences of climate change without a *prevention* strategy, even when framed favorably. Many viewed adaptation as procrastinating and endorsing a do-nothing, business-as-usual approach. Kempton hypothesizes that economic discounting may not figure in the public's valuing an intact environment to pass on to descendants [Kempton 1991]. However, as will be seen,



popular notions of what prevention or mitigation might entail seem too simplistic and largely technology-based.

In discussions of energy taxes, the public overwhelmingly believed their energy consumption (especially transport-related fuel demand) to be highly resistant to price changes [Kempton 1991]. A number of other studies have demonstrated that most of the public takes gasoline consumption to be highly inelastic and are therefore skeptical that increases in gasoline taxes would change consumer behavior (cited in [Farhar 1994]). (The same perception of the non-elasticity of gasoline consumption has been found in the Swiss population (see [Dahinden 1997]). In 1994, though, the public reportedly preferred reducing energy demand to increasing supply, except if the energy were to be derived from renewable or alternative fuels [Farhar 1994].

As noted above, by the late 1990s polls showed a seemingly rapid development of understanding of certain aspects of the climate change issue. Accordingly, by 1999, the vast majority of the American public believed global warming was occurring or was in the offing and constituted a serious problem, even though a much smaller majority held that science had reached a consensus on the issue [Kull 2000]. Where opinion split was on the degree of the problem's urgency and therefore on the justification for taking immediate, potentially costly steps to address it. A minority favored taking costly steps, while the majority believed that the solution could be found in relatively low-cost measures – \$25 per month per household in increased energy costs – and were unwilling to spend \$50 per month per household. Americans' technological optimism explains this reluctance and the finding that in fact a majority believed the necessary remedies would help, rather than damage, national economic performance [Kull 2000].

If this survey is reliable, the majority of the American public subscribes very much to the mainstream environmental policy approach of limited technological fixes, or at least echoes this approach in their poll answers. The popular public conception that global warming can be addressed with a stricter application of the conventional regulatory end-of-the-pipe approach (and/or market-based mechanisms like emissions trading) is likely related to the public's grafting the mental model of regional ambient pollutants onto this new problem. The popular opinion on the elasticity of gasoline consumption cited above shows the public doubts it is capable of significant changes in their levels of transportation demand (at least in the short to mid-term). Then the modest increases in fuel costs (e.g. in taxes) acceptable to the public could presumably only contribute to a "solution" to global climate change by enhancing funding for technology research and development, presumably for renewable fuels and enhanced efficiency. The studies cited in Chapter 3 cast doubt on the adequacy of such a solution, removed from any consideration of activity levels, to consumption-driven environmental problems.

#### 4.2.2.2 Psychological factors and knowledge in (energy-relevant) ecological behavior

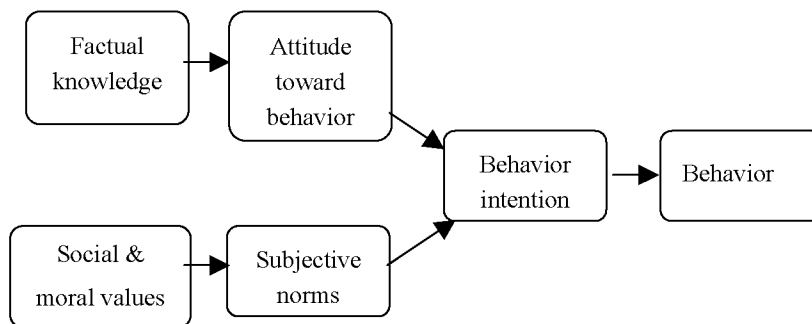
##### Psychological factors in ecological behavior

A main feature of the Energy-Revealing approach to energy and the environment is providing people with information and/or motivation deemed necessary (and often sufficient) to enable them to guide their behavior in a favorable direction. Information, knowledge, and motivation are examples of what some environmental psychologists term psychological variables or determinants of “ecological,” i.e. environment-oriented, behavior. This section lays the ground for the investigation into the links between knowledge and behavior, and then between knowledge and social change, by giving an overview of relevant conceptions of ecological behavior and these psychological variables.

There is no model that provides a full explanation of the factors and influences on ecological behavior, energy-related or otherwise [Bolscho 1994]. Social psychologists link behavior to value orientations determined by beliefs, attitudes, and, circularly, behavior; developmental psychologists ascribe value orientations to cognitive and psychological structures; while educators link pedagogy to information and knowledge acquisition to concern and awareness [Finger 1994]. Many types of actions, not only ecological behavior, depend on knowledge and understanding in their different dimensions, ethics and values, attitudes, experiences, and emotions, all of which are tightly connected to one another through complex, multi-linked pathways [Aho 1998, Bolscho 1994]. Environment-oriented behavior, like energy consumption, exhibits no unified, sector non-specific master pattern and, as is widely recognized, there is no unequivocal, context-independent connection between environmental consciousness and ecological behavior [Bolscho 1994].

The theory of reasoned action (behavior) (Figure 4.4) posits a dual chain of psychological influences on behavior intention, which in turn mediates ecological behavior. These psychological variables consist of factual environmental knowledge, attitude towards ecological behavior, values, and norms (e.g. [Ajzen 1986] [Kaiser 1999a]):

**Figure 4.4: The theory of reasoned action**



Kaiser’s theory of planned behavior extends this by considering outside, uncontrollable influences as a random influence on specific behaviors [Kaiser 1999a].

Kaiser contends that a person's ecological behavior should be measured generally across the full spectrum of behaviors and that it should be assessed with reference to a group-defined measure of behavior difficulty. That is, behaviors can be ranked relatively according to difficulty of execution, based on a group's or society's frequency of performing them. By then adding influences beyond one's control, influences stemming both from general socio-cultural factors and randomly varying local or personal situational factors, Kaiser allows for inconsistencies in behavior: He adds the realism of permitting an environmentalist to fail to do the relatively easy task of recycling newspapers and the anti-environmentalist to abstain from car-driving, both for situational, and even personally transient, reasons (see 4.2.3.1 for more detail). Provided situational factors are thus accounted for, and ecological behavior measured generally, Kaiser finds that ecological behavior intention, the last intervening variable, is a strong predictor of ecological behavior [Kaiser 1999a].

Social dimensions add to the complexity of analyzing general and especially energy-related ecological behavior. Preventive responses to climate change are inherently collective, isolated individual behavioral change having little effect [Kempton 1991, Meijnders 1998]. Climate change is an eminent example of an externality and common property "tragedy," both socially defined concepts. Energy conservation behavior may follow the logic of the prisoner's dilemma or the social trap, in addition to leading the individual into risk-benefit expectation traps and temporal and spatial discounting traps [Meijnders 1998].<sup>33</sup>

In general the social dimensions and general complexity ("messiness") of actors' energy use has made it difficult for psychologists to give generalizable, neat suggestions to policy makers, and has even prompted an exodus of psychologists from this research area [Shove 1998].

A different sociological approach is Giddens' social practices model.<sup>34</sup> Beliefs, norms, and values are part of the context of rules belonging to a shared social practice like heating, cooking, or traveling. The reproduction of these practices depends on both these rules and on varying situational factors [Spaargaren 2000]. Giddens then defines *lifestyle* as the "set of social practices which an individual embraces, together with the story-telling that goes along with it" (Giddens cited in [Spaargaren 2002]). But social practices are also simultaneously influenced by institutional infrastructures, the collective socio-material systems of provision (of electricity, gas and water, for example. See Figure 0.1). "When there is a high level – both in quantitative and qualitative respects – of 'green provisioning' of a certain social practice, people are more or less brought into a position in which the greening of their corresponding lifestyle-segment becomes a truly feasible (and sustainable) option" [Spaargaren 2002]. This

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<sup>33</sup> "However ... greed is not the only motive underlying an individual's decisions in a social dilemma. Two more motives are important as well: the equity motive and the efficiency motive ... The efficiency motive implies that if individuals believe that the continued existence of a collective good is seriously threatened, they will aim to preserve it. Hence, if individuals believe that climate change seriously threatens conditions of life, they will be more likely to render support to mitigation policy" [Meijnders 1998].

<sup>34</sup> Spaargaren endorses Giddens' use of *social practices* and *lifestyle* as the unit of analysis, instead of the individual, in research and policy for sustainable consumption (below).

sort of treatment is more closely connected to the Social-Revealing and ecological modernization theories discussed below.

## Knowledge

This section starts to explore environmental or energy “knowledge” in greater depth in psychology and other disciplines and contexts. The objective is to examine the variety, potential utility, and operation of knowledge in directing (and restraining) resource and energy consumption.

The theory of reasoned behavior (above) suggests that several variables and processes intervene between knowledge and behavior. Thus, knowledge should be viewed as a “distal predictor of behavior that is conveyed by more behavior-proximal mediators” [Kaiser 1999b]. This means that several mediators closer to behavior convey, and attenuate, the influence of knowledge on behavior. As noted, these intervening variables may include incentives, intentions, attitudes, values, and other factors.

For the individual, environmental knowledge takes one of at least four forms: declarative, procedural, effectiveness, and social [Kaiser 1999b]. Most *declarative* environmental knowledge is factual apprehension, usually of the workings of environmental systems. *Procedural* knowledge has to do with effectiveness in the execution of a given ecological behavior. Understanding the relative effectiveness of alternative choices (e.g. of favorable consumption patterns in diet or transport) shows a level of *effectiveness* knowledge. Finally, *social* knowledge pertains either to relevant social interaction skills or socially shared knowledge i.e. conventional or ethical social norms [Kaiser 1999b]. Environmental educators note the coinciding of development of social normative knowledge and the other types of knowledge, claiming that “moral and cognitive development go hand in hand” in environmental learning as well [Aho 1998].

More generally, a unit of knowledge must converge with other types of knowledge and often a wide array of other variables, both concurrent and distal, to exert a behavioral influence, and it is the proper convergence and not the quantity of knowledge that determines its effectiveness in promoting ecological behavior. Information or knowledge alone does not account for a very large portion of ecological or energy-related behavior [Kaiser 1999b],[Finger 1994]. For example, the social-cognitive process model of environmental behavior [Bolscho 1994] stresses the necessity of the convergence of “knowledges” in a conducive social context. It highlights the importance of social conditions “as a result of which the discrepancy between knowledge and action can be explained and perhaps overcome ... Environmental behavior as a goal of environmental consciousness is dependent upon acquiring knowledge structures as well as being embedded in a suitable social and value context” (author’s translation of [Bolscho 1994]).

Environmental knowledge acquisition appears to involve an intricate interplay of values, emotions, and other psychological variables. Meijnders’ dissertation work investigated the influence of negative emotion on this knowledge acquisition [Meijnders 1998]. Working with Dutch subjects, she verified that strong environmental “threats” provoke negative emotions and tensions in the recipient, whose motivation and systemic thought processes increase in

an attempt to find a behavioral solution to reduce the tensions.<sup>35</sup> Emotional appeals concerning climate change may change attitudes and opinions or evoke ecological behaviors, provided the mechanisms of anthropogenic climate change are explained clearly and assimilated; the contributory role of individual behavior is clarified; and arguments for mitigation measures are compellingly made. Otherwise, such appeals may only reinforce feelings of environmental “fatigue,” helplessness or fatalism [Meijnders 1998].

In some cases this fatalism may be firmly entrenched. In a Swiss study, Finger found that the strongest motivation for environmental learning is not necessarily acquisition of any conventional forms of knowledge but rather “psychological security” or “coping with fear.” Many Swiss learn about the environment in order to know what they will have to face in the future. Thus, far from leading to heightened ecological behavior or social action for change, continuing environmental education courses seem to substitute for such behaviors, by helping to cope with fears mainly generated by environmental catastrophes as portrayed by the news media. Ironically, continued consultation of the media for further information leads to further fear, resignation, and substitution of learning for social action or activism [Finger 1994]. If environmental fatalism is widespread or culturally endemic, it seems to act as a potent inhibiting mediator for (declarative) knowledge’s conversion to proactive responses of any kind, except perhaps the collection of more of this knowledge. For climate change, this would lock in adaptation as the only course. Perhaps provision of a different knowledge set, or sort, could break this cycle. Socially-Revealed knowledge as one such potential sort is described in section 4.2.3 below.

The complexities of knowledge’s connection to ecological behavior show the weaknesses of the conventional policy assumption of a straightforward link that can be exploited by public information campaigns and educational efforts. Although information has been one of the standard American energy conservation policy tools, affecting home energy use by providing information has been mostly ineffective; programs are beset with problems including those of credibility, failure to secure a behavioral commitment, or failure actively to involve the energy users. Informational programs often make the erroneous assumption, based on psychological or economic rational actor theories, that people will act on information about what steps they can take to save energy and money. Among other things, such programs fail to concentrate on the attractiveness, clarity, simplicity, or relevance of the message and/or the credibility of the sources [Stern 1987, 1992]. Nevertheless, information remains a popular policy tool in the public eye. In focus groups with Swiss lay subjects, asked to rank the acceptability of policy instruments – including information provision – as means of achieving reductions in general energy use, subjects ranked information the highest for low and medium reductions and equally high as other means for securing high reductions [Dahinden 1997].

Energy labeling of consumer appliances, seemingly a simple case of transmission of procedural or effectiveness knowledge, is likewise enmeshed in complex psychological and

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<sup>35</sup> Social-Revealing and ecological modernization of consumption would suggest that a person’s possible behavioral responses are both direct and indirect, the latter spanning a range of consumer and political action across different levels of integration.

situational variables and communication issues. Energy labeling often assumes a strong link between knowledge (of the energy implications of consumer goods and services) and action (changes in consumer choice) [Shove 1997]. Yet here too the amount of information may be less important than attracting the audience's attention and securing credibility. This depends on the presentation of message, interaction between audience and target, trust in sources, and many other factors discussed in the upcoming sections on communication.

Convergence with the proper social knowledge, and the proper social or cultural setting, may be important here, too. Cultural-sociological work in the area of the public's understanding of science suggests that ignorance of science may be a "function of active reflection upon, and construction of, the actor's social position and identity in relation to scientific-technical institutions" [Irwin 1996b]. Technological as well as scientific ignorance, even of the technical information the label's designer intends to transmit, can be actively used for social purposes and may not always represent an intellectual vacuum (see [Michael 1996]). From a related approach, efficiency labels that implicitly encourage or even condone purchasing larger, or larger numbers of, electronic items, or using them more freely, perhaps in part because they are promoted as relatively energy efficient, may not serve the efficiency goals of the larger socio-technical system. Without a broader message (a constructive "shared understanding"), labels may validate symbolic or even counter-productive actions of purchasing relatively more efficient models and provide psychological salves instead of actually contributing to reducing overall environmental insults [Moezzi 1998].

### **4.2.3 The Social-Revealing approach and non-discretionary factors in energy consumption**

#### **4.2.3.1 Theories, models, and advantages**

The preceding sections surveyed several of the major items on the Energy-Revealing agenda, including public opinion and knowledge of energy consumption and the environment, and the meaning and effect of knowledge sets. This section takes up in greater detail the second, alternative approach to energy analysis introduced at the start of section 4.2 and develops the related concept of non-discretionary factors.

The Energy-Concealing/Social-Revealing approach to energy analysis, it will be recalled, takes embedded energy consumption in products, services, and systems for granted and instead tries to shed light on its socio-technical drivers and causes the better to define and manage services and practices that consume energy. A better definition and description helps the effort to influence or manage energy-consuming services and practices. The argument behind the desired application of the Social-Revealing approach to energy communication indicators for the lay public (elaborated in sections 4.3.2.4 and 4.4 below) is the following: If end-users are to have a role in managing and shaping their own energy-consuming practices, services, and devices, they require a broader accounting (i.e. *knowledge* and under-

standing) of the determining factors than provided by the individual-oriented Energy-Revealing approach alone.<sup>36</sup>

Chapter 3 cataloged the role of social, economic, and other institutional non-discretionary variables from the wide perspective of environmentally significant consumption. The following discussion focuses on their treatment for energy issues in several disciplines and contexts: Kaiser's situational variables are related to the notion of non-discretionary energy variables. Stern's model of the causes of environmental and energy-relevant behavior makes something of a transition to (Energy-Revealing)/Social-Revealing: It keeps energy use visible but starts to illuminate social and institutional influencing variables that are largely beyond the end-user's direct control. Shove, Lutzenhiser, and Wilhite's sociological perspective crystallizes the Social-Revealing approach itself. The final two themes, the public's influence on energy-relevant configurations and perception of control, hint at the potential and complications of the application and communication of this Social-Revealing approach to lay users, issues again taken up in the concluding section of this chapter and the succeeding chapters.

As described in section 4.2.2.2 "Psychological factors in energy-relevant ecological behavior," one type of Kaiser's situational factors consists of non-volitional, socio-cultural constraints on ecological behavior that partially account for the differences in the ease with which various behaviors can be carried out [Kaiser 1999a].

Kaiser divides situational factors into two types: (1) universal, public constraints measured by a group statistic-determined, comparative level of difficulty of different behaviors, and (2) (stochastic) personal constraints on any individual's difficulty in carrying out behaviors, stemming from randomly varying life situations [Kaiser 1998b]. The first factor type imposes general constraints, enabling or making difficult a given behavior for everyone in a regionally or culturally defined group. However, in the face of greater or more severe situational constraints on ecological behavior, the more one overcomes these constraints the more highly one can be said to be behaving ecologically, and the more one singles oneself out as an outlier in a distribution curve of behavior frequencies across difficulties [Kaiser 1999a, b].

In one sense, Kaiser's situational factors conceptually elaborate the notion of a discretion continuum by putting the universal constraints on a scale determined by the statistical distribution of difficulty of performance across people in a society. Furthermore, he calls the personal situation factors situational (non-discretionary in a sense), and makes these a random variable allowing for inconsistency in action. On the other hand, however, as a psychological construct, this conception of situational factors cannot easily accommodate certain aspects of the socio-technical, Social-Revealing perspective presented below.

Stern and Oskamp's model of the causes of environmentally relevant behavior (Table 4-1) is often cited as a particularly good illustration of structural and institutional constraints on (energy-oriented) ecological behavior [Stern 1987, 1992]:

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<sup>36</sup> The software developed for the interviews described in Chapter 5 shows the comprehensiveness and synergies possible when the two approaches are combined.

Table 4-1: Stern's Causal Model of Resource Use

LEVEL OF CAUSALITY	TYPE OF VARIABLE	EXAMPLES
8	Background factors	Income, education, number of household members, local temperature conditions
7	Structural factors	Size of dwelling unit, appliance ownership
	Institutional factors	Owner/renter status, direct or indirect payment for energy
6	Recent events	Difficulty paying energy bills, experience with shortages, fuel price increases
5	General attitudes	Concern about national energy situation
	General beliefs	Belief households can help with national energy problem
4	Specific attitudes	Sense of personal obligation to use energy efficiently
	Specific beliefs	Belief that using less heat threatens family health
	Specific knowledge	Knowledge that water heater is a major energy user
3	Behavioral commitment	Commitment to cut household energy use by 15%
	Behavioral intention	Intention to install a solar heating system
2	Resource-using behavior	Length of time air conditioner is kept on; Insulating attic, lowering winter thermostat setting
1	Resource use	Kilowatt-hours per month
0	Observable effects	Lower energy costs, elimination of drafts, family quarrels over thermostat

From a version of this model, Stern has described a pyramid typology of energy consumption influences according to the degree of direct control by the end-user [Stern 1992]: At the lowest level are direct energy-using activities like turning on a light or using an electrical appliance. The middle level comprises residential or industrial energy users' technology choices, whose effects on energy consumption are more indirect, e.g. the choice to settle in a house of a given size and location largely determines one's heating and commuting needs. The intensity of use and the longevity of infrastructure influence the long-term impact or contribution of these choices. Stern calls the highest, most indirect level of influences *policy choices*: "Decisions by manufacturers of automobiles, appliances, or industrial equipment about whether to produce highly energy-efficient products are energy policies in that they



constrain consumers' technology choices" [Stern 1992].<sup>37</sup> Tax deductions for mortgage interest payments and subsidies for highway construction are similar government policies. They provide consumers with overarching incentives, disincentives, opportunities, or non-opportunities. Although policy is set by upper-level decision makers, it is sometimes amenable to outside input or public opinion.

Stern emphasizes that influencing business, industry, and government "policy" makers is more effective than individual behavioral change for energy conservation and for many other environmental problems.<sup>38</sup> Technology choices and policies should be targets of energy conservation efforts over and above everyday energy-relevant behavior, according to the prevention principle of pollution and energy use. This is supported by the long life and impact of technologies and the short-term fluctuations (reversals and re-reversals) in energy conservation behavior [Stern 1992, 1997].

Stern's energy choice typology is clearly on the conceptual way towards the Social-Revealing perspective on energy consumption. Both emphasize the determining decisions of institutional actors like building contractors and developers, manufacturers and retailers that frame or limit choice in end-users' decisions. Yet the full sociological-technological approach also incorporates analysis of the evolution of social norms and technologies, choice thresholds and technological "lock-in." "... Individual choice in industrial societies is limited by the way cities, energy and water supply systems, housing designs, product designs, etc. are configured. Individuals can influence what happens at the end of the pipe, but significant changes in energy use are bounded by the 'upstream' systems they are plugged into" [Wilhite 2000]. The evolution of such systems, the roles and interaction of agents and actors involved in their development, and possibilities for modifying or directing the course of development are important for studying and reducing energy demand.

Reflection on the history of technology, policy, and social choices can increase social "self-awareness," for example in the area of housing and office buildings: "The built environment embodies the expectations of designers, financiers, and occupiers, while also reflecting the organization and structure of the construction industries. As such it fossilizes past patterns of social relations and creates a form of inertia that slows changes in energy and resource use" [Shove 1998]. Historical examination can help identify important decisions, moments, and thresholds for technological and societal change as they arise, improving the quality of the long-term social investments they represent and possibly avoiding lock-ins to unfavorable energy outcomes [Wilhite 2000].

Historical analysis of this type can improve future group decision making and proactively warn against further unfavorable lock-ins, but could these prior technological choices be revisited, and past choices retaken or reversed? Bijker's answer is generally, but not absolutely, no. In technological development, "closure" of competitions between alternative technological artifacts creates the victorious and henceforth dominant form of technology.

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<sup>37</sup> Similarly, "Major technological innovations are roughly equivalent to governmental legislation, in the sense of establishing an enduring framework for everyday life" [Swearengen 2001].

<sup>38</sup> See Chapter 3, section 3.2.2.

Before closure technological artifacts exhibit interpretive flexibility, each relevant social group interpreting and attributing meaning to (constituting, even) the artifact. After closure and especially after degrees of “stabilization,” interpretive flexibility is no longer possible or it becomes greatly reduced, and in fact seems retrospectively not to have been present because the history of the development is rewritten. Reopening the field to socio-technical alternatives – reversing closure – is theoretically possible but practically quite difficult. Theoretically, the heterogeneity of the elements in the technological frame – social, psychological, technical, normative – leaves open the possibility of reversing the closure process by allowing for more or less advanced states of technological stabilization. But in political terms, highly stabilized frames exhibit obduracy due to successive attributions of meaning, building up of structures, and hardening of supportive networks of practices and social institutions. Closure and stabilization represent increasing levels of semiotic power,<sup>39</sup> as more groups and players are drawn in to the artifact’s “technological frame” and have stakes in defending and elaborating on the artifact’s settled meaning [Bijker 1995].<sup>40</sup>

Returning to the explication of the full Social-Revealing approach, analysis of the interlocking development of technologies and social norms is also necessary. Technologies (and people involved in diffusing and marketing them) sometimes generate new social “needs” and may conveniently pose themselves as the answer to these needs. An example is standardized American air conditioning uniformly installed in houses regardless of actual climatic need and tuned to provide a certain, perhaps unnecessarily low, indoor air temperature. This may create technology supply-dependent norms of temperature comfort and fuel demand where and when previously it may not have existed – the so-called “manufacturing of demand,” often followed by the seemingly immovable entrenchment of this type of demand in society. Other readily available, more environmentally friendly means of doing things like climate control (e.g. daylighting techniques) “may not be socially viable, given the layers of expectation and practice now built up by and around this particular technological option” [Shove 1998]. For instance, time-saving and convenience norms, in private life as well as business, drive trends of increasing substitution of machines for human labor and the need for farther and faster travel, both of which have profound impacts on energy use [Wilhite 2000].

The full Energy-Concealing/Social-Revealing approach allows for greater possibilities for social renewal or ecological modernization than psychological approaches can readily

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<sup>39</sup> The order of the normal, the habitus, “fixed and represented in technological frames” [Bijker 1995].

<sup>40</sup> This digression into social constructivist theory suggests the following series of analogues for the discretionary/non-discretionary dialectic from political and social theory. They are especially appropriate when applied to examinations of the historical evolution of technological frames or challenges to the prevailing technological regime in a political context:

- discretionary vs. non-discretionary
- voluntaristic vs. structural
- change vs. constancy
- malleability vs. obduracy
- micropolitics of power vs. semiotic power (Bijker)
- transformative capacity vs. domination (Giddens)

accommodate. Through it we can consider different option spaces, for example advanced technology, alternative technologies, alternative or earlier social norms,<sup>41</sup> all of which may have previously existed (in terms of social norms), may exist in other societies (apparent through cross-country comparisons), or may not yet exist (energy efficiency improvements beyond the current technical potential, different structural economic arrangements (e.g. promoting restraint and sufficiency<sup>42</sup>). This approach accommodates larger changes of higher-level barriers, social norm or systemic changes, or “absolute” constraints in technology that can be overcome by suitable long-term public investment.

Insights from the Social-Revealing approach, being sociologically rooted, could be misinterpreted as an excuse for denying most elements of choice and therefore responsibility in individual energy consumption (see footnote 31). In bringing such an institutional perspective to the end-user this is not at all the point. On the contrary, showing what is legitimately outside one’s direct control (non-discretionary) highlights by contrast what is under one’s control (discretionary), although Kaiser shows this is very much a matter of personal characteristics vis-à-vis society and random influences that require a specific situational context for any coherent analysis. Balancing this approach with elements from the conventional Energy-Revealing economics-engineering approach – those that explicate end-users’ direct contributions to energy consumption and attendant environmental insults – helps certain people to take personal responsibility where appropriate while peaking their interest in less discretionary social and technical issues as well (see Chapter 5).

However, a separate argument runs that leaving energy embedded in social functions and avoiding the explicit focus on energy and the environment characterizing Energy-Revealing can bypass the traditionally assumed environmental knowledge-understanding-action policy process and come directly to the action stage, while at the same time possibly broadening the relevant audiences for this stage. Moving audiences up the “knowledge infrastructure” (see [Connors 1998]) directly and sequentially, and for climate change alone, to the consumption-related elements of a solution specification is a laborious process, as the slow public diffusion of knowledge of energy efficiency and climate change has demonstrated. Instead, as documented in Chapter 3 and Appendix B there is a collection of concerns which may have overlapping solutions in energy conservation and source reduction: Climate change, national security, economic performance, reduction in materialism, psychological or social renewal, and so on. For policy applications, approaching energy and environmental problems from the non-discretionary and Energy-Concealing/Social-Revealing vantage point may bring different audiences to the forum and allow multiple constituencies for various (but related) problems to rally around steps in the solution specification stage.

#### **4.2.3.2 Public perception and perceived control of non-discretionary factors**

This section offers a preliminary look at the degree of the public’s perception of non-discretionary factors and its perceived degree of influence on them.

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<sup>41</sup> See Ch. 3, 3.3.3.2, “Anthropological/sociological treatments.”

<sup>42</sup> Ch. 3, 3.3.3.3, “Restraint and sufficiency” and “Structural economic factors.”

Farhar notes that American energy consumption policy shifted in the 1990s from a focus on behavioral changes to limited institutional changes such as DSM, appliance standards, and energy-efficient mortgage lending. This shift appears to have had the full support of the populace [Farhar 1994]. In polls, American have cited high institutional barriers as the reason they do not drive less, carpool more and use mass transit or other more environmentally friendly transport modes: 34% responded "I'm doing all I can," 40% objected to high up-front costs of energy efficiency improvements, and 16% cited inconvenience or difficulty in changing habits [Farhar 1994].

It seems reasonable to speculate that the public wants efficiency and the use of renewable energy to become "institutionalized" – to be built into the routine way of producing cars, buildings, and energy services, for example. The public seems willing to change its behavior, up to a point. Then much of the public seems to want institutional change, so that efficiency and reliance on sustainable energy sources are normal, not special activities ... The public wants the burden of change to fall on institutional (not just on family and individual) shoulders. Institutions include governments, utilities, automakers, builders, the financial community, and others whose policies, procedures, and practices constrain individual and household energy choices. Consumers say they will pay through mechanisms that support institutional change – such as "green pricing," "gas guzzler" taxes, IRP, and DSM programs – if the results are truly beneficial to the environment [Farhar 1994].

One notices the departure from the assumption of the Energy-Concealing/Social-Revealing approach that significant changes in aggregate energy use and general environmental protection "will be predicated on a significant social transformation." These comments suggest relatively modest institutional change. For example, the populace portrayed here seems unaware of the importance of feedback from technological and institutional change on group lifestyles, norms, and normative individual practices. Institutional change in this usage does not touch on sociological or cultural change, and the concurrent development of technology and energy-intensive social ways of living (see [Wilhite 2000]) is not confronted here.

It is interesting to compare this account of Americans' perception of the role and nature of non-discretionary factors to a concurrent analysis of the Swiss public's perception of these factors:

When asked what ... was preventing the solution of today's environmental problems, only 9% indicate a lack of information and knowledge. 44% ... say that economic stakes were too high, 20% state that political stakes were too important, and another 15% indicate too much individualism... In short, the Swiss have a quite disempowering perception of environ-

mental issues and problems, which they mainly see as global, urgent, and somewhat overwhelming. They are afraid of them and pessimistic about the future. They see major economic, political, and cultural forces in society preventing environmental problems from being addressed [Finger 1994].

It appears from this that many Swiss believe they understand these non-discretionary factors all too well but lack a belief in their own, or their government's, ability to change them; they feel politically, and geo-politically, helpless. If Farhar's analysis can be believed, it seems that in comparison Americans, despite common anti-big government rhetoric, leave the main work in confronting energy-related environmental problems to their government or governmental guidance, and seem to trust in its ability to solve them. Not so many of the Swiss. Finger suggests that they are either fatalistic, emotionally paralyzed, or so pessimistic and disempowered by their awareness of the very non-discretionary nature of factors driving the environmental problems that they content themselves with information gathering as solace against the inevitable environmental severities to come (section 4.2.2.2, "knowledge").<sup>43</sup> In this case, further information about non-discretionary factors related to energy consumption (in the context of environmental degradation) does not seem likely to provide the missing incentives or motivations; this situation calls for political rejuvenation on a grand scale. However, the problem of disenchantment and disempowerment of democratic electorates is beyond the scope of this work. (We return to the question of public perceptions and "use" of scientific and social knowledge at the conclusion of the section on risk communication (4.3.2.4) below.)

## **4.3 Communication and risk communication of factors and findings from energy perspectives**

### **4.3.1 Public communication**

Now that we have clarified something of the content of various energy knowledge types and touched on some of the necessary conditions or co-factors, we turn fully to the issue of their (bi-directional) conveyance through communication. Just as the standard energy consumption messages can benefit from a broadened perspective, so can the conventional means of communication. The discussion on risk communication below deals with communication among actors of a wider range of sizes and capacities and broadens the conception of communication flows, channels, and participation.

Developed especially in connection with the nuclear energy industry, public communication (PC) of science and technology has recently come back into vogue as a tool for affecting public attitudes on complex scientific issues. It is regarded as most effective when used in

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<sup>43</sup> Chapter 5 and Appendix A explore the Swiss public's thoughts on energy matters in greater depth and with greater subtlety, challenging some of these conclusions.

tandem with other tools like financial or regulatory measures [Meijnders 1998]. Its effectiveness also hinges on communication attributes examined below.

Covello's popularly cited definition of public communication in this context, used to define risk communication as well, is "any intentional exchange of scientific information among affected parties on health or environmental risks" (cited in [Kant 1995]). With regard to energy this reads "any intentional exchange of scientific information among affected parties on energy policy dilemmas." This usage does not include all aspects of communication with lay audiences, even of strictly Energy-Revealing issues. Typically conceived functions for public communication include informing, educating, managing and resolving conflicts, and facilitating decision making. There is a clear demarcation between PC for general knowledge enhancement, expected to affect beliefs, and PC intended to change a specific attitude or behavior [Kant 1995].

Previous sections have described the multi-variable complexity of inducing behavioral change. In the context of communication, necessary co-factors include audience attention, comprehension of the message, suitable emotional appeal, and alignment of attitudes, but even then the durability of any induced change is questionable [Kant 1995].

In the Netherlands and other Western countries, public communication in the service of decision making on issues of interest or import to society is supposed to "broaden the societal consensus for political decision making" [Kant 1995]. Yet the broad participatory mode of communication has not necessarily been the rule, even in Western democracies.

When the classic communication models were developed after WWII, authorities were seen to initiate uni-flow scientific communication efforts in order to increase levels of knowledge, assuming that this would lead to desired actions on the part of the receivers. In the stereotypical public information campaign, experts on rational energy use approach the matter from a technical standpoint and address an ignorant and emotional public. The increased knowledge imparted is supposed to palliate the public's negative emotions.

According to the traditional engineering model of information transfer through public communication, developed in the late 1940s by Shannon, Weaver and separately Lasswell, communication consists of source, objective, message, medium, transmission, channel, reconstruction-decoding, audience, noise, and other elements [Kant 1995], [Renn 1991]. The original model is static and mostly unidirectional compared with current models. Somewhat later models of public communication as diffusion of information to produce behavioral changes added attention, understanding, attitude, intention, behavior, and maintenance of the behavioral change. Attention and attitude, which depend on situational and personal factors, are recognized as limiting or decisive barriers for PC efforts [Kant 1995].

Depending on the actors' implicit assumptions and the operational rules, the relationship between senders and receivers in public communication in the West is dominated by one of four approaches: Technical, market, justice, and participatory. The *technical* approach involves technicians primarily and an emotional public only secondarily. Provision of public information is separated from decision making. The *market* approach deals with implementation of policy or technology "as a process of negotiation in a market situation." The *justice*

approach emphasizes an equitable distribution of risks determined by pre-established procedures and bargained positions. In the *participatory* approach, public communication centrally involves information and education of the public. A well-informed, participating public is considered necessary for proper decision making and to avoid a reduction in the vigor of the democratic process, much of which stems from the public's exclusion from and ignorance of scientific and technological policy matters. Dialogue is the dominant interactive mode. This is an idealized typology, and the reality is not so easily separable, as most public communication involves elements from all of these models [Kant 1995].

The following reviews some basics of the updated but conventional communications engineering (sender-receiver) model. The risk communications concepts presented in the next section extensively reformulate or enrich aspects of this model.

According to the general sender-receiver model, characteristics of the *message* include "correctness," completeness, comprehensibility, belief, trust, attention-getting quality, and ethical dimensions [Kant 1995]. Information needs to be relevant and relatable to local circumstances, otherwise it is not credible and will not be effective. Objectivity may be enhanced by increasing the number of sources and including and explaining contradictory views [Schneider 1993]. Written media may be preferable in cases of complex information or with sources whose credibility or attractiveness is held in doubt.

Although variously posed as the neutral scientific or altruistic communicator, objective, disinterested *senders (sources)* do not exist. The source is expected to have an interest in the communication outcome, and a lack of stated goals arouses suspicions, at least of incompetence. It may be preferable for the source to reveal objectives explicitly than to have the audience make poor assumptions, since they will draw conclusions in any case. (This was the route taken in explicitly specifying the response framework for the interviews in Chapter 5.) Source credibility depends partly on the quality of expertise and is particularly important when technology is involved. Attractiveness depends on the convergence of attitudes, sympathy and familiarity with the source [Kant 1995]. Trust and credibility issues will be expanded upon in the following section on risk communication.

The *receiver* is also known as the *audience* or *target*. It is commonplace to hear that the contents and processes of communication must be matched to fit the target group (e.g. [Aho 1998]), although this is almost self-evident. The receiver's characteristics include knowledge level, involvement (engagement) with the issue, expectations, needs, and motives. Parameters of the audience's "needs and wishes" include involvement, educational level, extent of (cognitive or emotional) removal from the risks involved, and vulnerability [Kant 1995].

Education is an important receiver variable. The complexity of environmental and energy issues increases the importance of the difference between education levels among members of an audience. Finally, as with knowledge acquisition in general (4.2.2.2, "Knowledge"), social factors surrounding the receiver – his social position, interaction, support, networks, and the like – are often important for processing, digesting, and perhaps acting on the message of the communication [Kant 1995].

### 4.3.2 Risk communication

Risk communication (RC) can be considered a subset of general public communication and can also be defined as an exchange of information about risks related to the environment or human health. The *risk communicator* is defined as “the individual or institution that intervenes to change existing knowledge or perception” [Kasperson 1991]. Traditional objectives of RC include producing changes in knowledge or attitudes, as in PC, prompting individual or group protective measures, or fulfilling other functions related to risk management, conflict resolution, or public participation. Risk communication has recently broadened its scope to include analysis of the exchange of information of certain kinds among multiple social subsystems (see [Renn 1991a]). Several relevant aspects of these types of exchange are taken up below.

#### 4.3.2.1 Criticisms of conventional risk communication conceptions

The communications engineering model of receiver and sender has been a dominant model in RC just as it has been in general PC. This model has been criticized as a social engineering version of a marketing approach whereby the senders intentionally deliver persuasive information in a manner targeted to receivers and measure the success of their efforts by the degree of behavioral change it prompts. This approach is inadequate for the analysis or design of risk communication. For one thing, it tends to be removed from the socio-political context and varying perceptions of the problem: The institutional setting of the communication is an important part of the experience and result. Risk communication is part of a complex communications web in which various groups and cultures possess varying perceptions, values, and interpretations [Kasperson 1991]. Good RC analysis may use a signal theory metaphor in describing interactive effects of communication.<sup>44</sup> However, these terms have meaning within specific social contexts and are not to be interpreted as technical, invariant, and perfectly well defined concepts [Renn 1991a].

The other prevailing model now often criticized is that of the altruistic communicator bent on advancing the public good. Political aspects of the risk communicator are downplayed in this model. The altruistic communicator is traditionally seen as “striving to manage risk in the ‘public interest’ and beset by a host of problems relating to the complexity of risk information, uncertainty, opaque social values, unscientific media, and a disinterested or volatile public, {who} must somehow produce in the ‘recipients’ a grasp of the scientific facts and an ability to put risks in perspective” [Kasperson 1991]. This model is taken to task for focusing on problems and failings in the target groups while neglecting problems with the risk communicators themselves. Risk communicators reflect the institutional goals and professional cultures of their job settings. Unstated motivations underlie the communication, and affect and possibly confuse the audience, as noted in the previous section on public communication.

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<sup>44</sup> Applied signal theory terms include volume effect, filtering (intensifying or attenuating), deleting and adding; mixing (changing the order of presentation); equalizing (putting messages in different contexts); and stereo (broadcasting the same message through different channels) [Renn 1991a].



Modern RC studies, in improving on some of these defects, nevertheless recognize the complexity of the processes at work and the limitations of their own models. RC literature cannot provide hard and fast guidelines for communicating with the public. Empirical evidence as a whole shows that “individuals as well as social units make use of a complex variety of internal and external cues to process messages and that the variation of one or two factors may only lead to marginal changes in the outcome” [Renn 1991b].

#### 4.3.2.2 Risk communication, trust, and debate

Renn (1991b) models two routes of persuasion in risk communication, basing them on the psychological elaboration-likelihood model. A receiver of RC uses the *central* route when he treats the substance or content of arguments and considers the pros and cons of issues in determining whether or not to believe in a message from a risk communicator. He uses the *peripheral* route when non-substantive cues, for example the risk communicator’s prestige, help him assess the credibility of a message or its sender. A peripherally engaged recipient places trust “holistically” in the sender, whereas the centrally engaged receiver decides whether or not to invest trust for each specific message from a given sender. Most issues in modern, specialized societies are too complicated for good analysis based on personal experience and the plausibility of arguments; thus, people tend to use the peripheral route more often. Renn notes that a delivery style geared towards generating interest in a message through the peripheral route by use of cues can be offensive to individuals who take a central interest in the matter.

Most information programs of the environmental or Energy-Revealing mold implicitly assume a mostly central RC processing route. If they are couched in environmental terms, put for instance into the climate change context, the complexity and controversy involved may however make the peripheral route dominant for most lay receivers. However, the pervasive decline in the public’s trust in institutions, and, among certain segments, science and technology in general, may reduce the power of peripheral RC to engage an audience on environmental issues.<sup>45</sup> Approaching energy consumption from the starting point of wider contexts or other issues, as is possible in Social-Revealing, and using individuals and small groups as risk communicators rather than large institutions, may help re-engage audiences through one or the other route.

Risk communication can be categorized according to levels of debate and analysis as well as routes of communication. Level one is a factual level concerning probabilities and damage potentials from the risk in question (e.g. health effects of air emissions); level two is a “clinical mode” that deals with risk management, response, and experience of institutions (e.g. regulation of hazardous substances); and level three is a “world view perspective” that deals with the actual or potential effect of various values and lifestyles on the risk (technology’s place in society, environmental justice). As one moves up these levels, the degrees of com-

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<sup>45</sup> “What scientists interpret as a naïve and impracticable public expectation of a zero-risk environment can thus be seen instead as an expression of zero trust in institutions which claim to be able to manage large-scale risks throughout society” [Irwin 1996b].

plexity and intensity of conflict increase. Renn concludes that the type of concern of the audience must determine the level at which the RC message operates and its corresponding content.

Several factors, including declining public trust in institutions and products of new technological paradigms like genetically modified organisms, could push risk debates from the first to the second or third levels. If risk debates are held on the third level, trust is not furthered by technical arguments or institutional competence. Here, trust depends on a consensus on basic issues often having to do with lifestyles and values, a consensus that is clearly lacking in pluralistic Western societies. This third level involves a “macro-sociological framework” that resists empirical testing and generalization across cases [Renn 1991b]. For example, it seems that conventional energy analysis (Energy-Revealing) generally presumes a type of risk debate and communication centered around the first two levels and rejects attempts to take the discourse explicitly to the third level; whereas Social-Revealing tends, or lends itself, to third-level debate. The third level also lacks a clear communication medium [Renn 1991b]. The development of the enhanced household energy software tool (Chapter 5) was meant to contribute to the furthering of such a medium for risk communication on issues of energy consumption and climate change.

#### **4.3.2.3 Social amplification of risk**

Renn’s concept of the social amplification of risk depends on multi-path communication flows and feedback. Individuals’ perception of and reaction to RC from others and from institutions in turn spur institutional responses or change [Renn 1991a]. That is, secondary effects of the risk communication may involve “changes in social and institutional behavior that were induced by individual responses to risk communication” [Kasperson 1986]. “Secondary effects evolve as responses to signals sent from the receivers of risk communication ... to risk handling institutions. Secondary impacts include such effects as *enduring mental perceptions*, personal apathy, political pressure, *institutional or political changes*, and *new social movements*” ([Renn 1991a], emphasis added). Secondary impacts are communicated to individuals and social groups, and the resulting new feedback may generate tertiary social amplification effects of the original communication. On a macro level, amplified RC functions alongside multiple factors that enhance or deter general social communication and decision making [Renn 1991a].

To charge the social amplification process, eventually media and other institutions must take up the topic and concern of individuals and especially groups. Social groups and institutions are the major agenda setters, even though the original impetus, and the distal source of institution-changing secondary effects, may lie with individuals [Renn 1991a].

The social amplification of risk framework is inclusive in that it permits analysis of communication on an individual (micro), group (meso), and social (macro) level, and all combi-

nations of the three. In the matrix in Table 4-2, each cell embodies a communication situation wherein sender and receiver may be individual, group, or political institution.<sup>46</sup>

**Table 4-2: Renn’s [1991a] objectives of risk communication, levels of analysis, and pathways for the social amplification of risk**

<b>From/to</b>	<b>MICRO-LEVEL Individual</b>	<b>MESO-LEVEL Group</b>	<b>MACRO-LEVEL Society</b>
<b>Individual</b>	Persuasion for risk reduction Risk acceptance Education	Influence on group decision Request for support Education	Change of risk policies Request for support Information
<b>Group</b>	Education Support Persuasion for risk reduction Risk acceptance Acceptance of risk management Trust in group's competence	Education Coalition Conflict resolution  Prestige Acceptance of risk management Trust in group's competence	Information Influence on risk policies Acquisition of social resources Change in risk culture Compliance with risk standards Development of incentives for structural change
<b>Society</b>	Education  Risk reduction Emergency response Acceptance of risk management Trust in risk agencies  Loyalty with respect to the risk handling capacity of society	Education  Risk reduction Emergency response Acceptance of risk management Legitimization of risk agencies Loyalty with respect to the risk handling capacity of society Mediating in conflict resolution	Strategies for risk management and regulation Agenda for risk agencies Institutional reform Development of new paradigms of risk Changes in risk culture  Influence on international and global risk policies International conflict resolution

<sup>46</sup> In row 3, one of the motivations for RC from government agencies is to build public confidence in their assurance that the political and regulatory system can manage environmental risks, showing evidence of the openness of the decision making process, its flexibility, and resilience [Renn 1991a]. However, in today’s Risk Society this function is increasingly unfulfilled. It is partly the failure of governments with respect to climate change prevention/mitigation and the invalidity of this assurance for environment risks that suggests the approach of using (grassroots) individual leverage on governments to promote institutional changes.

#### **4.3.2.4 Proposed application of risk communication, ecological modernization, and caveats**

We can use Renn's conceptual communications framework of the social amplification of risk to describe potential policy applications of this work. The work itself, as a product of an individual (one researcher) within the context of a scientific institution (the Swiss Federal Institute of Technology), can be made part of a risk communication to individuals from a scientific institution (2,1) and a private individual (1,1) ultimately to encourage secondary communication responses to groups and institutions on their parts, in their capacities as individuals (1,2) and (1,3), and maybe even as groups (2,2) and (2,3). Specifically, our communication concerning less-discretionary energy use seeks to inform (and motivate) individuals regarding – or at least prompt a conceptually wider dialogue concerning – their need for amplified communication with groups and institutions in the context of energy conservation to promote constructive secondary RC effects that ameliorate environmental damage and climate change. Primary RC concerning discretionary energy use, on the other hand, focuses on (2,1) and partly (1,1), mostly for the purpose of informing and motivating individuals to modify risky direct energy consumption behavior. The ultimate policy objective for the non-discretionary communication, summarized in Renn's terminology, would be to support the generation of secondary institutional effects of RC to individuals, positive effects on institutions and institutional arrangements that lessen or mitigate the risks they pose in their current form to the global environment.

Knowledge's potential to facilitate the process of amplified risk communication and secondary effects, especially from individuals acting in their roles as citizens, consumers, and social actors in support of environmentally favorable institutional and cultural changes, is simply risk communication terminology for what in ecological modernization theory is called monitoring for consumer-citizen involvement in the ecological modernization of consumption.

The most important but unusual purpose to which consumers put information about energy consumption may be their use of it to give more input into and wield greater influence over governmental and corporate technological policy choices normally largely closed to them. This assumes the appropriate political or corporate communications channels are in place. The explosive development of the internet seems promising in this regard, for the greatly increased information and transparency it can give users regarding the details of these choices in industry and government and the general ease of information and opinion exchange it will increasingly facilitate.

This is very much in line with the "politics of technology" supported by STS and SCOT analysis, which "stresses the malleability of technology, the possibility for choice, the basic insight that things could have been otherwise." Demonstrating the interpretive flexibility of artifacts highlights the political nature of past technological choices and debunks the deterministic spin retrospectively cast on the history of the technology by current members of the

dominant technological frame. Thus it offers a basis for wider democratic participation in current technological choices [Bijker 1995].<sup>47</sup>

We note in passing that enhanced lay knowledge of the environmental, energy, or social dimensions of energy consumption also seems to conform well with the participatory mode of communications and its traditional aim of improving the basis for decision making in democratic processes. Lay input into risk communication and management also seems all the more warranted in an age of declining trust in, even alienation from, major societal institutions.

As noted, our application also has much in common with ecological modernization theory, especially recent Dutch sociological work. As a social theory, ecological modernization (EM) concerns itself with the “(re)design of central institutions of modernity in dealing with the ecological crisis and on the basis of environmental criteria” [Mol 1995]. The reflexive variant (Hajer in [Mol 2000]) has broadened its focus to the “structural change of socio-technological systems” [Mol 2000].<sup>48</sup> As noted in Chapter 2, this implies that the state provide favorable conditions and contexts for consumers (and producers) to take a larger role in environmental improvements [Mol 1995].

Ecological modernization of consumption, like related Post-Fordist sociological theories, looks favorably on what seem to be trends toward the increasing influence of consumers in the (re)organization of production and consumption chains. Privatization and liberalization in Dutch utility markets, for example, are expanding or differentiating consumers’ relationships towards providers from traditional captive consumer to customer, citizen-consumer, and participant or co-provider. Citizen-consumers, “conscious citizens who may take individual action to serve social or environmental goals” [van Vliet 2002] are increasingly catered to by new marketing schemes like green-electricity and a variety of eco- and fair-trade product labeling. Their opinions seem to matter more than ever for business and policy makers. “Consumer-oriented monitoring” of commercial service providers and corporate producers “can also allow for counter-surveillance and strengthen the potentials of citizen-consumers to change the infrastructures of consumption” towards lower or better resource use [van den Burg 2001]. This is best combined with consumers’ self-monitoring of resource use. Both ends of the discretion continuum, or to use Renn’s terminology, both types of risk communication (primary and secondary) for environmental improvement, are then covered. The interview version of the ECO<sub>2</sub> energy software (Chapter 5) was designed to permit both types of consumer-oriented monitoring.

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<sup>47</sup> Bijker notes, however, that the STS constructivist analysis is politically neutral in that it does not necessarily work to the benefit of less powerful or victimized groups.

<sup>48</sup> Ecological modernization challenges the contentions of environmentalists (and radical eco-centrists, treadmill-of-production, demodernization, and deindustrialization theorists) that a fundamental reorganization of modern society – its industrialized production system, capitalism, and centralized states – is necessary to this goal. EM does acknowledge the need for some fundamental structural remedies of ‘design faults’ in modern industrial production and consumption [Mol 2000]. However, EM advocates an ecological rationality that is independent of and on equal footing with others like the prevailing economic rationality [Mol 1995].

Several caveats are in order. Given the political and direct action potential of this risk communication application, lessons from cultural theories of power should be heeded. The discussion of SCOT in section 4.2.3.1 described the process of increasing obduracy and structural power as technological regimes progressively stabilize. Cultural theory says that social opportunities for the use of (scientific) knowledge are not homogeneous but depend on people's social positions, especially those of power and dependency, which culturally "inscribe" for people what they are permitted to "know" and how they are permitted to act. These boundaries are often implicit and "culturally rehearsed" [Irwin 1996b]. Social and institutional resistance to change extends also to actors' knowledge of, and negotiability of their role in sustaining, given constraints. Scientific knowledge that is socially legitimate and practically useful to people must be sensitive to these social and epistemological points: It must be "reflexive and self-aware" [Irwin 1996b]. This is true for the scientific message of the Energy-Revealing approach, and it is likely true of the more sociological message of the Social-Revealing approach as well. We must heed the caveats concerning psychological, social, and cultural variability and nuances of knowledge and communication discussed throughout this chapter, and not expect blanket applicability of this or any risk communication approach.

Second, the subsection above on criticisms of conventional risk communication related the new emphasis on the receivers' active role in the communications process, the elevation of this process to the level of "product" or message, and the recognition of the diversity of perceptions and values among the spectrum of groups and cultures which comprise the audiences. On the one hand, this conforms with the participatory communications mode and the goals of furthering and deepening democratic participation, to which the amplified RC suggested here lends itself. On the other hand, if the messages of both visibility approaches are sufficiently diluted or subordinated to process, or if the equal importance of all levels of "local," "contextual," or alternative knowledge among the audience groups is insisted on (as appears to be the vogue among some cultural reconstructionists looking into public knowledge), then the point of this research may be lost. Bi-directional communications flow and participation are necessary for legitimate process but should not be championed at the cost of either the complex realities of environmental science, processes, and risks or those of societal drivers, interaction, and causality which the two approaches treat. This tension between breadth, subtlety, diversity, and disciplinary inclusiveness on the one hand and research aim on the other is likely common to many trans-disciplinary projects. A suitable balance must be struck.

#### **4.4 Final comments and further applications**

This section offers some final comments on the chapter's themes and points towards the empirical application of Chapter 5.

The Social-Revealing and broadened social science parent perspectives assert that "understanding the dynamics of energy demand (or demand for the services energy makes possible) is an exercise in understanding socio-technical change and the co-evolution of infrastructures, devices, routines and habits" [Wilhite 2000]. Analysis of both technological and

concurrent sociological development is thus necessary. This sort of analysis constitutes the third tier of energy consumption research: not (1) energy per se, or (2) just energy services, but (3) energy-related practices, sometimes addressed as a form and part of general consumption. Following in this vein, indicators of non-discretionary energy consumption might gauge end-users' perceptions and help improve the accuracy of perceptions of "the networks and infrastructures that together shape possibilities and choices that then form the subject of social negotiation" [Shove 1998]. Third tier-type research is at the cutting edge and is rarely done; bringing this perspective to the lay end-user even less so.

This type of treatment of energy consumption departs from conventions when, for instance, it treats demand as malleable in order to posit changing the course of the constant escalation of aggregate energy demand. But in fact, laypersons may be more receptive to the concept of malleable demand, which harmonizes with common folk sense, than analysts or policy makers following the imperatives of the prevailing paradigm or directly beholden to actors who benefit from perpetual demand escalation.

Bottom-up policy and market pull, a form of secondary effect of risk communication, has been suggested as a desired outcome of communication about non-discretionary energy consumption. Focusing on the institutional-cultural/behavioral boundary and the public's understanding of this with respect to consumption and energy use (and climate change) – and encapsulating this in the proper communications or indicator framework – could influence the public's willingness and desire to support environmentally favorable institutional, technological, and cultural changes.<sup>49</sup>

It has been suggested that social norms often follow the evolution of technological systems, or at least that changes in such systems can lead to corresponding cultural or social changes [Wilhite, personal communication 2000]. The direction of causality is important, since the decision makers responsible for technological and related institutional parameters can be much more easily identified and potentially influenced than those accountable for social norms, if they exist at all. However, enhancing the collective socio-technical awareness is also possible and desirable.

It is not our intention to foster an illusion of a full, exercisable capacity for "independent action" vis-à-vis large-scale, historically rooted or entrenched societal forces on the part of end-users or policy makers. Indeed, both may have their largest influential capacities in

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<sup>49</sup> At some point, greater insight may be politically counter-productive. "At a deeper level of global analysis ... a much richer data-bank of information which is of an economic, demographic, and socio-economic-technological interactive nature ... [might] then reveal much [greater] challenges with regard to the need of policy changes, lifestyle changes, industrial, and commercial changes ... and fundamental changes in the mechanisms and framework with presently guide and control the global environment" [Whiston 2000]. The resistance to such deep examination and radical changes would be gargantuan.

times of technological and social change, in moments or at thresholds of opportunity [Shove 1998]. However, such moments seem more common with the increasing pace of change today both in technology and society, as well as the increasing availability of information about these processes. The current techno-economic paradigm is not yet too advanced in its evolution for beneficent shaping of its characteristics, nor are all of its new social norms inexorably entrenched.



## Chapter 5

### Field Experiment with Computer-aided Interviews

*"Change the environment; do not try to change man."*

Design Science, 1969.

*"Everything is foreseen, yet the freedom of choice is given."*

Ethics of the Fathers, 3:19

#### 5.1 Introduction

A major theme of Chapter 4 was lay knowledge, perceptions of, and risk communication concerning, less discretionary influences on energy consumption — their nature, extent, variability, and pliability. Focusing on the institutional-social/behavioral boundary with respect to consumption and energy use, how could one encapsulate it in a communicative framework for laypeople that could enhance their ability or desire to support environmentally favorable personal, technological, social, or other institutional changes? Cutting-edge integrated assessment-based models might be a logical starting point, since they expose some of the deeper social, institutional, and technological connections to energy and environmental trends.<sup>50</sup> Would a reconfiguration of a pre-existing personal and regional energy calculator for Switzerland, a software program based on such a model, be useful in pointing in this direction, at least as a springboard for discussions and questions in interviews or focus groups?

Gregor Dürrenberger and Christoph Hartmann's ECO<sub>2</sub> Calculator program<sup>51</sup> incorporated both the household and national Swiss levels but largely separated them into personal and regional modules. Working together over a period of months to produce interview version 2.0 of the program,<sup>52</sup> we combined elements from the two modules in such a way as to allow the user to pose and at least partly answer the questions described in Chapter 2. The redesigned version would bring less-discretionary elements from the regional model, originally designed primarily for policy makers and planners, into a close interaction with the end-

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<sup>50</sup> Whiston calls indicators that expose the deeper social-institutional connections to environmental states and trends "second-order environmental indicators." These connections are best shown dynamically and interactively [Whiston 2000]. Hypothesized third-order indicators "relat[e] to values, laws, legislation (and their influence, effectiveness, failure points, obstacles and barriers ... and the underlying rate of change," and thus seem in some ways enhanced "response" indicators from the Pressure-State-Response environmental indicator typology. The interviews explored the acceptability, utility, and workability of second-order type indicators for lay users.

<sup>51</sup> The latest Internet versions of the original personal and regional ECO<sub>2</sub> calculators, respectively, can be accessed at [http://www.novatlantis.ch/eco2\\_pers/](http://www.novatlantis.ch/eco2_pers/) and [http://www.novatlantis.ch/eco2\\_regio/](http://www.novatlantis.ch/eco2_regio/)

<sup>52</sup> Gregor Dürrenberger and Christoph Hartmann, Der persönliche ECO<sub>2</sub> Rechner, Interview-version 2.0, 2001, ETH Zürich.

users' familiar household variables. In order to answer the posed questions and other descriptive questions more fully, to test the hypotheses, and to gauge such a program's usefulness as a tool for communication and education, it was clear the final program should be tested in an interview or focus group setting. Although focus groups would have added an element of social dynamism, the novelty and pioneering character of this effort, as well as constraints on time and manpower, argued for beginning with a set of pilot structured interview sessions.

## **5.2 Software development and modeling**

This section is adapted from a text provided by Gregor Dürrenberger and Christoph Hartmann, the principal software developers.

### **5.2.1 Previous version of the Personal ECO<sub>2</sub>-Calculator**

The Personal ECO<sub>2</sub> Calculator software tool was designed to give people a detailed accounting of how much energy they use in their daily lives. The program subdivides the individual user's energy balance (also called profile or budget) into 13 categories of everyday life: housing (or "living"), diet, private transportation (car), public transportation (train/bus), air travel, heating, miscellaneous consumption, and public services. All categories except the last three have a direct as well as an embodied (grey) component.

As output, users can choose among any combination of the following two output variables:

1. Gross energy, end energy
2. Energy (gigajoules per year or watts), CO<sub>2</sub> (tons per year)

As input, users set the values of the model variables and of selected technical parameters according to their personal situation (see Table 5-1). The output, the individual energy balance or profile, is always visible on the interface, its categories are color-coded to match the color of the corresponding input fields on the interface, and it reflects the impact of every change in input in real-time.

### **5.2.2 Interview version of the Personal ECO<sub>2</sub>-Calculator**

The ECO<sub>2</sub>-interview version tunes the Personal ECO<sub>2</sub>-Calculator according to the needs of this particular study. It does not differentiate between output variables: All results are given in (gross) energy units (gigajoules per year or watts). The interview version consists of the original Personal ECO<sub>2</sub>-Calculator and extended features, as well as an additional long-term screen with individual and Swiss aggregate energy displays.

As an extension of the original Personal ECO<sub>2</sub>-Calculator, the ECO<sub>2</sub>-interview version allows users to compare their current energy consumption with a series of possible alternative (in our interview context, conservation) consumption patterns. The program permits

users to generate and save alternative profiles, corresponding to short and mid-term behavioral and purchasing changes, in addition to their status quo profiles.

On the separate long-term screen (Figure 5.1 and Figure 5.2) unique to the interview-version, long-term social and technological changes can be specified in order to account for non-discretionary impacts on personal budgets. Apart from a trend assumption reflecting conventionally projected social and technical development out to the year 2030, users can define individual projections by varying 14 social and technical parameters. Of these, 6 (energy efficiencies in industry, household, and mobility sectors) have been modeled to show a direct impact on the user's individual profile, while 8 of them (development of demography, household size, per capita use of floor space, and mobility trends) have no impact on the individual's profile but are relevant for overall Swiss energy requirements (i.e. their impacts register on Swiss aggregate (national) and average energy budgets also displayed on the long-term screen). These latter graphs were used for long-term benchmarking. Each parameter can be set at five different levels: 2030 trend level, two levels above, and two below.

Table 5-1 shows the list of input options and buttons (model variables and model parameters) for the interview version. The table's first column "Output category" indicates which output category the input option affects. The second column describes the input's Excel button or object with a keyword. The third column indicates whether the program's model sets the variable or parameter by tuning the respective Swiss lifestyle average to the individual user's specifications, labeled as *tuned*, or whether it sets the value by accepting the user's inputted technical standard (for parameters) or the appropriate level of energy consumption (for variables). In the latter case the column reads *set*. The table's fourth and fifth columns indicate which input options are typically open to potential short-term behavioral changes in the household and which options are more likely restricted to mid-term changes. These two categories are not pre-defined or absolute, but certain options are more obviously strictly short-term or mid-term – the allocations in the table are "best guesses." Finally, the last column identifies the settable long-term technological or social parameters that were modeled for the long-term screen.

**Table 5-1: Output and input parameters, buttons, types, and specifications in the ECO<sub>2</sub> – interview version**

Output category	Button	Calculation	Short-term	Mid-term	Long-term
Living – house	Age of the building	tuned		X	
Living – house	Living space	tuned		X	
Living – furniture	Quantity of furniture	tuned	X		
Living – articles	Quantity of personal effects	tuned	X		
Living – heating	Additional rooms	tuned	X		
Living – heating	Age of the heating system	set		X	

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<b>Output category</b>	<b>Button</b>	<b>Calculation</b>	<b>Short-term</b>	<b>Mid-term</b>	<b>Long-term</b>
Living – heating	Building insulation	tuned		X	
“	Climate	tuned		X	
“	Sunlight	tuned		X	
“	Percentage of the living space heated with a high and low temperature	set	X		
“	Ventilation	tuned	X		
“	Heating behavior	tuned	X		
Living – hot water	Liters per day	set	X		
Living – electrical appliances	Number	tuned		X	
“	Use (frequency & intensity)	tuned	X		
Living – household appliances	Age	tuned		X	
“	Use	tuned	X		
Living – entertainment equipment	Number	tuned		X	
“	Use	tuned	X		
Diet	Quantity	tuned	X		
“	Composition	tuned		X	
“	Frozen food	tuned	X		
“	Number of restaurant meals	set	X		
“	Cafeteria meals	set		X	
Diet – electrical appliances	Age / Number	tuned		X	
“	Use	tuned	X		
Private transportation – Car/Bike	Type	tuned		X	
“	Mileage	set	X		

Chapter 5 Field Experiment with Computer-aided Interviews

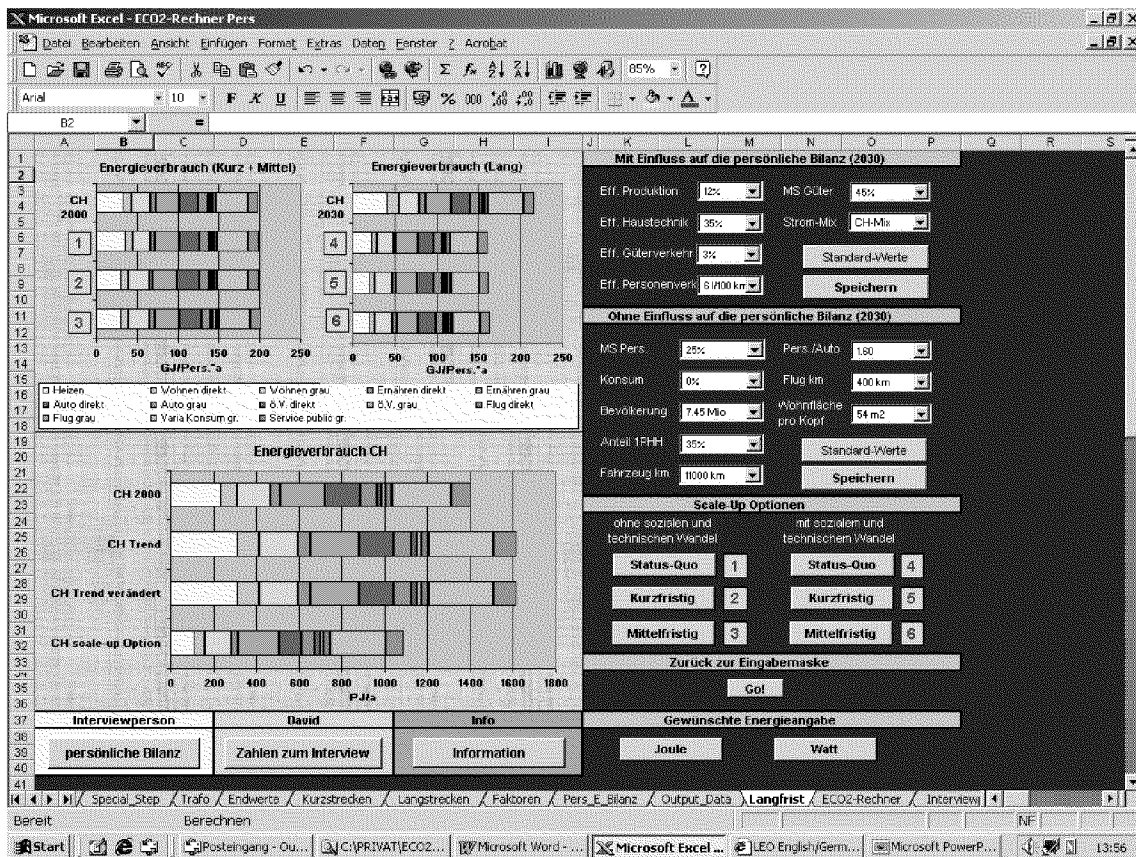
Output category	Button	Calculation	Short-term	Mid-term	Long-term
Public transport – Train/Bus	Mileage	set		X	
Transport – Flight	Mileage	set	X		
Miscellaneous	Printed material	tuned		X	
“	Clothing	tuned	X		
“	Miscellaneous articles	tuned	X		
“	Recreation	tuned		X	
“	Personal services	tuned		X	
General condition <b>with</b> impact on personal budget	Efficiency in industrial production of goods and services	tuned			X
“	Efficiency of domestic heating, A/C, ventilation	tuned			X
“	Efficiency of transportation of goods and services	tuned			X
“	Efficiency of personal transportation vehicles	tuned			X
“	Modal split of transportation of goods and services (% train vs. truck)	tuned			X
“	Method of electrical power production	tuned			X
General condition <b>without</b> impact on personal budget	Modal split of transportation of people (% train vs. car)	tuned			X
“	Material Consumption	tuned			X
“	Population	tuned			X
General condition <b>without</b> impact on personal budget	Percentage of one-person-households	tuned			X

Output category	Button	Calculation	Short-term	Mid-term	Long-term
"	Car mileage	tuned			X
"	Vehicle occupancy (pers/car)	tuned			X
"	Flight mileage	tuned			X
"	Living space per person	tuned			X

The program allows users to run through the options twice for each time-horizon and saves all four data sets for later analysis.

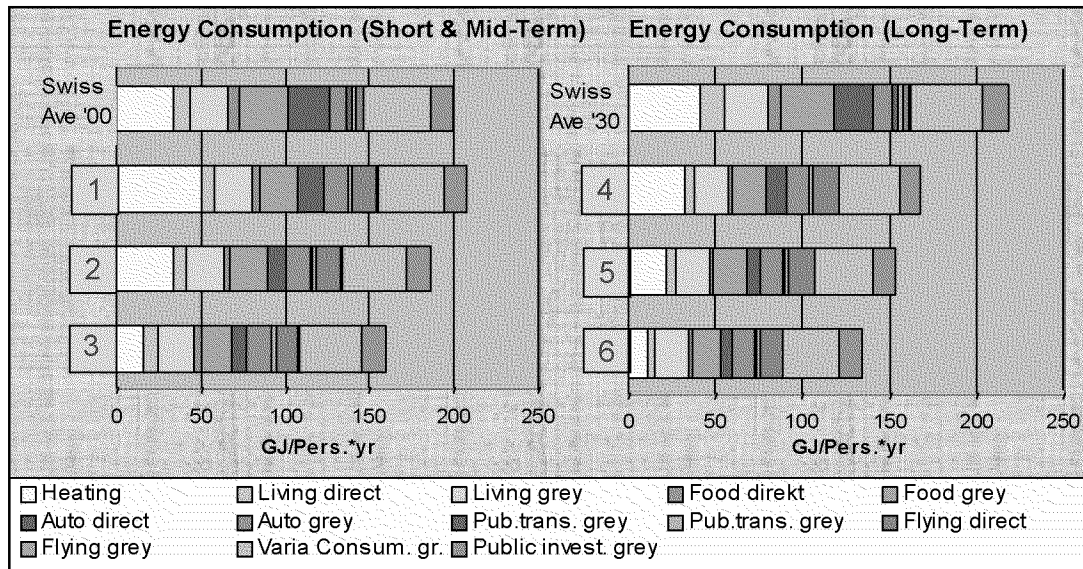
Figure 5.1 shows the graphical interface for the entire long-term screen with all output patterns. Various output graphs are displayed on the left and settable parameters (as well as some other program function buttons) on the right. The left-hand output display is divided into two parts. The upper part shows two sets of personal energy balances with four bars each, while the lower part exhibits data for aggregate Swiss national energy consumption.

Figure 5.1: Long-term (non-discretionary) screen



The left set of the displayed personal energy balances comprise, from top to bottom, the Swiss per capita average in 2000 and the user's three personal energy balances generated in the first ECO<sub>2</sub> screen, i.e. the user's status quo, short-term, and mid-term conservation profiles. The right-hand set of personal energy balances consists of the matching graphs on the left under the hypothetical influence of (tuned to) the technological parameters at levels set by the program user (far right). A close-up snapshot of these eight graphs from a typical interview session is offered in Figure 5.2 below.

**Figure 5.2: Close-up of individual user output from long-term screen, with key for color-coded categories**



The lower output section in Figure 5.1 shows various energy profiles for the whole of Switzerland (in petajoules or gigawatts). The first bar shows Swiss energy consumption in 2000, subdivided according to the same categories as in the individual profiles. The second bar shows the projected trend values for 2030. The third bar shows Swiss energy consumption in 2030 according to the parameters set by the user. The final part displays results from applying the scale-up function by means of buttons on the lower right. This function is designed as a long-term thought-experiment: How much energy would be consumed in Switzerland if everyone's consumption behavior resembled the user's? Using the buttons on the lower right, each of the individual energy balances, i.e. status quo, short-term, and mid-term, can be scaled-up with or without the assumption of concomitant long-term social and technological changes.

Output from the program can be inspected visually on the screen or on printouts, and Excel data generated during a session can be analyzed using typical Excel and statistical functions and/or can be exported to a database program.

Further technical details are provided in Appendix C: Energy Modeling for the ECO<sub>2</sub> program.

### 5.3 Interview recruitment

Twenty-one subjects were selected from a pool of candidates ranging in age, income, education, profession (or students' field of study), housing, car use, environmental leanings, and other variables. We did not make a random sampling of subjects but rather selected a subject pool in which a range of characteristics was represented. We decided against sampling randomly since, due to the length and complexity of the interviews and constraints on time and manpower, we did not deem it feasible to conduct a sufficient number of interviews to reach a statistically generalizable sample size. One option that could have potentially allowed statistical inferences to be drawn for the entire population, interviewing only university students, was rejected as too limiting for the purposes of a pilot study experiment and overly tedious for the interviewer. Close to half of the subjects were university students (who were generally more available and in need of the compensation offered, CHF 100 for the session). Student interview sessions lasted an average of three and one-half hours; most interviews were done in single days, with a break in the middle. Later interviews with businesspeople were streamlined to approximately three hours. All interviews were conducted personally by the author, the majority in English.

### 5.4 Interview description and guideline

1. In a set of short preliminary questions, the subject's initial opinions and impressions are assessed, including her degree of engagement with energy problems and environmental issues, her self-ranking as an energy consumer, her most highly consuming activities, faith in technology vs. behavioral change as solutions, and so forth.
2. After various other preliminaries, with help from the interviewer, the subject enters information about her housing, heating, transportation, diet, miscellaneous consumption, and the like (most both direct and embodied) to generate her status quo energy consumption profile in gigajoules or watts per year. She compares her profile to the average and to one for her household type, in total and across categories.<sup>53</sup> She is asked to try to account for the size of the most surprising or largest category in her profile.
3. The subject then goes through the entered activities again and categorizes them according to whether or not she is able to change them in a direction of lower energy consumption, and if so, whether and to what extent she is willing.<sup>54</sup> The subject quantifies the able and willing categories with new choices on the user interface; the program saves these and generates new profiles (up to two, representing short and mid-term conservation efforts). The subject compares them to her status quo profile.

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<sup>53</sup> The categories are listed below in section 5.7.2 "Terms and comments."

<sup>54</sup> The program can naturally also be used in a predictive fashion to show the energy effects of expected future changes, whether increases or decreases. For the sake of illustration and comparison, we quantified only potential downward changes.



4. Moving to the screen with long-term, national non-discretionary factors (Figure 5.1), the subject makes choices in future (or simply hypothetical present) levels of various technological variables or parameters ("Type I" variables), including efficiencies of industrial production, residential and commercial heating/air conditioning/ventilation, and personal and goods transportation; modal split for goods transportation; and electric power generation mix. Each variable has a 2030 trend level and four other levels arrayed around the trend. The effect of implementing these levels produces changes that are shown in corresponding (2030) personal profiles displayed to the right of the status quo short- and mid-term profiles (as well as in the future Swiss average and aggregate graphs). The subject is asked to make a series of comparisons of the effects on the profiles of various levels and combinations of these parameters. The subject is also asked to compare her conservation profile(s) with her status quo profile under the influence of technological changes in order to see under which circumstances such changes are more or less important for reducing her energy consumption than personally initiated changes alone (as reflected in the conservation profiles; i.e. the subject compares graph 4 with graph 3 (or 2) in Figure 5.2, considering total energy, separate activity categories, or both). Technology variables are maximized or minimized, alone or in combinations, to simulate a variety of circumstances; the comparison questions are repeated, and depending on the person, some of the conclusions change as thresholds are crossed.
5. The subject now chooses levels for demographic and social variables in Switzerland ("Type II" variables), including population, percentage of single-person households, modal split for personal travel, general material consumption, average driving and flying levels, auto occupancy rates, and per capita housing floor space. Unlike the technological variables, changes in these variables are not modeled to affect changes in the subject's personal energy profiles, so in order to see their effects, the subject is directed to focus on the Swiss average and/or Swiss aggregate displays.
6. Once everything is set, the subject is asked to assess the effect of all of the combined variables on (future) Swiss energy use, to see which are the most important determinants (and especially whether technological or social predominate); and to muse on the connections between the two classes of variables, here artificially separated.
7. The highest and lowest values for driving and flying are pre-programmed to current US levels and Swiss levels in 1970, respectively. As cross-cultural or cross-temporal illustrations and social thought experiments, the interviewer selects these and asks for the subject's hypothetical personal reactions to a Switzerland in which these levels obtained.
8. As a section follow-up, the interviewer asks whether the subject's perceptions have changed regarding the most important determinants of energy consumption, on a personal or national level, and whether she would now rank herself differently. What is the subject's view of the relative impact of (personal) discretionary vs. non-discretionary factors now that she has seen them both modeled?

9. To contextualize for a moment, how absolutely “non-discretionary” does she consider the modeled technological and social variables? For a given activity sector like heating or transportation, how easily does she think the relevant (modeled) variables could be changed to favorable levels; and what are possible intervention points and pathways for end-users as well as for higher-level decision makers?
10. The final function scales up any of the subject’s personal profiles to Swiss national levels to answer the question: “What would national energy use be if everyone consumed the way I do, now or with conservation measures, and with or without technological changes?” (question 8, Chapter 2). How does the result compare to present or future (trend) levels in Switzerland (as appropriate) and thus how does the subject’s lifestyle compare to others? How do the subject’s scaled-up profiles, even the personal conservation profiles combined with advanced technology, compare to ecological energy thresholds like the 2000 Watt society? What additional, unaddressed parts of the story does this suggest?
11. The interview concludes with short debriefing questions to address some final substantive points and solicit the subject’s assessment of the program and the interview experience.

## 5.5 Data capture, storage, and analysis means

During the interviews data were recorded through a combination of selective cassette recording, pre-prepared worksheets filled out by the interviewer or the subject, on-site handwritten notes, and Excel data generated by the software and saved for each subject at the interview’s conclusion.

Portions of the audio recordings were transcribed or their data otherwise extracted into a Zoot 3.1<sup>55</sup> program database. Zoot and subsequently Excel 2000 served as the main data storage, manipulation, and analysis tools.

## 5.6 Subjects’ biographical statistics

See Table 5-2 for profiles of the 21 subjects.

**Note:** For reporting purposes, subjects were assigned subject numbers and will be referred to in the text by “S” followed by their number, e.g. S8.

**Table 5-2: Subjects’ biographical profiles**

<b>GENDER</b>	16 male, 5 female
<b>AGE</b>	Avg. 32.3, s.d. 11.7
<b>RESIDENCE</b>	Zurich (16), Aarau (1), Brüttisellen (1), Trimmis (1), Lausanne (1), Prilly (1)

<sup>55</sup> <http://www.zootsoftware.com/>

EDUCATIONAL LEVEL	University (undergraduate or higher) 18; trade-school or equivalent: 3.
PROFESSION	13 7 <sup>th</sup> / 8 <sup>th</sup> semester ETH undergraduates, doctoral students, or recent graduates: <sup>56</sup> 8 professionals: private banker (2), bank worker (1), bank director (1), commodity trader (1), business owner (1), biomedical scientist/entrepreneur (1), clergyman (1)
HOUSEHOLD SIZE	Avg. 2.70, s.d. 1.08
HOUSEHOLD INCOME (MONTHLY)	Avg. CHF 7994.74, s.d. 3516.70
PERSONAL INCOME (MONTHLY) <sup>57</sup>	Avg. CHF 3235.00, s.d. 2251.34
HOUSING	18 apartments, one double-apt., two houses
AUTO USE (CAR OR MOTORCYCLE)	10 autos, 2 motorcycles (with autos)
ENVIRONMENTALISM <sup>58</sup>	Avg. 0.79 (neutral to somewhat green), s.d. 1.04
ENGAGEMENT WITH ENERGY ISSUES	Avg. 67.5%, s.d. 29.36%

#### Appendix A: Findings from Two Past Swiss Studies

Appendix A represents the fruits of the author's search for past studies relevant to the hypothesis set. It reviews findings from two past studies of Swiss householders' views on energy, one from the 1980s and the other from the 1990s. *Energy in Everyday Life (L'Energie au Quotidien)* is a summary of findings from 56 in-depth interviews with French-speaking Swiss on the subject of energy, conducted in the 1980s as a study within the Swiss Research Project (NFP) 44. The larger section consists of sociological research into households' energy consumption involved in daily activities like lighting, heating, water use, recycling, and transportation. Urs Dahinden's *Democratizing Environmental Policy (Demokratisierung der Umweltpolitik)* asks how public input can be combined with expert knowledge to further a "democratization" of environmental policy. His empirical case study is based on extensive focus group discussions of the role of economic instruments in energy policy, among them information for consumers and energy specialists. In Appendix A, results and incidental findings from these two studies are selectively discussed and compared. Themes include personal vs. state-corporate responsibility; lay views on the role of information; the evolution of comfort norms and demand escalation; and social shaping possibilities. The author's own investigations and experiments, discussed here in Chapter 5, partly overlap with and partly go beyond these themes.

<sup>56</sup> Students' fields of study: physics (1), food sciences (2), environmental engineering (4), electrical engineering (1), survey engineering (1), biology (1), computer science (1), architecture (1), process engineering (doctoral- 1).

<sup>57</sup> Household income/household size

## 5.7 Results

### 5.7.1 Subject groups

**The three groups:** The groups will be introduced now because much of the further description and analysis makes reference to them.

The subjects were categorized into three groups on the basis of strong patterns suggested by data from the first part of the interview – through the subjects’ encounter and experimentation with technological variables (through step 4 in the interview description above). Up to this point, subjects had formed first impressions of the relative impacts of technological changes compared to those of personal conservation measures, based on their own idiosyncratic energy profiles and considered before demographic and social parameters were introduced on a national scale. I made a short, dense textual summary of all of these data for each subject. I then discerned the three groups by “eyeing” these summaries all at once. (More detail is given in 5.7.5.3 below.)

Subsequent data were analyzed with reference to these three groups and to the data as a whole, and, for a given hypothesis or theme, notable group patterns, or their absence, were described. Often strong group consistency was maintained, which meant that the groups generally proved meaningful across the range of themes in the data. However, these groups are not the only ones that can be formed on the basis of these data, nor, as will be shown, do all the data conform to them.

In the course of the results presentation and discussion we will see to what extent these analytical functional groups hold up as differentiated lifestyle groups of householders who “evolve a variety of approaches to (sustainable) consumption and (co)provision” [Spaargaren 2002].

#### 5.7.1.1 Group I biographical data

Table 5-3: Group I biographical profile

NUMBER	14
SUBJECTS	S1, S2, S3,S4,S8,S9,S10,S12,S13,S14,S16,S18,S20,S21
GENDER	10 male, 4 female
AGE	Avg. 26.6, s.d. 3.86
RESIDENCE	Zurich (10), Brüttsellen (1), Trimmis (1), Lausanne (1), Prilly (1)
EDUCATIONAL LEVEL	University (undergraduate or higher) 14

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<sup>58</sup> Numerical interpretation: 2: very green; 1: somewhat green; 0: neutral; -1: somewhat anti-green (‘pro-growth,’ etc); -2: very anti-green.

PROFESSION	7 <sup>th</sup> / 8 <sup>th</sup> semester ETH students, doctoral students, or recent graduates (13); one bio-medical scientist/entrepreneur of a recent start-up company (1) (This subject was recently a doctoral student.)
HOUSEHOLD SIZE	Household size: avg. 2.77, s.d. 0.93
HOUSEHOLD INCOME (MONTHLY)	Avg. CHF 6825, s.d. 3358
PERSONAL INCOME (MONTHLY)	Avg. 2381, s.d. 1461
HOUSING	13 apartments, one single-family house
AUTO USE (CAR OR MOTORCYCLE)	2 autos, 1 auto and motorcycle
ENVIRONMENTALISM	Avg. 1.25 (somewhat green to green), s.d. 0.67
ENGAGEMENT WITH ENERGY ISSUES	Avg. 76.9%, s.d. 27.9%

#### Group I data summary (through Type I variables in interview step 4)

*(Students, under-average energy consumers, personal/technological “balanced”)*

Group I comprises two-thirds of the subjects. Members are mostly students or recent students who still lead something of a “student” lifestyle (even if now working). They are mostly under-average energy consumers (average deviation from Swiss national average: -30.48 GJ/Pers.\*yr, standard deviation: 26.50 GJ/Pers.\*yr.<sup>59</sup>). They display a modest ability/willingness to reduce in the mid-term: Average: 23.02 GJ/Pers.\*yr, standard deviation: 15.21 GJ/Pers.\*yr.<sup>60</sup> On the question of which has a greater downward effect on their energy consumption, technological (Tech) or personal (Pers) interventions, Group I members generally see a balance between Tech and Pers, often with Pers dominant for Flying and/or Auto and Heating. This balance is usually at least somewhat sensitive to the technological levels reached.

#### 5.7.1.2 Group II biographical data

Table 5-4: Group II biographical profile

NUMBER	4
SUBJECTS	S5, S6, S15, S19
GENDER	3 male, 1 female
AGE	Avg. 37.8, s.d. 11.1
RESIDENCE	Zurich (4)
EDUCATIONAL LEVEL	University (undergraduate or higher) 2; trade-school 2
PROFESSION	Business owner, commodity trader, bank worker, private banker
HOUSEHOLD SIZE	Avg. 1.5, s.d. 0.58

<sup>59</sup>  $\Sigma^m_a$ Status Quo energy consumption -  $\Sigma^m_a$ CH\_average, where a: Heating; ; b: Housing direct; c: Housing grey; d: Diet direct; e: Diet grey; f: Private transportation (Auto) direct; g: Private transportation (Auto) grey; h: Public transportation direct; i: Public transportation grey; j: Air travel (Flying) direct; k: Air travel (Flying) grey; l: Miscellaneous consumption grey; m: Public investment grey (See 5.7.2 “Terms and comments” below).

<sup>60</sup>  $\Sigma^m_a$ StatusQuo1(E\_value) -  $\Sigma^m_a$ Could\_reduce (See 5.7.2 “Terms and definitions” below).

HOUSEHOLD INCOME (MONTHLY)	Avg. CHF 9250, s.d. 3775
PERSONAL INCOME (MONTHLY)	Avg.: 6375, s.d. 2626
HOUSING	4 apartments
AUTO USE (CAR OR MOTORCYCLE)	4 autos
ENVIRONMENTALISM	0.375 (neutral to very slightly green), s.d. 0.629
ENGAGEMENT WITH ENERGY ISSUES	Avg. 56.25%, s.d.12.5%

### Group II data summary

*(Younger professionals, above-average energy consumers, “balanced”)*

Much above-average energy users (average: 144.20 GJ/Pers.\*yr, standard deviation: 74.89) in single- or two-member households (although one, S15, was expecting a child and therefore anticipated some lifestyle changes, and one was a middle-aged man whose children had moved out but who remained in the same large flat), willing to make many changes in the short or more typically mid-term, which may have strong impacts on their energy profiles (average reduction: 77.62, standard deviation: 69.40). They see some balance between Pers and Tech or at least Pers dominance for a few categories (typically at least Flying).

### 5.7.1.3 Group III biographical data

Table 5-5: Group III biographical profile

NUMBER	3
SUBJECTS	S7, S11, S17
GENDER	3 male
AGE	Avg. 51, s.d. 16.5
RESIDENCE	Zurich (2), Aarau (1)
EDUCATIONAL LEVEL	University (doctorates) 2, trade school (1)
PROFESSION	Bank director, private banker, clergyman
HOUSEHOLD SIZE	Avg. 4, s.d. 0
HOUSEHOLD INCOME (MONTHLY)	Avg. CHF 11000, s.d. 1732
PERSONAL INCOME (MONTHLY)	Avg. 2750 s.d. 433
HOUSING	1 house , 1 apartment , 1 double-apartment
AUTO USE (CAR OR MOTORCYCLE)	2 autos, 1 auto and motorcycle
ENVIRONMENTALISM	Avg. -0.833 (somewhat anti-green), s.d. 1.26
ENGAGEMENT WITH ENERGY ISSUES	Avg. 41.66%, s.d. 38.19%

### Group III data summary

*(Family professionals, average energy consumers, personal change-resistant)*

Average or somewhat above-average energy users (average: 21.59, standard deviation: 27.03), all with larger (four) member households, resistant to any change in personal behavior or circumstances (minimal changes and/or energy impacts; average reduction: 7.12, standard deviation: 1.59). They recognize that their personal energy profiles are affected almost

exclusively by technological, rather than personal, changes (even though they later see that aggregate behavioral and demographic parameters may have a strong influence on national consumption).

Table 5-6 shows a simple summary of some of the groups' differentiating characteristics. (The last column, "μ Pers vs. Tech" (a dependent variable), conveys which type of intervention, personal or top-down technological measures, is most effective on average for that group, and is recognized as such.)

**Table 5-6: Groups I, II, and III in simple contrast**

	Age	Energy use	Household size	μ Pers vs. Tech
Group I	↓	↓	↑	=, Pers
Group II	–	↑	↓	Pers
Group III	↑	–	–↑	Tech

### 5.7.2 Terms and comments

As preliminaries, here are the English<sup>61</sup> terms for the energy sectors comprising the energy profiles (both individual and national):

a: Heating;

b: Housing (Living) direct;

c: Housing grey;

d: Diet direct;

e: Diet grey;

f: Private transportation (Auto) direct;

g: Private transportation (Auto) grey;

h: Public transportation direct;

i: Public transportation grey;

j: Air travel (Flying) direct;

k: Air travel (Flying) grey;

l: Miscellaneous consumption grey;

m: Public investment grey

Numerical energy values are sometimes referred to using this labeling. For example, StatusQuo<sup>®</sup> refers to the energy value of the Diet grey activity (in gigajoules per year) in a

<sup>61</sup> The program user interface was in German.

user's status quo energy profile.  $\Sigma(\text{StatusQuo})^{m_a}$  refers to the sum of all the energy sector (i.e. activity type) values across the user's status quo profile, i.e. his total (yearly) energy use.

The short and mid-term conservation profiles generated in the first part of the interview (step 3) were referred to during the interview by the terms *can reduce* (and would) and *could reduce* (and would),<sup>62</sup> respectively. Changes the subjects identified as possible but personally undesirable (nuances explored only in the longer, student version of the interviews) were called *can reduce but don't want to* (in the short-term) and *could reduce but wouldn't want to*<sup>63</sup> (mid-term). Unchangeable items were sometimes labeled *cannot change* (and in the streamlined interviews this latter category was the catch-all alternative to *could reduce (and would)*, implying any changes the subject could not and/or would not undertake). These terms are sometimes used in the short-hand formulas or discussion below.

### Note on correlation analysis

As part of the analysis, correlations were calculated between the quantitative data results (including the Before/After questions) and the variables age, household size, personal income, green-ness, and energy-engagement. Correlations were calculated across all subjects (group correlations were not done). Where relevant, a summary of the moderate correlations found and some interpretations are provided. Moderate correlations are defined to have correlation coefficients from  $\pm .40$  to  $\pm .80$ . There were no strong correlations found ( $< -.80$  or  $> .80$ ). Where no mention or comment is made, the correlation is weak ( $> -.40$  or  $< 0.40$ ).

*The following presentation of results is organized loosely around the hypotheses and related themes. Within each section, units of data, sometimes corresponding to individual interview questions, are grouped and ordered for clarity.*

## 5.7.3 Hypothesis F (partial)

### 5.7.3.1 Comparison of subject's status quo totals to the Swiss average<sup>64</sup>

#### Deviation of subject's status quo energy use from the Swiss average

$$\Sigma^{m_a} \text{StatusQuo} - \Sigma^{m_a} \text{CH\_average}$$

Table 5-7: Deviation of subjects' status quo energy use from the Swiss average

	Average (gj/person-yr)	Standard Deviation
Total	3.5315	71.94647
Group I	-30.48214	26.50401
Group II	144.2033	74.88531

<sup>62</sup> (*Das kann ich tun* and *könnte ich tun* in the German.

<sup>63</sup> (*Das kann ich tun aber will ich nicht* and *könnte ich tun aber würde ich nicht*

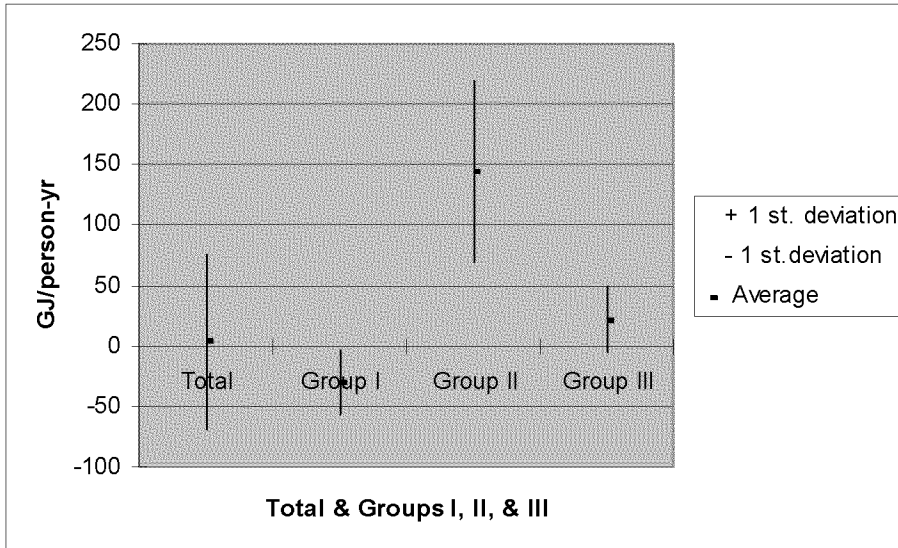
<sup>64</sup> One should not discount the possibility of users deliberately or unconsciously underestimating the amount of energy they use so as to appear better or more conserving. Their actual profiles may be larger.



Group III | 21.59

27.02737

Figure 5.3: Deviation of subjects' status quo energy use from the Swiss average



The groups' average departure from the Swiss national average energy consumption has been commented on above under the respective group data summaries.

To take direct electricity use as an example, electricity for Living direct (which includes lighting and household appliances), as well as for Diet direct (which includes stove, oven, refrigerator, freezer, and kitchen appliances) was slightly below the Swiss average overall and for Groups I and II, and slightly above average for Group III. All groups, however, used somewhat more electricity for Public transportation than the average.<sup>65</sup>

#### A sample standard deviation of subject's status quo energy use from the Swiss average

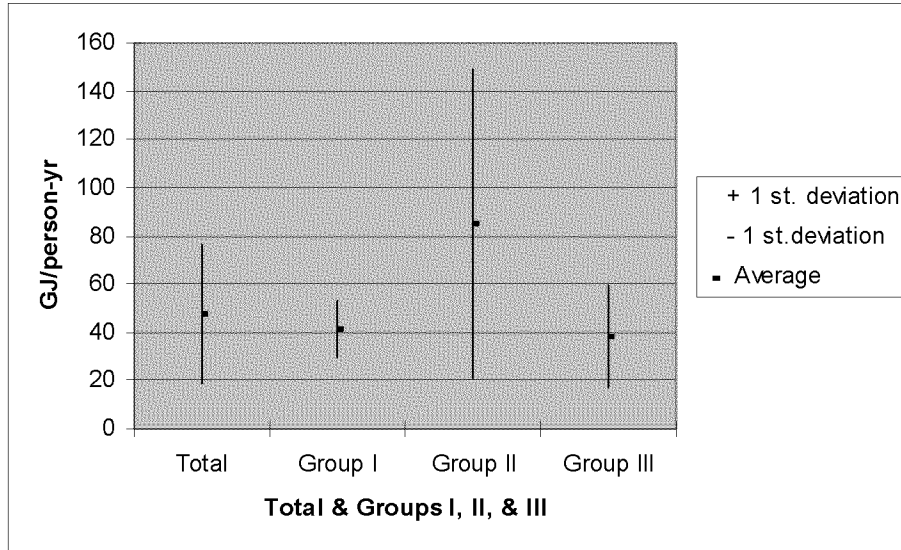
This is defined as the root of the sum of the square of differences between the subject's sectoral status quo values and Swiss average sectoral values. This conforms with the general direction of the deviations shown in Table 5-7 and Figure 5.3.

Table 5-8: Sample standard deviation of subject's status quo energy use from the Swiss average

	Average (gj/person-yr)	Standard Deviation
Total	47.278	28.85
Group I	41.162	11.642
Group II	84.943	63.825
Group III	38.15	20.926

<sup>65</sup> Given the large number of subjects who live in Zurich, with its outstanding public transportation system, this is to be expected.

Figure 5.4: Sample standard deviation of subject's status quo energy use from the Swiss average



### 5.7.3.2 Correlations

Correlation between deviation of subjects' status quo energy use from the Swiss average and personal income: 0.679. Correlation between standard deviation of subject's status quo energy use from the Swiss average and personal income: 0.455. Correlation between Deviation of subject's status quo energy use to the Swiss average and household size: -0.404.

The income correlations could be expected to be sizeable. Income is well known to be one of the best predictors for energy use. The positive correlation with income is almost strong: the first statistic, 0.679, is one of the strongest correlations found among all the quantitative, correlatable data. No meaningful (moderate) correlations were found with age, green-ness, or energy-engagement.

**Note:** Further exploration of comparisons between individual and aggregate behavioral data are discussed below under 5.7.7 "Hypothesis G: Cross-temporal and cross-cultural comparisons" and 5.7.8.1 "Hypothesis F (completion): Elusiveness of the 2000 Watt society. Why is future Swiss national energy consumption so large (even with optimistic assumptions)? Is this inevitable?"

### 5.7.4 Hypothesis A: Discretionary Exists and Hypothesis B: People Distinguish

#### 5.7.4.1 Number of items the subject assigns to can (and would) reduce

This is the number of items assigned to *can/could reduce (and would)* for the conservation profile(s) (step 3 in the interview). This statistic was tracked for each subject but there is no numerical summary for the total or per group. I did not deem this as meaningful as the energy impact of the subject's choices for these categories: This is calculated and summarized in the other profile numbers here.

The number of items assigned to *can reduce but don't want to* and *could reduce but wouldn't want to* as well as *cannot change* was also tracked for each subject but there is no numerical summary for the total or per group.)

#### 5.7.4.2 Total amount of energy reduced from status quo personal profile through short-term conservation steps

$\Sigma^{m_a} \text{StatusQuo} - \Sigma^{m_a} \text{Can reduce}$

(Note: The data is incomplete: Short-term reductions were only consistently explored in the longer student-versions of the interviews. This means that mostly only Group I data is reliable.)

Table 5-9: Total energy reduced through short-term conservation steps

	Average (gj/person-yr)	Standard Deviation
Total	15.3925	34.7625
Group I	6.405	7.421258
Group II	(66.23)	(80.9845)
Group III	(6.496667)	(1.90266)

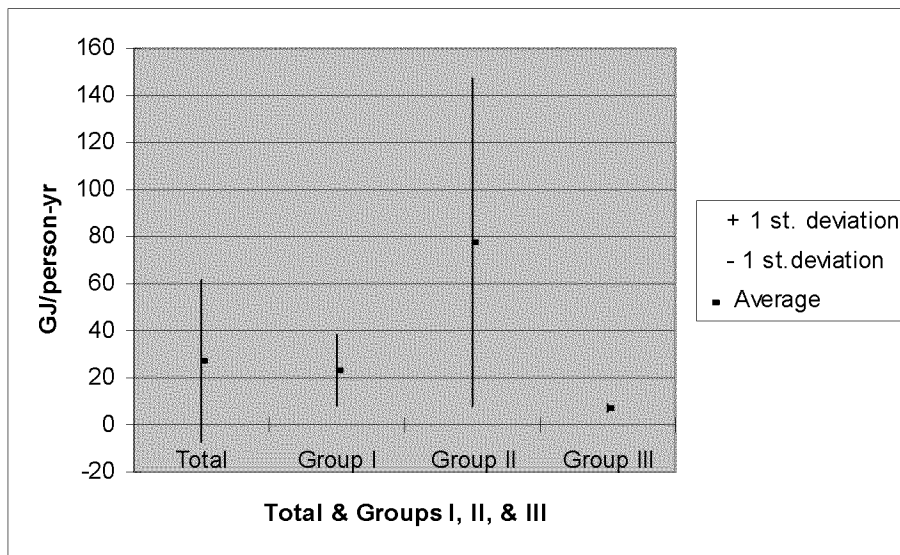
#### 5.7.4.3 Total amount of energy reduced from status quo personal profile through mid-term conservation steps (inclusive of short-term steps)

$\Sigma^{m_a} \text{StatusQuo1} - \Sigma^{m_a} \text{Could reduce}$

Table 5-10: Total energy reduced through mid-term conservation steps (inclusive of short-term steps)

	Average (gj/person-yr)	Standard Deviation
Total	27.139	34.1
Group I	23.022	15.21
Group II	77.62	69.3961
Group III	7.12	1.59

**Figure 5.5: Total energy reduced from personal profile through short and mid-term conservation steps**



As noted in the group data summaries, Group I is willing to make moderate quantitative energy reductions (close to the overall average), Group II more significant reductions, and Group III minimal ones.

#### 5.7.4.4 Correlations

**Short-term energy reductions and personal income: 0.6812. Mid (and short-) term energy reductions and personal income: 0.5776.** These two are again among the highest if not the highest correlations found in the data. One interpretation is that those with higher incomes have more flexibility to reduce in the short and mid-term, in that their larger budgets offer some non-essential (financially discretionary) cushion in money and linked energy expenditure which can be reduced, and which subjects are willing to reduce to some extent. Several of the highest income earners from Group II acknowledged this when they differentiated between “need to have” and “nice to have” in their expenditures and activities. Restraint may occur at all levels of income, but the higher levels offer more opportunities for substitution and painless reduction. By contrast, a number of low income subjects from Group I saw themselves as living closer to the level of basic needs with minimal possibilities further to reduce energy expenditures. This aspect of *discretionary*, then, is quite similar to the economic notion of *discretionary income*.

**Mid (and short-) term energy reductions and household size: -0.423.** As noted in Group III’s data summary, members of this group, older family professionals with the consistently largest household size, are most resistant to changes from their status quo.

We note that in the subjects’ viewing the energy profile and reduction possibilities as a whole across all household activities, it is possible to let reductions in one sector compensate for increases in another. If we permit the user to change the base information that includes

household size (generally not done in the sessions), she can even “game” the program, for instance, by increasing air travel but simulating a growth in family household size that reduces her personal (individual) energy balance. These sorts of games, in which one sector is played off another, are possible when only the total profile energy is set as the target to minimize and not that of individual sectors. Such strategies fail if one reckons by sectoral energy (or overall CO<sub>2</sub> or climate-forcing effect).

### **5.7.5 Hypotheses C, D, and E: (Non)discretionary accounting, (Mis)perception of non-discretionary, and Communication about Non-discretionary**

#### **5.7.5.1 Average of subjects’ predictions for Type I (technological) parameters**

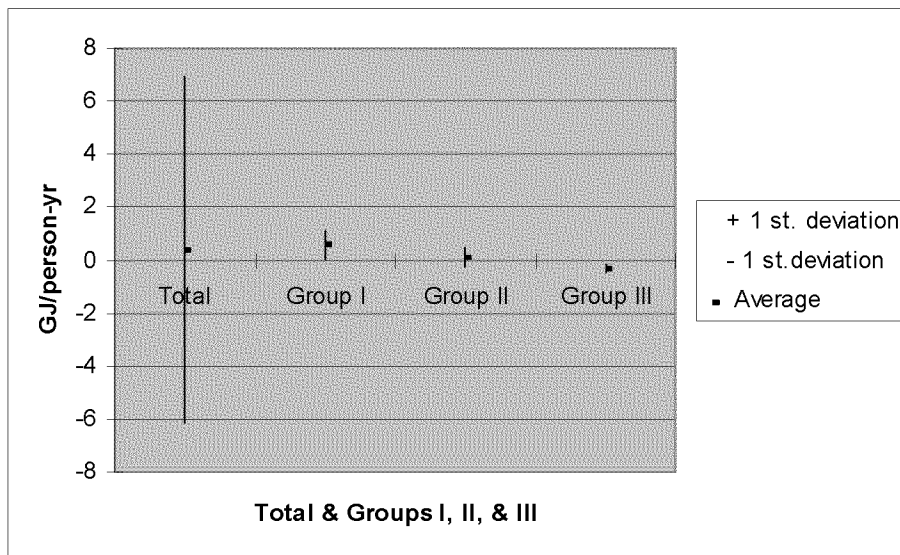
As a means of soliciting subject involvement with the use of the program during step 4 of the interviews, subjects were asked to choose values for the modeled non-discretionary parameters, Type I (technological) and Type II (social, demographic). Since the model uses them as inputs into long-term 2030 scenarios, we asked subjects for their “predictions” in making a choice from the five levels offered for each, trend levels and two above and below trend. We explained that we were not striving for accurate predictions, and that in fact an alternate view of the parameters was as a new set of broad hypothetical societal conditions to impose instantaneously ‘on top’ of the subject’s set of behavioral choices, as it were. Nevertheless, the subjects’ predictions of the evolution of these variables, averaged for a given subject and then over subjects, yields some interesting, if slightly tangential, information on their levels of technological optimism and guesses as to Switzerland’s future social evolution.

For each Type I parameter, the subject’s choice among the five levels was assigned a number from -2 to 2, with the trend value assigned 0, more technologically optimistic (higher efficiency) predictions than the trend assigned 1 or 2, and less optimistic than trend assigned -1 or -2. These ratings were then averaged across parameters, yielding values ranging from -2 (highly pessimistic) to 2 (highly optimistic), with 0 a match with trend. These in turn were averaged for the subjects as a whole and within Groups I to III. These averages are reported in the table below.

**Table 5-11: Average of subjects’ predictions for technological parameters (technological optimism)**

	Average	Standard Deviation
Total	0.39	6.53
Group I	0.57	0.50
Group II	0.10	0.35
Group III	-0.30	0.14

**Figure 5.6: Average of subjects' predictions for technological parameters (technological optimism)**



### Correlations

**Technological optimism and age:** -0.51; and **green-ness:** 0.469; and **energy-engagement:** 0.596. In words, the younger, the more technologically optimistic, and the greener or especially more engaged with energy issues the subjects were, the more technologically optimistic they appeared. The correlation with green-ness is somewhat unexpected, especially as green-ness often connotes a suspicion of technology. The several levels of abstraction and grossness in the measure of green-ness, and the only moderate correlation, is one explanation. Another is the possibility that environmentalists are more technologically optimistic in (our sample in) Switzerland, perhaps combining rational-scientism and ecological consciousness (and thereby appearing to be good candidates for ecological modernization in a strict sense [Cohen 2000]).

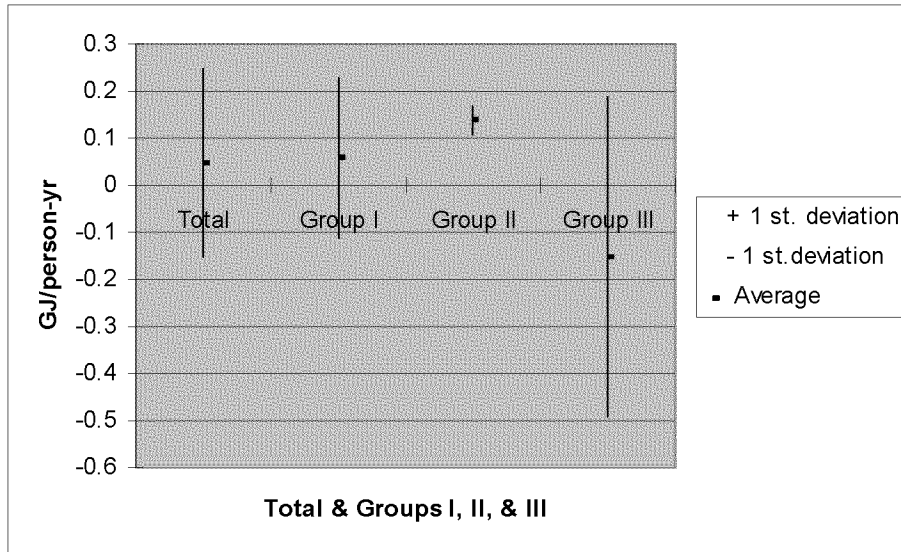
#### 5.7.5.2 Average of subjects' predictions for Type II (social) parameters

Subjects' choices of Type II parameter levels in interview step 5 were similarly ranked, averaged, and then averaged over subjects and groups. For each Type II parameter, the subject's choice among the five levels was assigned a number from -2 to 2, with the trend value assigned 0, higher activity/demographic levels than trend assigned 1 or 2, and lower activity/demographic levels assigned -1 or -2. These ratings were then averaged across parameters, yielding values ranging from -2 to 2, with 0 at trend. These were then again averaged across the subjects and the groups. As the table and graph show, all averages lie very close to the trend. (This clearly reflects subjects' uncertainty and lack of predictive confidence: When unsure, most pick the trend value.)

Table 5-12: Average of subjects' predictions of social parameters

	Average	Standard Deviation
Total	0.05	0.20
Group I	0.06	0.17
Group II	0.14	0.03
Group III	-0.15	0.34

Figure 5.7: Average of subjects' predictions of social development



### 5.7.5.3 Effects of Type I parameters on subjects' profiles and the analytical extraction of Groups I-III

As described above in step 4 of the interview, subjects experimented with various (combinations of) levels of technological (Type I) long-term parameters and observed the modeled effects on their personal profiles, especially noting the impact on their status quo profile compared to what they could (and would) achieve by personal steps alone. This latter comparison was carried out when the first parameter, efficiency of production, was set (and the others remained at their default trend levels), and it was repeated when efficiency of production was maximized or minimized, after all Type I parameters had been set, and again after all Type I parameters had been maximized or minimized.

These experiments allowed subjects to form first impressions of the relative impacts of Type I ('Tech') changes as compared to those of personal conservation measures ('Pers'), assessed of course only on the basis of their own idiosyncratic energy profiles and considered before Type II parameters were introduced on a national scale. The subjects' perceptions of the Tech-Pers comparison, as extracted from interview questions, were individually analyzed, but no total or group summary statistics were generated. Instead, a short, dense textual summary was made for each subject of these data and all of the prior data since the start of the interview. These were "eyed" and from them the three basic groups I, II, and III were

discerned. Their construction and descriptions, as reported in the group summaries above (5.7.1), were based on these textual summaries.

### **Subjects' interim conclusions concerning effects of Type Is on their energy profiles**

Step 4 of the interview concluded with a few overall open questions:

"What do {the preceding exercises} tell you about what's important to reduce your own energy consumption?"

"In general, what does this exercise alone suggest to you in terms of energy conservation policy?"

The main part of these results entered into the textual summaries that formed the basis of the groupings. A selection of additional salient comments from group members follows:

#### **Group I**

There were varying opinions in Group I on the difficulty of inducing personal or technical change – in addition to, and independent of one's stand on, the belabored issue of which is more effective in reducing energy consumption (this is explored further below, for example in 5.7.8). S2 found personal change generally more effective for her profiles, except at the highest efficiency levels, which she deemed unrealistic and in any case less easy to achieve than her own changes in the mid-term. But she still viewed personal change as harder to effect than normal levels of efficiency improvements, even though technological change faced significant political barriers. S10, by contrast, judged technological change to be more effective overall, but similarly found efforts to induce it more likely to bear fruit than trying to convince people to behave more "reasonably" (more "efficiently" per unit effort expended). Others refined this to suggest investing in the most (cost) effective Type I variables. For example, S3's experience with the software showed him that improvements in goods transportation efficiency do not seem to produce such dramatic reductions overall as equivalent improvements in personal transportation.

After completing the exercises with Type I variables alone, some believed in the feasibility of a technological fix if the technological improvement were sufficiently high. S8, for example, at first concluded: "It's comfortable, too comfortable: I needn't do anything {but wait for technological development}," but later (after seeing the operation of Type II variables on the aggregate) he lowered his confidence in Type I variables alone.

Among those of Group I who discovered that personal change was more effective and thought it was easier to achieve, some (e.g. S18) said they would put their greater awareness into action in the household and assumed other similarly enlightened householders would do the same. However, other subjects (e.g. S12) said they would not substantially change their behavior as a result of seeing its significance in areas like transportation and flying demonstrated during the interview sessions.

S21 said she believed the processes of personal and technological change could reinforce each other. When citizens see the government taking an active role in stimulating technologi-



cal improvement for environmental benefits, they are better prepared psychologically to do their part to conserve. Higher energy prices help reinforce this psychological effect, and independently they stimulate market forces to promote innovations in efficiencies.

Several subjects – including S8, S14, and S18 – spoke as if they assumed that findings true of their own profiles applied to everyone. S14, for example, was excited at discovering that a few relatively small personal changes (trivial compared to most of the efforts necessary for diffusing better technologies, he said) could dramatically improve his heating profile, and he wanted to conclude that this was generally the case. In such instances, we pointed out to the subject that these properties were highly particular to the individual's profiles and not necessarily generalizable: We would soon examine the situation in the aggregate.

One subject in Group I (S18) differentiated technological improvements in categories according to the evenness of the distribution of their use or impact on the general population. Food and Living, he said, are activities done by everyone, so efficiency improvements here would be felt everywhere across the population. Flying, however, is still a more privileged activity, and technological progress in this area would not redound to the benefit of the whole population. In applying this egalitarian reasoning, S18 implicitly took an approach more typical of environmental justice than a global CO<sub>2</sub> emissions perspective. If in doing so the subject viewed energy use as representative of broader consumption, environmental, or even sustainability impacts, his perspective would be understandable and useful in that context.

### **Group II**

In Group II, S15 concluded that personal steps were more important than any steps industry might take, since it is the individual who decides whether to place efficiency or environmental performance ahead of cost in her purchasing decision. However, efficiency improvements are necessary, and consumers must also (collectively) exert market pull to compel manufacturers to generate them. For her the direction of the impulse is clearly bottom-up: Manufacturers respond to expressed consumer demand, and they would not try to impose highly efficient products on uninterested consumers.

S5 judged technological change and behavioral change to be roughly equal in effect but technological change to be more time-consuming (2030) and uncertain. Behavior is much more quickly amenable to change on an individual level, but the difficulty here is in the scale: it is much harder to motivate and reinforce across major portions of the population. Still, through the use of market instruments and, secondarily, possibly legal measures, it is still perhaps faster and surer than promoting technological change.

### **Group III**

In Group III, S17 found technology dominant in effect but cautioned that the pace of development of energy-saving technologies was highly dependent on whether (price) incentives to save energy were in place.

#### 5.7.5.4 Advanced technology's effects on individual conservation behavior

Another question asked as a follow-up to the experiments with Type I variables in interview step 4 was the following:

"... Put another way, would any of your choices for "Can change" (conserving measures) be different under these new technological conditions? Which ones?" {i.e. how constant would your behavioral choices be under different assumptions about technological progress?}

This issue appeared to have been generally too difficult or abstract for subjects to address confidently, casting doubt on the validity of the answers received. Nevertheless, the following is a summary of results:

In Group I, all subjects believed their behavioral choices would not change under different technological conditions, except for two subjects: S20 and S4. S20 answered the question by imagining that improved technology would facilitate behavioral changes, e.g. technology would make it easier instantly to switch off heating with one flick of a switch, just as one currently does with lights (many Swiss apartments lack such a central control).

S4 answered that with improved information technologies his use of printed material from computer printers (a part of Miscellaneous Consumption grey) would be reduced. On much faster, reliable, and comfortable computers and networks, he could store more information digitally without having to print out for convenience or as a backup. He also imagined a single unit combining many different multi-media applications such as computer, stereo, and television.

In Group II, two subjects (S15 and S19) answered negatively, while S5 and S6 answered in the affirmative. The latter two noted the possibility of a change in the direction of greater energy use, for example using the car more if it were much more efficient (individual rebound) or purchasing an air conditioner or microwave if one knew it used significantly less energy than it does presently. S5 probed the question's meaning subtly, noting that it was both his knowledge and awareness of advanced technology as well as the actual technological advances that might affect his behavior:

*Subject:* Does technological progress change one's behavior? Yes, of course it does. Also knowing that my car uses only 2 l/100 km would (also) change my behavior {in the direction of greater consumption}.

*Interviewer (DG):* Would it have to be strong technological progress to change the behavior {i.e. what is the technological elasticity of your behavioral change}?

*Subject:* That's very difficult to answer.

Group III subjects answered negatively or could not give an answer. S17 insisted his behavior would be affected mainly by price changes. While acknowledging a feedback between price and technological changes, he characteristically insisted prices were the prime mover.

**5.7.5.5 BA4: Ability to influence personal energy consumption**

One of the analytical features built into the interviews was a cluster of time<sub>1</sub>/time<sub>2</sub> (t<sub>1</sub>/t<sub>2</sub> or Before/After “BA”) questions designed to measure the subjects’ degree of learning or opinion change over the course of the interview. Some of the results of these measures are reported later in this chapter in section 5.7.9.1 “The program and interview as a communicative/educational tool: Subjects’ degree of learning over the course of the session.” Other results, however, relate to views on the relative impacts of technological (or other higher level) interventions and personal steps and are appropriate to discuss here.

Definitional note for the Before/After (BA) questions: In general, we examined the difference between the state of the variable at t<sub>1</sub> and its state at t<sub>2</sub>, that is, the paired difference  $d = \text{variable } \alpha \text{ } t_2 - \text{variable } \alpha \text{ } t_1$ . Thus,  $\alpha$ ’s levels can be assigned any numerical value, as long as the same value scale is used at both t<sub>1</sub> and t<sub>2</sub>. If there is no change, the paired difference is 0 (nil). For closed questions like the subject’s self-ranking as an energy user (below), the variable can take on between 3 and 5 values, which when consistently assigned ordinal rankings, means that the most the paired difference can be is 4.

Note also that methodological problems with some interview questions, apparent only after the fact, made certain Before/After comparisons partially invalid and conclusions based on them therefore suspect. Reported here are only those comparisons that seem reliable and defensible.

The constituent answers in the Before/After questions were quantitative or were assigned ordinal rankings where possible, in order to allow for a numerical (often percentage) or quasi-numerical measure of change from time<sub>1</sub> to time<sub>2</sub>. In this case the average change for the total (all subjects together) was -3%, i.e. a slight downward revision in subjects’ assessment of their ability to influence their personal energy consumption. Group I’s average was -6%, twice the total average, suggesting the session brought home to some members of Group I the limits of their ability (or willingness, with which ability may be conflated in approaching this question) to influence their personal profiles. Groups II’s average was +6%, twice the total average in the positive direction, but this was due to just one subject who saw a 25% greater personal influence by the end of the session. All Group III’s members showed no change.

It should be noted that one of the questions used to measure this assessed change over time was an (optionally open) Yes-or-No question.<sup>66</sup> As for the answers themselves, the majority said ‘Yes, I can influence’ at both t<sub>1</sub> and t<sub>2</sub>, two affirmative answers which produced a 0% change over time. The exceptions were one member of Group I, S9, who had essentially ‘No’ answers for both t<sub>1</sub> and t<sub>2</sub> and showed only a difference in degree. One member of Group III, S7, gave categorical ‘No’ answers at t<sub>1</sub> and t<sub>2</sub> (“I can’t change anything, I use what I need and need what I use” (again showing a possible conflation as noted above)). One mem-

<sup>66</sup> Do you feel you have some personal ability to influence (“decision making capability” over) your energy consumption?

ber of Group I, S4, apparently had a complete reversal of opinion from 'Yes' to 'No' (He said what he used was quite low and that he could not reduce further) but we assigned this -50% as a hedge against the subject's possible misinterpretation of the question and thus invalidation of that result.

#### **5.7.5.6 BA5: Importance of behavior/personal factors in determining subjects' current energy use**

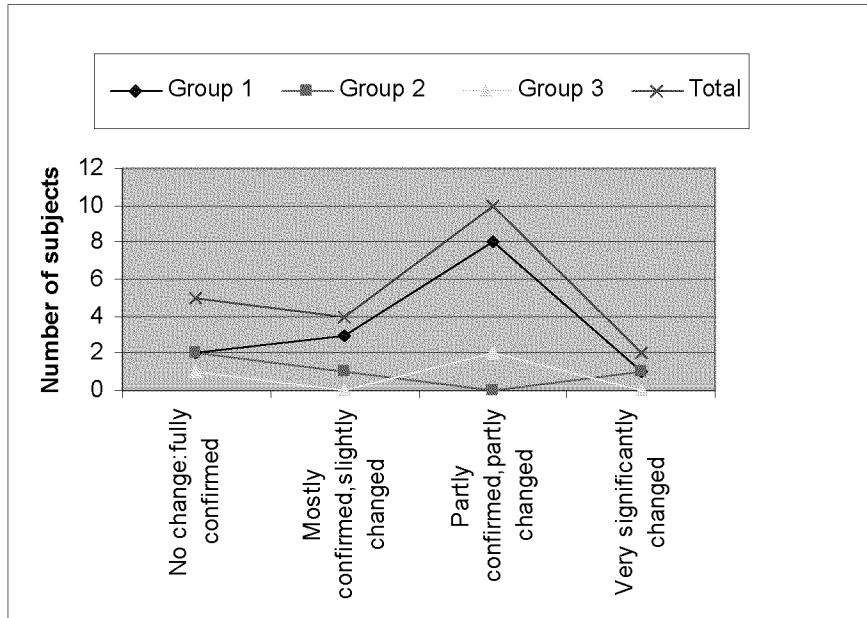
The average for the total is -5%, i.e. an ex-post downward revision of their original assessment of personal factors in influencing their current status quo energy use (probably in favor of technological or other factors) by about 5%. (This seems to conform to the total results for BA4 in section 5.7.5.5, possibly because the subjects' interpretation of the two sets of questions overlapped.) Group I's average was -7%, Group II's was +12.5% (but with a large standard deviation: 3 members had 0% and 1 member 50%), and Groups III's was -25% (but one subject's data were not available).

The total average of -5% suggests as a result of the interview session a tendency for a modest growth in recognition of the strength of the role of non-discretionary factors (especially technological) in determining personal status quo energy consumption levels and a corresponding lowered weight given to personal factors. This is true on average of Group I members (-7%) while Group II members, as might be expected of a high-consuming group of professionals, show no change or an increase in the weight given to personal factors. One member of Group III weighted technological factors much higher at the end (and personal factors even lower than an already rather low rating) and so drove down the average for his small group.

#### **5.7.5.7 BA6: Time<sub>2</sub> assessment of importance of declared determinants of subjects' current energy use.**

Near the beginning of the interview (step 2), subjects were asked to account for the size of the prominent sectors in their personal energy profiles. Near the end (step 8), they were asked how accurate their accounting had proved. The degree of change in their perceptions can be summarized by classifying subjects' experiences into one of four groups: a. No change – fully confirmed; b. Mostly confirmed, slightly changed; c. Partly confirmed, partly (i.e. assessment of some other determinants) more significantly changed; and d. Very significantly changed. The results are summarized in Figure 5.8 below and details for individual subjects presented next.

Figure 5.8: Change in perception of importance of determinants of personal status quo



**No change – fully confirmed**

Total 5 members: Group I, 2 members; Group II, 2 members; Group III, 1 member.

**Group I**

S3: The importance of personal choice was largely confirmed generally and for flying; for food grey, personal choice now seemed somewhat less important.

**Mostly confirmed, slightly changed**

Total 4 members: Group I, 3 members; Group II, 1 member.

**Group I**

S21: Mostly confirmation with some upward revision for the leisure activities in Miscellaneous consumption, which showed themselves to be more important than she had realized. The subject said she would think about them more carefully in the future. On the other hand, at high technology levels, most categories were technology dominated, except Flying which always remained personally dominated.

**Partly confirmed, partly changed**

Total 10 members: Group I, 8 members; Group III, 2 members.

### **Group I**

Flying was more important than previously realized (S12, S4), and confirmed for S10, while S8 was surprised at his frequency of flying over the past ten years brought out by the exercise of recollecting trips. Many were surprised how large certain categories were: Heating (S10, S8, S2), Living (S10, S4), and Food (S10, S8, S4 – confirmed).

### **Group III**

S17 had his assessment of the influence of personal factors confirmed. He also gained a heightened appreciation of technology's potential, and of the macro-economic factors that would influence technological change.

#### **Very significantly changed**

Total 2 members: Group I, 1 member; Group II, 1 member.

### **Group I**

S14 discovered that personal efforts alone were far more significant than he had realized, although much of the change came from effects on Heating of his planned move to a new apartment. S14 explained that he was amazed that personal efforts, and just a few of them at that (e.g. moving to a new apartment and some other heating-related efforts) had an impact equivalent to future (trend) technological changes. Some of these technical changes are not trivial to effectuate, whereas his personal changes seemed comparatively trivial (especially since several were incidental to the move he was planning anyway).

### **Group II**

S19 saw the greater impact and potential of personal efforts for his own household, which he extrapolated to private households in general.

**Additionally**, there were several other related surprises for subjects concerning aspects of their status quo profiles: Regarding Flying, S7 was not surprised how much energy his flying utilized, but he was surprised how greatly it exceeded the Swiss average (400 km/person-yr). He thought regional or municipal flying averages (like Zurich's) would be much higher. (This issue is elaborated below in 5.7.9.2 "Energy communication: Subjects' mistrust of the data and model.")

S15 experienced a change in perception of how large her consumption was (compared to the average), if not in perception of the factors driving this: She was surprised to the point of shock at how much more she consumed than the Swiss average in many categories. (She also thought she would be closer to her peer group whom she thought consumed similarly to her.) She was especially surprised because she had thought her behavior had already been "optimized" or rationalized. She noted that her basic needs like heating and food had energy values close to the Swiss average, while her leisure goods and activities like her auto and flying ("extras") were generally much higher than the Swiss average. Her distinction and

differential finding between essentials and luxuries mirror Group II member S5's distinction of the same, which he termed "need to have" and "nice to have."

To summarize these Before/After questions and the preceding several sections, as a result of the interview session, subjects tended to rate non-discretionary (especially technological) factors as somewhat stronger determinants of their energy consumption levels than personal factors. That is, after experience with the program, on average subjects had a slightly diminished view of the efficacy (or possibility) of personal interventions to reduce consumption. This was only generally true of total energy profiles. Individual sectors sometimes showed the contrary. Direct electricity consumption in Living, Diet, and Public transportation (as well as direct fuel use for Flying) were such counter-examples. For reducing electricity consumption from these activities, short to mid-term personal steps were on average more effective than broad-scale technological improvements like higher efficiencies, although this finding was true largely only of Group I (student) members. Most subjects, especially Group II younger professionals, expressed a willingness to make modest efforts to conserve electricity for Living and Diet activity sectors.

Perhaps the most prominent counter-example was Flying, which was mostly recognized as highly important in one's energy profile.<sup>67</sup> Flying was seen to be strongly dependent on personal circumstances, behavior, and choices and only weakly influenced by technology. These two observations, the recognition of the prominence and importance of Flying in individual profiles and its dominance by personal determinants, held among most subjects along a range of incomes, self-ranking, and other demographic variables. However, as discussed shortly in 5.7.5.10, recognition does not imply responsibility. The tendency to discount the meaningfulness of individual conservation efforts – and in fact the single consumer's (vanishingly small?) economic role in supporting and perpetuating the aviation market – is perfectly captured in the air traveler's standard defense: "The planes are flying anyway {whether or not I'm on board}."

Time1/Time2 and cross-group comparisons of views on importance of personal vs. socio-technical changes for reducing energy use: As a result of the interview session subjects show a tendency for a modest growth in recognition of the strength of the role of non-discretionary (especially technological) factors in determining personal status quo energy consumption levels and a corresponding lowered weight given to personal factors.

The importance of flying: Experience with the program showed most subjects that long-distance flying is prominent (or even dominant) in their status quo personal energy profiles and that personal-behavioral, rather than technological, factors drive any potential change in air transportation's energy

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<sup>67</sup> An extended CO<sub>2</sub> model would show Flying several times more important on a CO<sub>2</sub> or climate-forcing basis.

impact. These two observations, recognition of the prominence and importance of Flying and its dominance by personal determinants, are true across many subjects and variables like overall rank as energy consumer, income level, and other demographic variables.

#### 5.7.5.8 Technological vs. social factors' effects on *national* energy use

In step 5 of the interview the subjects set levels of Type II social and demographic variables. Step 6 asked the subject to look at the combined effects and to judge between the two types, Type I and Type II:

“How do the two types of long-term variables, first and second set, compare in importance? I.e. which seem more significant to you for their impact on energy consumption?”

In short, the results from this question and from  $t_1/t_2$  measurement show that after experience with the program, a strong majority of subjects identified Type II social and demographic variables as more important than technological variables for their impact on future national energy use. Scaled-up to the aggregate level, then, “behavioral”-type parameters again appear to dominate. As a learning process this reflected a moderate increase in social/demographic variables' importance (+13% total average) and a slight downward revision for technological variables (-6%). Subjects' judgment between the two sometimes clearly depended on their reference point, the goal they favored for future national energy levels (specifically whether reduction or stabilization).<sup>68</sup> The remainder of this section elaborates on these points.

Having set all of the Type II parameters to some levels and observed the effects, subjects were asked to identify the most influential ones and then to compare the impact of Type I and Type IIs. As this was a complex and challenging task, we subsequently simplified the comparison by offering to set all (or most) of the Type I parameters to their highest (most efficient) modeled levels while simultaneously setting all Type IIs to their highest activity levels (joint minimizations were also sometimes done).<sup>69</sup> The answers before and after this maximization exercise (if it was done) were recorded, and any change in opinion noted (reported below).

#### **Total**

As noted, Type II variables were overwhelmingly chosen by most subjects as more significant or influential.

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<sup>68</sup> In addition, by shifting the focus from the individual to the aggregate level, this question implicitly brought out the distinction between efficiency and conservation: It highlighted the difference between smaller scale efficiency increases in production methods and societal-scale increases in activity that defeat conservation aims.

<sup>69</sup> The interview question ran “We can make it easier to compare the effect of Type I efficiency variables to Type II social and demographic variables. We'll set both at high levels and see the net effect on aggregate energy use, CH Trend below.”



### Group I

A large majority chose Type IIs. Two subjects settled on Type Is, but one of these rated them as only slightly more important. One subject could not judge between them as a whole and said it depended on the categories considered.

### Group II

Type IIs were chosen by all as dominant. Two subjects had notable extended comments:

Although the two classes are nearly balanced, S15 said, Type IIs are stronger and can cancel out gains from higher efficiencies. Whereas if we held down activity levels, we could have overall improvement in future energy use even with more moderate Type I improvements than the maximum. This assessment accorded with her earlier emphasis on behavioral changes over technological changes for the individual. Later S15 admitted the difficulty of changing social trends towards greater activity, for instance in long-distance plane travel.

S19 commented on the realism of the maximization exercise. Efficiencies could indeed be maximized, he said, but Switzerland would not realistically see the highest (programmed) levels of car use (US levels of driving (1600 km/person-yr)), plane use (US flying levels (2200 km/person-yr)); and other Type IIs. He suggested that better technologies were currently being adopted, but activities were not increasing nearly to the extent of the highest or even second highest parameter settings. Thus, this subject seemed to suggest that in dealing with the energy problem in Switzerland we not aim for maximized levels of Type Is to compensate for Type IIs, since the latter will not reach maximum levels. However, this conclusion assumes the national energy goal is stabilization, not significant reduction in energy use. This illustrates how important subjects' reference points were to the conclusions they drew from this exercise. Two subjects could observe identical graphs, but while one said that Type I efficiencies were canceled out by Type II growth, the other might say that natural Type II growth was nicely balanced by improved Type I efficiencies. The first's aim or reference point is probably a future reduction in national energy consumption (progress towards 2000 watts per capita), while the second subject may view stabilization at current levels as satisfactory.

An example of this in Group I was S18's observation that with both Type Is and IIs maximized, Switzerland's 2030 level is just slightly higher than its current level. This reinforced his previous conclusion that Type Is were more important or dominant. "We can have a luxury lifestyle and, with the best technologies, we can still keep our current levels of energy consumption as a nation. So, such good technologies are good for the environment." The subject seemed to view the 2030 trend (approximately 1600 petajoules vs. 1400 in 2000) as a goal, so he justifiably concluded that without advanced technology, high activity levels would make things much worse.<sup>70</sup>

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<sup>70</sup> According to his answer to a preliminary question on national goals, however, S18 favored a reduction in future national energy use to 70% of current levels. The judgment in favor of Type Is, then, might represent a change of opinion, misinterpretation, misrepresentation, or muddling of views on either this or the preliminary

### Group III

Two subjects could not decide between the two. The third, S7, reversed himself and settled on Type II, experiencing something of a revelation in the process. Looking at the results of the joint maximization, he saw that the Type II variables completely overwhelmed the gains from improvements in Type Is, leaving total energy use roughly unchanged from current levels. The parameter “Percentage of one-person households” stood out for him as the most influential:

To have total energy improvement, we must have larger households – more people living together. So it’s the people, not the technology that is determinant in the aggregate! ... I’m happy I saw this ... I said in the beginning of the interview that it’s only technology, but what I’ve seen here tonight shows me that one-person households {household size} make(s) much more of a difference than technology.

Household size, he noted, was much more important than the other variable he singled out, auto efficiency: Moving from over 9 liters/100 km to 2-4 liters/100 km has less of a dampening influence on overall energy consumption than strong reductions in single-person households e.g. from 30% to 25% single-family households. He noted that the luxury of being able to live alone in one’s flat was only possible in a wealthy country like Switzerland, and, secondly, he suspected that the population and the percentage of single-person households were inversely related.

### BA7: Type I and Type II importance for Swiss national energy consumption

This measures the change in a subject’s assessment of the importance of Type I and Type II factors in influencing aggregate Swiss energy consumption.<sup>71</sup> The total average of change for Type I was -6% (i.e. a slight downward revision in importance) and +13% for Type II (a moderate increase in importance of Type II factors). Group I yielded an average of -3% for Type I and +6% for Type II. Group II showed higher figures in the same direction: -11% and 14% averages, respectively. Group III lacked data except for one member (S7) who showed a 100% increase in his assessment of the importance of Type II variables, specifically household size (and a more moderate (in this case corresponding) decrease in his assessment of Type Is’ importance). These findings could be linked with subjects’ assessments of the technical and the personal for their individual profiles, but that is not pursued here.

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question. Or he might have answered here on the basis of what he considered realistic to achieve or reasonable to expect, which could be higher than what he thought actually desirable.

<sup>71</sup> For these measures of change in assessments there is not necessarily a correlation between the subject’s change in assessment of Type I and that of Type II: Unlike the judgment issue just discussed, the two types are not zero-sum, in that both can be, and can be considered, important.

### Correlations

Correlations of subjects' learning about Type II's (Before/After7) & their environmentalism (Green-ness rating): -0.665;

Correlations of subjects' learning about Type II's (Before/After7) & their energy-engagement: -0.476.

This is rather understandable: The greener or more engaged subjects experienced the least learning about the role of Type II factors for Swiss national consumption, whereas the most anti-green or least engaged subjects experienced the most learning (e.g. S7 from Group III who had a 100% degree of learning on this score; see Group III immediately above).

Technological vs. social factors' effects on national energy use: After experience with the program, a strong majority of subjects identify social and demographic forces as more important than technological variables for the goal of reducing future national energy consumption. As a learning process this reflects a moderate increase in assessment of Type II's importance (+13% total average) and a slight downward revision in that of Type I (-6%).

#### 5.7.5.9 Socially dictated activities

"How much of your energy consumption behavior do you feel depends on activities dictated, so to speak, by society (and therefore not so subject to change)?"

This question was one of several follow-up questions posed after Type II explorations (interview step 8).

**Note:** Several subjects clearly interpreted this question differently from what I had intended by it. Thinking perhaps this was another  $t_2$  assessment of their view on technology, some subjects believed this question asked how much of their current (grey energy) consumption was dictated by existing technologies. The questionnaire order and this question's phraseology tended towards this interpretation and were clearly at fault. Prior questions had essentially asked to what extent technology determined levels of energy consumption, and the question just before this one asked again for subjects' rating of their behavior's contribution to status quo levels. It was therefore reasonable that some subjects would read technology into the question. Noticing the confusion, I tried to correct it by accepting the first answer and then re-orienting the question towards activities that may be dictated by social norms, rather than energy use determined by technologies.

Each group showed a range of answers, which are arranged here by ascending order by group. In general, Group I members tended to believe more was socially dictated than Group II and Group III members.

### **Group I**

**Minimal influence:** S14 (he lives close to the level of basic needs), S3, S12, S10 (he is not one to pay much heed to social expectations – “For instance, I don’t ski.”)

**Up to 50%:** S8 (20-30%), S18 (not more than 25%), S4 (40%: Alone he would not do many activities that he does together with peers); S2 (a significant amount, especially vacations and restaurant visits, activities she was socialized in through her upbringing. These activities are, in her words, normalized and expected of people.)

**75% or more:** S20 (Up to 75%: “I could live without many of these appliances in the house, etc. {but society prescribes their ownership}”); S16 and S1 (75%); S21 (“quite a lot,” for example going to the cinema for recreation: “If Swiss took walks instead of going to the cinema one evening, things would be a lot different. We Swiss do not spend our free time in non-consumptive ways.”); S9 (more than he expected).

### **Group II**

**Very little:** S5 claims to be independent of such pressures.

**Less than 50% but not insignificant:** S19, S15.

**At least 50%:** S6.

### **Group III**

**None:** S7

**Very little:** S17 (He generally feels no social pressure to engage in energy-consuming activities like driving to the mountains for ski weekends, although this is typical of his (socio-)economic peer group.

#### **5.7.5.10 Ranking actors’ measure of responsibility in the effort to reduce Swiss energy consumption**

“In general, in the effort to reduce Swiss energy consumption, what measure of responsibility would you assign (apportion) to the following actors?

(Rank them from 1-highest responsibility to 7-lowest responsibility.)

Yourself

Your peers

Building owners/managers

Politicians

Technicians

Business/corporate leaders

Others

Feel free to comment or explain your choices, if you wish.”

**Table 5-13: Ranking actors' responsibilities (average of ordinal values)**

	Self	Peers	Bldg own- ers	Politicians	Technicians	Business	Others
<b>Total Avg.</b>	4.0	4.9	2.6	1.9	2.6	1.7	5
<b>Total s.d.</b>	2.3	1.8	1.1	0.73	1.3	0.9	1.7
<b>Group I Avg.</b>	4.2	4.9	2.5	1.9	2.9	1.6	5
<b>Group I s.d.</b>	2.0	1.5	1.2	0.6	1.4	1.0	1.7
<b>Group II Avg.</b>	3.1	3.8	2.9	1.4	2.2	1.6	
<b>Group II s.d.</b>	2.7	2.8	1.0	0.48	0.76	0.48	
<b>Group III Avg.</b>	4	7	2.2	2.2	2	2	
<b>Group III s.d.</b>	3		1.3	1.3	1	1	

### Overall summary of results

Average rankings:

**Total:** 1.7 Business/corporate leaders; 2 Politicians; 2.5 Building owners/managers; 2.6 Technicians; 4 Yourself; 5 Your peers; 5 Others

**Group I:** 1.6 Business/corporate leaders; 2 Politicians; 2.5 Building owners/managers; 3 Technicians; 4 Yourself; 5 Your peers; 5 Others

**Group II:** 1 Politicians; 1.6 Business/corporate leaders; 2 Technicians; 3 Building owners/managers; 3.1 Yourself; 4 Your peers

**Group III:** 2 Business/corporate leaders; 2 Politicians; 2 Building owners/managers; 2 Technicians; 4 Yourself; 7 Your peers

### Conclusions

There seems to be no meaningful difference between total results and group results, and thus no differentiation across groups on this question. The order of importance is business/corporate leaders, politicians (first cluster), building owners/managers, technicians (second cluster), individual-oneself, peers, others (third cluster). Among some groups the order is slightly different but the general clusters are the same. Thus, decision makers at the highest level in business and government are held most responsible, then decision makers at a lower level of the building or equipment – building owners/managers and technicians – and then at the lowest level the individual, the subject or her peers.

### Note on question interpretation

This question was an extension beyond the areas of analysis concentrated on during the interview and was appropriately raised at the end (step 11). The question was in fact one of the questions asked in the questionnaire for *Energy in Everyday Life*, the Swiss study reported on in Appendix A. To place it in the context of the present study, our interview concentrated on effectiveness and loci of influence on energy consumption. One of the main purposes and uses of the program as a whole is to allow the user to catalog and quantitatively to compare

the effectiveness of interventions on either side of the user / provider-producer-society border. Much of the further discussion on top of this, in the interview and in potential future studies, centers on the political feasibility or – especially for the aim of ecological modernization in future applications – on the mechanisms of implementation, of enacting those changes on the producer-society side shown to be most effective. Below we report on subjects' thoughts on political and cultural possibilities and limitations on the exercise of (their) influence to produce such changes. Here in this question at the interview's end we touched on the question of responsibility, to be interpreted either as who can and should exercise their power to bring about change or who is societally 'responsible' or culpable in case of failure. Admittedly the subjects could have interpreted the question either way or as a repetition of the earlier focus on effectiveness or ability; the question and results are not very rigorously formulated. For example, it was clear soon after the interview (not in time for clarification before the subject answered) that at least S14 interpreted the question as what can these actors do, rather than what level of responsibility do they have; and other subjects probably interpreted some of both into the question. Yet all in all, if we apply the maxim offered in *Energy in Everyday Life* (Appendix A, section 1.6), that conservation "capability engenders responsibility," to the societal level, then perhaps we should not be so concerned about the possible conflation of the two.

The results here are thus not so surprising, especially if a number of subjects interpreted the question as one of effectiveness or ability in accordance with the earlier line of inquiry. The results show an emphasis on higher-level decision makers first, then lower level decision makers, and lastly the individual. The top-down, structural element dominates here as well.<sup>72</sup> As exceptions, some subjects (e.g. S17) ranked individuals first but only when viewed in the aggregate or in sufficient numbers to constitute a critical mass for change (viewing them this way eliminates the apparent scale inconsistency that troubled S21 (below)).

### **Subjects' comments**

Reproduced below are some miscellaneous points from subjects who offered open comments to this question. (Often only the actor group for which the subject had a comment is described here):

The question's formulation troubled S21. She said the actors described operate on different levels (yourself, your peers, and building owners are on a different level (of aggregation or abstraction) than politicians, technicians, and business leaders, making it hard to cross-compare them. Ranking only the politicians, technicians, and business/corporate leaders, the subject put business/corporate leaders first (since Type Is are about equally important as other factors, and given the importance of business and corporations nowadays in affecting these variables), politicians second, and technicians third.

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<sup>72</sup> The results here match experiences with Dutch environmental focus groups in which participants "passed the buck," saying it was the responsibility of politicians and business and not the individual, and least of all themselves [van Vliet, personal communication].

S15 said all categories ranked high (1-2) in some way or capacity. (Yourself and your peers she interpreted as individuals acting together responsibly, again aggregating to overcome the social trap.) As 'others' she offered the media and teachers for their influence on how people think.

Noting the comment about S17 above, we list his ranking: 1 yourself (choosing 'your peers' implies shifting responsibility to others); 2 technicians (such as trend-setting architects); 2 business/corporate leaders; 3-4 building owners and managers, who can make tenants' electricity and heating more explicitly priced; and 3-4 politicians, who largely follow voters but do have a limited influence over public opinion.

S12 also placed 'yourself' first because of consumers' purchasing power and collective influence through demand-pull. At the same he put business/corporate leaders jointly in the first place and said that responsible companies should be rewarded with subsidies or tax breaks.

S18 ranked 'your peers' highly and also noted the problem of collective action: "Je mehr Personen mitmachen, desto mehr Einfluss."<sup>73</sup>

### **5.7.6 Hypothesis H: Separation of the social from the technological**

Having set Type I and Type II variables against each other in a series of exercises and questions, the interview raises the issue of combination and interlocking evolution of the social and the technological to avoid creating the impression that they always necessarily operate independently (interview step 6):

This program separated the two classes of long-term variables – technological on the one hand and social, cultural, demographic on the other – for technical reasons. But they could be treated together, and we just gave some reasons for doing so {earlier in the questionnaire}. When examining influences on energy consumption, would you prefer a clear separation between the two classes of variables or a combined treatment of both classes? For example, if you had to design a program involving both, would you separate them or try to keep them together?

In total, 12 subjects favored separation (i.e. keeping the program's presentation), six favored combination or presenting both options, and two had no opinion (no data for one). The program's separation of the variables biases answers towards separation, as it requires a stronger conviction to argue for changing to a combination. Still, we wanted to explore this issue, and this was the closest we could come within the limitations of the program. Provided this bias is kept in mind, the results may still be revealing.

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<sup>73</sup> "The more people go along with {a behavioral change} the more influence they have {on the whole}."

No clear group-based pattern is obvious at this level of analysis, nor is it clear theoretically why there should be a difference between groups. Thus, the results are discussed by group only for consistency of presentation and not for any special analytic reason.

### **Group I**

Five subjects favored combination or both approaches (jointly), eight favored separation, and one had no opinion. One subject in favor of combination (S9) agreed strongly with the suggestion of a close linkage between Type Is and Type IIs and said the combination should be like the joint Type I-Type II maximization exercise (see 5.7.5.8) but be done automatically. Other combination advocates agreed with the reasons suggested for combining but had no idea how it might be executed. Reasons the others gave for separating were that the two types are actually separate (S13); one cannot measure the effects of each if everything is combined (S8); the interplay is more interesting to examine when they are separated (S2); it is best to show separately two ways to approach the energy problem. Also, the two types are not directly causally related; rather, there are complicated connections. To show rebound, one can set the variables manually as in the joint maximization/minimization exercises (S21). Further arguments offered for separation were differences in how the two types can be influenced: Type Is can only be influenced by scientists and political actors. But Type II “lifestyle” variables are themselves only slightly amenable to political manipulation (S12 and S4); Combining the variables requires assuming a rate of dependence of Type II consumption levels on Type I variables, which is too difficult to predict accurately (S3).

### **Group II**

Three subjects were clearly in favor of separation. One (S5) distinguished between purposes of scientific analysis, for which separation is appropriate, and presentation for a layperson, which may benefit from combination. As a layperson, the subject might have wanted to see a combination for the reasons suggested in the interview. But from an analytical or scientific perspective, he would not combine them since that would make interpretation and isolation of effects too difficult.

### **Group III**

One member of Group III favored separation while one admitted to being overtaxed by the question and lacking the knowledge or expertise to render a judgment on the matter.

Separation of the social from the technological: Subjects favored separation of technological from social variables by roughly a two-to-one margin. Subjects had varied and reasoned answers on both sides. Most of the reasons for separation were related to the function or operation of such an accounting program and not generally because the subjects thought the two types were actually independent.



### 5.7.7 Hypothesis G: Cross-temporal and cross-cultural comparisons

The following summarizes the interview questions for the thought experiments in interview step 7:

Let's do a thought experiment. The (extreme) values here (in the drop-down values for the Type II parameter "Auto kilometers") represent a) the per capita kilometers driven per year in Switzerland in 1970 (3500 km)/ b) the distance currently driven per capita in the US (16000 km). Let's see the hypothetical impact on the Swiss average energy profile by imagining that Switzerland would a) return to a Swiss 1970s level of driving; b) emulate current US driving levels.

(If you drive a car currently:) Imagine you lived in a Switzerland of the future in which people a) drove on average only as much as they did in 1970 b) drove as much as Americans do currently, reflecting a shift in social norms towards a) less b) more driving in general.

Would you go along with such shifts and change your driving levels, to the extent you could? To what levels?

Similar thought experiments were done for plane travel, simulating a) historically low levels (200 km per capita, actually only half the current national average) and b) US current average levels of 2200 km.

Like the questions concerning Type I-Type II separation or combination, the auto and plane thought experiments sought to use the capabilities of the program as a springboard to discuss issues otherwise difficult to quantify or illustrate. Douglas and Isherwood [1979] claimed that people synchronize their behaviors ("keep to the level") to conform with people whose behavior they see they see as relevant for themselves [Spaargaren 2000a]: Would our subjects change their behaviors to stay in line with a new (or old) "level"? But like the previous question, this one was only partly successful. One problem, that national averages are not necessarily the proper reference groups for everyone, is discussed later (5.7.9.2). Another problem was that it was difficult for many subjects to imagine mass shifts in people's driving or flying patterns in isolation, without being prompted by, or causing, reinforcing or counteracting shifts in other variables like prices or infrastructure. On this point they were correct, although for specificity and simplicity the exercise tried to examine the shift as a purely social phenomenon. Parallel with Brooks' experiences [Brooks 2001], many people do not readily think "sociologically" (or in this case "anthropologically" — see Chapter 3, section 3.3.3.2, "Anthropological/sociological treatments"): Subjects often reinterpreted the experimental change in independent variables to reflect anything other than our intended reversal of social norms, normalization, or cultivation (see Chapter 3, same section). Interviewees' assessments of the question (reported below) point to some of the difficulties.

#### **5.7.7.1 Auto: Downward revision to 1970 per capita levels**

Most Group I members were not car drivers and were thus exempt from this question. Those who drove cars said they would lower their driving levels somewhat under the circumstances but more likely due to congestion or other reasons and not necessarily out of social pressure.

Most Group II members claimed no effect: They drive the extent they must or want, no more and no less. One member said she would personally reduce, but that her household's overall driving would not decline.

There were no data for Group III, largely because the subjects deemed the exercise unrealistic and refused to entertain the scenarios.

#### **5.7.7.2 Auto: Upward revision to US levels**

In Group I, nine would drive more, again most because of a presumed concomitant decrease in public transportation services and the necessity to drive more to get around. Three said they would not change their driving habits, and one might drive less (and probably use public transportation) as a reaction to presumed increased congestion. One rejected the thought experiment.

Group II members all claimed they would not change their driving behavior.

Two Group III members showed no change or even a decrease as a counter response to congestion, while one rejected the thought experiment.

Effects of changing social norms on individual behavior: Group I members would tend to follow a hypothetical escalating social trend towards more driving (although most because of a presumed concomitant decrease in public transportation services and the need to drive more to get around). Other groups are more resistant to change (or would even lower driving levels in counter-response).

#### **5.7.7.3 Plane: Downward revision**

This exercise was not done in most instances. The data that exist show two members of Group I reducing their flying but largely because of hypothesized increased prices; three generally unchanged; one unchanged because of binding family obligations; one unchanged in marked contradistinction to his (hypothetical) response for auto driving; and one unchanged because he "just loves flying."

The single member of Group II who did the exercise showed no change because of non-negotiable family obligations.

#### **5.7.7.4 Plane: Upward revision to US levels**

Almost all participating Group I members showed no change, as did the single participating Group II member. Group III members did not participate or rejected the scenario.

#### **5.7.7.5 Subjects' follow-up assessment of the exercise**

In the follow-up questions at the end of the interview, subjects were asked to evaluate the usefulness of the thought experiments involving flying and driving: "Did the thought experiments with historically low Swiss auto travel values or high US values for auto and flight help shed light on alternative development patterns?" [explore another "set of socio-technical alternatives" (Chapter 3, 3.3.4.2)].

Viewing subjects' responses as a whole, seven subjects answered clearly in the affirmative. Ten subjects answered unequivocally no. Several of these latter pointed out, justifiably, that the question was not examined in any great depth in the exercises. A number repeated their criticisms that North American (or past historical) scenarios were not realistic development patterns or models for Switzerland, and others again insisted that the notion was too hypothetical and that it was too difficult to know how one would behave under such imaginary circumstances.

Some five subjects hedged their answers. S17, for example, attributed the difference in driving levels between Switzerland and the US to the difference in land prices, which is a matter of supply, and to different zoning laws, which are also a function of land conditions.

### **5.7.8 Consumer-citizen involvement in affecting less-discretionary factors**

#### **5.7.8.1 Hypothesis F (completion): Elusiveness of the 2000 Watt society. Why is future Swiss national energy consumption so large (even with optimistic assumptions)? Is this inevitable?**

In (optional) interview step 10, one or more of the subject's personal energy profiles (i.e. status quo or conservation profiles) were scaled up to national levels, under current or various possible future technological conditions. Discussion of overall scale limits is not often pursued in the context of sustainable consumption (and even less so in policy settings). This was an opportune time to explore the issue, especially via a function that let users gauge their contribution to the aggregate if their choices were widely imitated (assuming no social trap/prisoners' dilemma problems). It also allowed us to explore the other side of Hypothesis F, "Aggregate data comparisons," as mentioned in Chapter 2's hypothesis explication, by making explicit links between the individual and the aggregate levels and helping visualize a flow this time from the former to the latter. In general it was indeed "fruitful and instructive" to make these links: The scaling-up function generated much thought and discussion (and even, as anticipated, some degree of dismay and resignation) from those subjects who explored it.

The subjects' resulting scaled-up graph was invariably at least the equivalent of 4000 watts/person (for the 2030 projected Swiss population), even for the most spartan or conservationist-minded Group I student, and even at the highest modelled levels of technical efficiency.<sup>74</sup> Finally, subjects were asked: Why is national energy use still so large; why aren't combined personal and technological changes enough even to approach the designated ecological standard of 2000 watts? (Which categories are still so much larger than they used to be in 1950 when Switzerland consumed 2000 watts per capita?)

This section presents a thematic summary of subjects' responses, some of them excerpted verbatim. The topic stimulated an outpouring of rich "lay social theories of a local world – the frank reflections of ordinary {sic} people forced to think through that world" [Lemert 1999]. Apart from a few labels or qualifiers, we do not provide further comment: Parallels to social science's treatment of consumption (Chapter 3) should be obvious. The concluding text box abstracts from this summary. (In the following, normal quotation marks " " indicate a verbatim quotation; single quotation marks ' ' indicate paraphrasing.)

#### **(Partial) disbelief in the feasibility of the threshold**

- "Such a standard is just {meant} to frighten people" --- S19.
- "If the threshold is really that low, I can just heat my house, eat, and have a few electric appliances only. That's it." --- S12
- "How could one possibly make it a third of my {scaled-up total energy use} to reach 450-480 petajoules?" --- S13

#### **Need to reduce grey energies**

- At least seven subjects remarked on the large size of the grey energy categories. They noted that the grey energies are high, often surprisingly much higher than their direct counterparts, and they remain relatively high in the future even under optimistic variable settings. Noted especially were Housing (S20, S21, S9), Diet (S20, S18, S8, S12), Miscellaneous consumption (S20, S1, S21, S14, S8), and Public investment (S21).
- S18 said this would require heavy public funding of technological development and regulations to limit activity levels, and would therefore be politically difficult. Public consciousness could be influenced, albeit also with difficulty.
- S8's prescription was to reduce goods transportation, improve food production, and otherwise lower Diet grey by stimulating more fresh and less frozen food consumption. Miscellaneous consumption must be lowered though less consumptive holidays.

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<sup>74</sup> The Type I parameters need much higher modeled value(s) at the top end and/or the Type II much lower value(s) (including of course population); otherwise Switzerland cannot approach 2000 watts per capita. The program's modeling shows Ehrlich's IPAT identity at work. We did not dwell on the 2000 watt threshold or really emphasize it until this optional part at the end; doing so might have demoralized the subjects and distracted them from the other exercises.

### **Perverse economic incentives and huge transport of constituent materials as inflator of grey energies**

- ‘Huge transport of constituents in manufacturing process, for example for food.’ --- S20
- S12 attributed the distancing and transport of goods’ constituent materials to labor cost differentials around the world, especially between developed and developing countries. Such transport makes little sense in terms of rational energy use, but it does make sense in terms of labor costs as they currently obtain.
- (See also the block quotation from S7 in “Lifestyle normalization” below.)

### **Problematic lifestyles of luxury, availability, and convenience**

- “We want to have all at all times.” --- S20
- ‘Household goods, luxury goods, frequent travel, vacations, living far from our workplace and commuting, etc. all represent our standard of living here and now.’ --- S12
- ‘Miscellaneous consumption grey is a sort of “mirror of the Swiss lifestyle. We Swiss do not spend our free time in non-consumptive ways.” --- S21
- ‘Far-flung leisure travel, advertising, {associated} social norms.’ --- S15
- ‘Advertising, promotion, manufacturing of demand.’ --- S19
- ‘The Swiss {in the 1950s} clearly didn’t have such incomes, cars, and the trade we have now.’ --- S5
- ‘Because we are spoiled; we want well-heated places, we are spread-out in the countryside, etc. In 1950 the Swiss had a much simpler life.’ --- S11
- ‘We could use much less space if we had to {to lower Housing grey}. But it’s mostly grey categories, especially Miscellaneous consumption: We could stop taking so many holidays.’ --- S17
- ‘In the 1950s at the 2000 watt level, there was much less activity in society, much less public building than now (Public investment grey), less lighting of public spaces, and much less advertising.’ --- S4

### **Lifestyle normalization at ever-higher levels and (im)possibility of reversal**

- S3: It’s a good start. {Referring to his scaled-up profile.} It may not be possible to achieve 2 kW unless we live in a barrel in the middle of the woods.  
DG {in a spontaneous exchange}: But Switzerland achieved that per capita in 1950. Were they living like that then?  
S3: It was a lower standard and it’s very hard to move back to it. Although then they felt it was o.k. in general. For us, life like

that would be a shock. For example, no television. The majority today would resist moving back to that.

DG: Is it then a social question and not a technological one? (Look at which categories are large: Miscellaneous consumption, Diet, Air travel.)

S3: Yes, these are mostly social choices reflecting the Swiss standard of living; for example, as Miscellaneous consumption I don't have to go to the movies, it's my choice.

- 'There's been a lifestyle change towards a consumer society since 1960: Diet grey was much smaller, there was very little flying, many fewer cars.' "One can't go backwards." 'And we shouldn't go backwards. But make people more responsible. If they know more, e.g. from such a computer program as this, they may be more inclined to change their behavior.' --- S6.
- "You can get people to consume more intelligently, but you can't get them to consume less." --- S11
- 'I'm not optimistic that we can get people to travel less, especially fly less.' --- S15
- 'Nothing can be done about levels of personal transportation, especially far-flung leisure travel.' --- S20
- 'Miscellaneous consumption and Public investment are the major contributors; these are very hard to change without drastic lifestyle changes ("unless you just stay at home and never go out").' --- S4
- 'The standard of living was much lower in 1950. But we're also using much more technology than we used then; e.g. freezers and air conditioners are widespread.

Also social changes: Women (have to) work, and they have much less help in the household {substitution of energy-consuming devices for labor}.

{Normalization:} Once you get used to a technological device, you cannot imagine living without it: "How did we manage before?"

I doubt that cutting back will be accepted by society.

There are many (technological) things now without which the society wouldn't work.'

--- S19

- S7: Food we can't do anything about, we need to eat.  
DG {spontaneous exchange}: But did they eat in 1950?  
S7: It was much more expensive and they didn't have as much food then. They ate simpler things, e.g. potatoes. One sausage occasionally for the whole family.  
The food market *could* be much more efficient than it is now, like {stopping} transporting produce across the world so that people can eat produce out of season.

No one wants to go back to living like they did in 1950, and it won't happen; people would rebel against any government that tried to force them back.

S7 then noted, as if for first time, just how large the Miscellaneous consumption category was in the national tally, that in fact it might become the largest single category in the future. Without my prompting, he talked about the constant proliferation of items and devices in hotels now compared to the past; he seemed suddenly to become aware of the (general) trend towards proliferation of devices as well as the tendency for activity to co-evolve with technology and cancel out efficiency gains.

- 'In the 1950s, they had one to two weeks holidays total {per year}, and they worked on Saturday morning, so they did less on the weekend.

The question is whether we really want to do this {move to 2000 watts/person}. I don't see such drastic changes in the offing.' --- S17

- 'Nothing's unchangeable, but they say "Man kann nicht zurückgehen."<sup>75</sup> Nothing would work apart from strong government intervention (like taxing an airline ticket to make it 5000 instead of 500 francs), and which government would get re-elected that did that?' --- S5

### **Shrinking Household size**

S21, S7 (see S7 in Group III, section 5.7.5.8)

### **Public awareness**

- "It's hard to {further} influence public awareness in Switzerland: Much progress has already been achieved here, and the potential may be exhausted; the public may have experienced saturation on the environment issue, making further appeals fruitless." --- S18

### **Basic needs and pliable wants**

- S15 and S5 (of Group II) made the distinction between basic needs (e.g. Heating), which are generally resistant to change, and leisure goods or activities like Flying and parts of Miscellaneous consumption, which can be reduced, at least in theory. However, the trend in Swiss society is towards higher leisure.

### **Only draconian measures would work**

- S5 concluded from the program that reductions could not be achieved by either technology or voluntary behavioral change, separately or in combination. All that remains is draconian measures, a 'Singapore' approach of extremely high auto license fees and auto taxes of 150%, for example.

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<sup>75</sup> "We can't go backwards."

### Technological-fix from changes in the technological paradigm

- S17 cast doubt on the scope of the model in the program and suggested that unanticipated technological revolutions may be in the offing that offer much greater efficiencies than the best modeled here, or completely different ways of doing things, resulting in radically less energy use in line with environmental thresholds. (This is discussed below in 5.7.9.2)

The elusive 2000 Watt Society: Why is future Swiss national energy consumption so large even with optimistic assumptions about technology and activity levels? Themes in the subjects' discussion: (Partial) disbelief in the feasibility of the threshold; techno-socio-political issue; need to reduce grey energies; perverse economic incentives or huge transport of constituent materials as inflator of grey energies; problematic lifestyles of luxury, availability, and convenience; lifestyle normalization at ever-higher levels and (im)possibility of reversal; far-flung leisure travel; shrinking household size; low public awareness; needs vs. wants; draconian measures; technological fix from changes in the technological paradigm.

#### 5.7.8.2 Shaping future Swiss consumption trajectories: "Machbarkeit"

{The following question asks for a community perspective.} Do you agree (1) that Swiss society has the power to make a collective, societal choice of its energy consumption level? Or rather do you agree (2) that social and economic processes have their own internal mechanisms that will automatically or inevitably lead to an increase in energy consumption?

{The following question asks for a corresponding individual perspective.} Do you feel you have some personal ability to influence – 'decision making capability' over – your energy consumption?

These first two interview follow-up questions (interview step 11) explicitly state that the questions call for a community and individual perspective, respectively. The first one is essentially a question of whether the national trend levels for Type I and Type II variables are inevitable or not, i.e., in terms of the program function, whether the society can craft a "Swiss 2030 Tailor-Made Scenario" different from the "Swiss 2030 Trend" graph (the third and second graphs, respectively, in the lower left portion of Figure 5.1). The previous section 5.7.8.1 showed that subjects recognize the difficulty of radical reductions. Here we ask effectively whether even a moderate deviation from projected increasing trends is feasible. These questions were borrowed from *Energy in Everyday Life* and *Democratizing Environmental Policy* (Appendix A), and they echo the discussion of social *Machbarkeit* described in Appendix A's section 1.9.3.



The overall group results show that a strong majority agrees with (1), that Switzerland has the power of choice. There were only two apparently unqualified endorsements of (2). However, many who answered (1) emphasized that the society may have the power, but it will not necessarily exercise it. Overall, the interviewee pool seemed to have a greater sense of social *Machbarkeit* and less of a feeling of helplessness over corporate and social trends and policies than the majority of focus group subjects in *Democratizing Environmental Policy* or interviewees in *Energy in Everyday Life* (although it is prudent to recall here that our subject pool, and probably E.E.L.'s, are not necessarily representative of the population).

Group I had only a single unqualified choice of (2). The others chose (1), although some raised reservations, for example (1) applied only on a longer time-scale, or the potential did not guarantee that societal choice would be exercised and exhausted.

S18 said the collective has the power to adjust its energy levels, but the individual is quite limited in his freedom to act in opposition to energy-increasing structures (e.g. can bank workers independently make the decision to turn off their computers when not in use?).

S10 rejected the denial of personal responsibility inherent in the characterization of energy evolution as automatic (2), calling this a "cop-out." (This matches his balanced view of personal and technological interventions for his own profile, and it sounds similar to the D.E.P. focus group participant quoted near the beginning of section 1.9.3, Appendix A.)

In answering the question, S21 interestingly situated the issue in a Swiss historical and cultural setting: Switzerland could collectively chart its own course on a time scale of 30 years. Presently Switzerland follows its own independent path, although it seems that globalized social and economic processes may prove stronger in the long-term.

Group II members split evenly on this question, but those who chose (2) did not do so categorically.

S6 echoed a common view in Group I, and S11's view in Group III, when he said "Switzerland should have the power, but it doesn't. Or rather it has the potential, but it doesn't use it."

S15 leaned more toward (2), citing a lack of influence over the grey energy content of a large proportion of imported goods, and the relatively small Swiss consumer market making for rather weak market pull or countervailing power from Swiss consumers. However, were the Swiss to become more concerned and mobilized through some environmental crisis, they would stand a better chance than many other Westerners of implementing measures (through referenda) to improve energy use.

S5, trained as an economist, challenged the question's presupposition that a "collective" exists in this context and claimed that only the second question, the one based on the individual's perspective, was meaningful as phrased. Pressed to answer the first question, he would choose (2): Energy growth is automatic and inevitable unless taxed or legally addressed.

One Group III member chose (2) and two chose (1). Group III's economist S17, as opposed to Group II's, asserted that there was nothing inevitable about social or economic processes.

They can certainly be influenced by voters, who may even be willing to accept some “pain” to hold down energy use.

Shaping future Swiss consumption trajectories: A majority of subjects felt that Swiss society has the ability to make a collective choice of its energy consumption levels and that trend level increases are not the inevitable result of “automatic” socio-economic processes. This does not imply they think that ability will be exercised.

### **5.7.8.3 Affecting “less-discretionary” factors and the role and influence of the consumer-citizen**

A summary of subjects’ views on the issue of the tractability of Swiss energy consumption, and the extent of the end-users’ potential involvement or role, is provided by the answers to this follow-up question:

“What do you think your role is, if any, in addressing {societal} problems connected to energy consumption?”

Viewing all groups together, 12 subjects answered unequivocally that they had no role. Two or three others found it hard to say definitively. Among the latter S17 said it may be possible to influence others, but not effectively as an individual (voter). Social changes do not come quickly, and creating a constituency for change also takes time. The process is aided by people’s seeing and feeling the adverse effects of excessive consumption in the form of noise and air pollution, for example.

The remainder believed they had, or might have in the future, some individual influence, but mostly not as individual consumers. Several students of environmental engineering and architecture counted themselves in this group because of their future professional roles. Decision makers like politicians, certain researchers, and corporate officers and business managers can have greater influence and therefore larger roles.

A few subjects specifically invoked their roles as consumers or citizens participating in or supporting the activities of NGOs.

Consumer-citizen involvement in addressing Swiss energy consumption: Twelve subjects said unequivocally they had no means of personally helping address the national energy problem. Three couldn’t answer. The remainder believed they might have some individual influence in the future, but mostly not as individual consumers. Several students of environmental engineering or architecture viewed themselves as potential future decision makers in their career capacities. A few subjects specifically invoked their roles as consumers or citizens who participate in or support the activities of NGOs.

#### 5.7.8.4 Interview step 9

Interview step 9 gave subjects an opportunity to brainstorm on the possibilities for greening infrastructures, technologies, and social practices connected to a sector of their choice. In what way and how easily could the relevant Type I or Type II variables be changed to favorable levels; and (to expand on the theme of the previous section) what are end-users' and higher-level decision makers' intervention points?

The results here are meant to point to the sort of findings one might expect from future, politically contextual studies along these lines. Outlining trends can perhaps help guide their design.

The sectors subjects chose to discuss were the following:

- 10 Auto (6 in Group I, 2 each in Groups II and III),
- 4 Food (3 in Group I, 1 in Group II),
- 3 Heating (all in Group I),
- 2 Living (both in Group II),
- 1 Public transportation (Group III),
- 1 Flying (Group II).

#### **Auto and Public transportation**

Subjects split on the question of whether an end-user could exert any influence on higher-level technological and social factors in the transportation sector. Some said the individual end-user had no control and could not provide the impetus for change, while others saw a distinct role for consumer-citizens individually or acting through NGOs and/or consumer groups. Those in the first camp thought industrial and automotive technologies could only be improved by influential researchers, manufacturers, and politicians who affect fuel prices or efficiency standards; the energy lobbies and financiers; the media; or the public at large. Several thought dramatic improvements were currently technologically feasible but were economically and politically unwise, since companies and the Swiss government earned huge revenue through the (sale and) taxation of gasoline and diesel fuel. As for the one subject's views on public transportation infrastructure, direct influence is very rare, but influence through support of price incentives, subsidies, and policies favoring extensive and reliable mass transit alternatives is common in democratic Switzerland.

Changing social practices related to auto use – such as distance traveled, car occupancy, or shifting to trams or trains – was considered even more difficult than changing technologies, and many also viewed the individual's role here as even narrower. Still, some held that norms of car use were amenable to policy intervention to some extent, which was in turn subject to citizens' influence. Several insisted that a personal behavioral response, like choosing to drive less, could make a difference, and a few believed in the power of their own example or their moral and fiscal suasion of their peers.

### **Diet**

In order to affect Diet-related variables, subjects emphasized the need for increasing organic, seasonal and local food production and consumption and reducing meat and frozen goods consumption. The frozen food market was considered hard to dislodge. To reduce meat consumption, meat must be made much more expensive, and information campaigns should be instituted to increase public awareness of its energy and environmental costs. One Group I subject cited Diet as a good illustration of the "circle of interactions" between micro and macro: Individual consumer choice is important, but at the same time there must be organic product offerings, which requires political decisions and support. The single Group II member cited the manufacturing of demand and creation of wants in the Diet sector and said that appeals and the recent BSE scare would help increase reflexivity here. As decision makers, the meat industry and the agricultural ministries were cited. For a personal role, three subjects suggested reducing meat and frozen goods purchases and reducing shopping frequency. One food scientist suggested her role as a professional as well as her participation in votes and referenda and setting her own example as a vegetarian.

### **Heating**

According to the subjects, energy regulations and standards like *Minergie* drive improvements in housing efficiency, while householders' desire to save money on their heating makes for natural (market) drivers. Still, one subject thought a larger market for efficient housing and related products was necessary and could be built up by green consciousness (change in mentality) or greater demand from wealthy individuals and institutions, which could lower prices. Living space and household size, on the other hand, (Type II) could not be changed without a high level of sensitization in the society.

Government agencies were considered important for information campaigns (S13), appeals, awareness-raising, incentive programs (S14), and standard-setting (S13). Other key decision makers included house renter and owner groups and other lobbying groups, contracting companies, and energy suppliers (S8).

The three subjects each believed their best personal contribution would have minimal effect since they are not decision makers of power, S14 because he is not an appliance manufacturer, S13 and S8 because they are not home-owners with funds to invest in efficient housing and insulation and thereby buoy the market, and to make their voices heard in home-owner organizations and lobbying groups. The best they felt they could do is to improve their practices on a personal level given their current circumstances, or speak out in renters' associations for better insulation of their apartment buildings.

### **Living**

Two Group II members discussed Living. S4 said decision makers could intervene to lower the grey energy of houses by regulating that building materials be transported by train (rather than truck). However, as an architect he noted that if high efficiency equipment were

mandated for heating, air conditioning, and ventilation, then transport distances would increase because such equipment is not domestically made and would have to be imported.

S4 also noted the acquisition-use dichotomy: People, including himself, are generally only concerned about Living sector energy, if at all, when making a purchase, an investment in an appliance, and not when using it from day to day: Their concern extends at most to the one-time purchase decision and not the multiple routine use of the equipment.

Social factors related to Living are again much less susceptible to influence. One subject thought economic instruments were the best hope for shaping them. S4 pointed out that certain social practices, like the maximum age children could still sleep in their parents' room, were once limited by government regulation. Now, government could regulate scarce living space in certain ways but not the size of apartments.

S4 saw multiple personal roles for himself as an ordinary consumer and as an architect. First, his personal initiatives like installing solar cells on the roof for home power or choosing a more efficient freezer could contribute somewhat to demand-pull. Second, he said he could potentially (privately) influence other people, for instance in their choice of solar energy or green electricity. Yet, he could wield his greatest influence as an architect. Architects who design large buildings in Switzerland have considerable influence in setting guidelines on what sort of equipment will be installed in them. Individual architects can be key decision makers for the whole sector. In addition, his choice of building design could affect the "Living Space" parameter. He could also influence Swiss electricity mix if he were successfully to design a solar building and thereby set a trend in Swiss construction practices.

## **5.7.9 Hypothesis I: Energy(-Concealing) Communication**

### **5.7.9.1 The program and interview as a communicative/educational tool: Subjects' degree of learning over the course of the session**

Communicating about energy use and facilitating learning, broadly construed, are main points of the software program and the interview. Assessments of subjects' learning have been described extensively above in reports on (explicit or implicit) Before/After ( $t_1/t_2$ ) questions. This section describes the outcome of the few remaining Before/After tests and presents other material pertaining to energy communication.

#### **BA1: Subjects' self-ranking as energy users (high, medium, low) vis-à-vis the Swiss average and lifestyle group averages**

##### **Group I**

Group I learned on average that their energy consumption compared to their lifestyle group was marginally higher than they had thought originally.

### **Group II**

Group II learned on average that their energy consumption was somewhat higher than they had thought, measured against both the national average and that of their respective lifestyle group.

### **Group III**

Group III showed no change in their self-assessment of energy consumption, that is, high accuracy in their assessments/predictions.

### **Correlation**

**BA1** (for comparison with lifestyle group) and **household size**: -0.40. This suggests a very moderate negative correlation between the degree of learning or change in a subject's self-assessment vis-à-vis their lifestyle group and the size of the subject's household: Subjects in larger households experienced less learning on this point. One possibility is that those in larger households included all of Group III, who are established family people with stronger notions of their consumption habits and well-established lifestyles. They are surer of, and more fixed in, their ideas.

Time<sub>1</sub>/time<sub>2</sub> self-assessment of energy consumption levels compared to both the Swiss average and the average for the respective lifestyle groups: Group I learned on average that their energy consumption compared to their lifestyle group was marginally higher than they had thought. Group II learned on average that their energy consumption was somewhat higher than they had thought, measured against both the average and that of their lifestyle group. Group III showed no change in self-assessment of their energy consumption, i.e. good accuracy from the beginning.

### **BA3: Subjects' assessments of the environmental friendliness of their lifestyle as measured against an ecological standard (2000 watts/person)**

The total average is about -1.11, i.e. a downward revision of more than one assessment "unit" (e.g. from highly friendly to moderately friendly or from moderately unfriendly to highly unfriendly). All three groups have a close average of about -1; all have approximately a one unit downward revision. Group I's average is -1.21, the largest in magnitude, suggesting that students overestimated the friendliness of their lifestyles the most and/or learned the most about this fact from the session. Group II's average, -1, is the next largest in magnitude, but two of its four members had no change. Group III's average of -.75 comes from only two members (one could not answer the question): 0 and -1.5.

The gap between people's perceptions of their environmental performance (their environmental image of themselves) and reality (the impacts of their practices) is widely noted, as is

the gap between people's avowals of environmentalism and their actual behavior or the environmental impacts of their lifestyles. Drawing subjects' attention to these gaps (at least as far as energy use reflects environmental performance) in the hope of reconciling or narrowing them is a mainstay of Energy/Environmental-Revealing approaches. We are naturally more skeptical that such information provision will actually lead to bridging the gap; however, as part of a joint Energy and Social-Revealing program, it may be a first step in that direction.

### Correlation

**BA3 and Personal Income:** 0.40. This barely moderate correlation suggests that higher income earners experienced slightly greater learning through the program concerning the (un)friendliness of their lifestyle, i.e. the divergence of their energy balance from 2000 watts. This is not surprising, as the higher income earners tended to have larger status quo profiles, so the divergence, and evidently the visible starkness of this divergence, was larger among these subjects.

Time/time<sub>2</sub> self-assessment of environmental friendliness of lifestyle: On average subjects learned that they had somewhat overestimated the environmental friendliness of their lifestyles.

#### 5.7.9.2 Energy communication: Subjects' mistrust of the data and model

The believability of the data and/or expert model for the end-user is an aspect of bi-directional communication that surfaced a number of times during the interviews.

S19 was amazed that his total energy use so greatly exceeded the Swiss average (so much so that he almost deliberately mistrusted the statistics).

Many subjects were surprised at how low the Swiss average is for air travel (400 km/year). (As with all of the national averages, this includes the entire population, young and old alike.) S6, however, thought this figure was impossibly low and refused to accept it. He preferred to see the flying statistic for his lifestyle group instead, which he understandably thought he could better relate to his experience. However, we did not make this datum available. In retrospect, this omission is a clear deficiency of the program and the session. Sociologists know that most people tend to relate their behaviors (and any changes in them) better to those of their peers, not (only) to an abstract national average. This is clearly an area to enhance in future versions.

Several others, S7 and S19 among them, also challenged the national monthly average for miscellaneous expenditures (CHF 40) as unreasonably low. Such data, they said, should be differentiated by region or earning bracket: They knew no one who spent so little per month in Zurich (where a single visit to the barber typically costs as much or more).

In the on-screen questionnaire used to construct the individual's energy profile, the use of estimates of consumption activities compared to the Swiss average (as in amount of furniture

purchases or personal effects) may have somewhat compromised the validity of those results. Several items offered a non-quantified movable bar, the middle marked with “Swiss average” and the lower and upper ends corresponding to half as much and twice as much, respectively. Some of these items offered tips giving an indication of what the Swiss average is, but those that did not may have yielded dubious results: For lack of knowledge, the user will have generally chosen the average. Apparently this was tested in previous versions of the software and does not compromise the validity of users’ energy profiles [Dürrenberger, personal communication]. However, mixing such items with others asking for a specific quantitative data entry may also have made the final uniform quantitative energy profile less credible for some users [Spaargaren and van Vliet, personal communication].

Several subjects justifiably raised the issue of the believability of the model on which the program is based. S5 qualified his answer to the general question of how much he had learned from the session by saying: ‘If the model is true — if I can trust what it has shown me to be a fair representation of present reality and future scenarios — then I have learned such and such.’ For the end-users — as opposed to the developers — the model is an impenetrable black box that they must take on faith in order to have confidence in the conclusions they draw from it.

Indeed, the subject pool’s other economist S17 cast doubt on the model’s believability in some respects. Confronted with a future tailor-made Swiss national scenario for energy use that far exceeded the 2000 watt threshold, even with optimistic technological parameter settings, he countered that our model presents only a few possible future realities based on values diverging (but not greatly) from extrapolated trend values, and while these trajectories may be likely, they are not the only possible future scenarios.

Paraphrasing our exchange, the subject said that development could go in another direction, that we could witness technological change that allows people to do much more with less. I pointed out that these improvements were already modeled and projected in the program. He retorted that those were just trend extrapolations and did not capture the more fundamentally and qualitatively different technologies or systems that might come into use. These would make much more difference to the national energy account. ‘Fundamental shifts {changes in techno-economic paradigms} have taken place in the last one hundred years ... The program’s modeled scenario is one possibility, but there are other scenarios. In general, all of these sorts of long-run forecasts have proved completely wrong in the past.’ (S5 and S17 are right, of course: There are different modeling approaches with potentially different results and implications. For an example of one such model, from the field of artificial societies, see footnote 77 in Chapter 6.)

In essence, then, S17 cut the Gordian knot of energy consumption with a strong technological fix reminiscent of eco-efficiency and other contemporary lines of environmental management thinking (although he also suggested the possibility of behavioral shifts prompted by higher prices reflecting growing environmental concerns). S17 divined that environmental sustainability would require either much greater technological improvements than the best the program offered, much less activity, or both (more accurately socio-technical



shifts that brought about deep changes affecting both); not surprisingly, given his particular philosophical outlook and his experience in the session, he chose the 'technical' route.

Several subjects, including S18 and S6, challenged the finding that the energy consumed per kilometer by flying would not noticeably improve in the future from any possible manipulation of Type I technological variables in the program. Although perhaps surprising, this result was verified by the modelers and attributed to the reduction of future plane size and occupancy rates, which cancels out the savings from any improvement in the efficiency of jet engines [Dürrenberger, personal communication]. Such explanations did not satisfy S18 and S6, whose insistence that the unchanged Flying energies were incorrect amounted to a challenge to an aspect of the model.

Users' (mis)trust in data and model: The believability of the data and/or the model, and users' trust in them and faith in the conclusions they draw based on their experiences in the session, were important issues for some participants. Several challenged data on flights or monthly expenditure (these seemed unreasonably, extremely low compared to the subjects' own). A number wanted greater opportunities to compare themselves with regional and/or lifestyle group data. Some did not believe energy from flying would be unaffected by future technological change. Others qualified their conclusions in the session by saying "if the model here can be trusted." One subject in particular, confronted with future tailor-made Swiss national scenarios for energy use that far exceeded the 2000 watt threshold, even with optimistic technological parameter settings, insisted that the technological change offered by the model was only one possibility based on extrapolations and that "quantum leap" improvements over these could well be expected.

### **5.7.9.3 Other energy communication issues: Misleading, misplaced emphasis in presentation of technological and social factors**

In reviewing the logic and effectiveness of the interview structure and analyzing some related reactions from interviewees, we discovered a danger that the first part of the non-discretionary section (interview step 4) devotes too much time to Type I variables in isolation and only shows their effects on personal profiles. Despite the subsequent attempts at a balanced presentation of the effects of Type II variables (on the average and aggregate), some seemed to remember mainly the preliminary lessons about the influence of technology and to "take home" this message. It was certainly not our intention to cultivate an exaggerated belief in technological fixes.

The following spontaneous exchange took place near the end of the interview with S10:

S10: I'm astonished that technological improvement has much more effect than personal lifestyle. Now I've seen that the grey energies are much higher {than I'd realized}, but I don't know

how much I can affect this part. But this might then make people think that it's not necessary to change anything. And this is the wrong conclusion {in the aggregate}.

DG: But when I introduced Type II and we saw how these run counter to Type I variables ...?

S10: Difficult ...

DG: Had you forgotten that point? I'll admit that the first parts show technology has a very strong role. But I thought that bringing in the Type IIs, and also emphasizing the potential links and co-evolution of the two types, made up for that.

Later, after the formal interview with S10 was over, I added the following by way of explanation of my motives:

One of the goals here in including the second part of the program is in fact to show the importance of these sorts of variables that are generally outside of one's direct control. And this is not meant to turn everyone into technological optimists, but rather to show that if we as a society influence the direction and change of some of these variables, we can have good results. And the results from both kinds of (Type I and Type II) variable changes may or may not exceed what we can do directly in our own households {depending on the person}. The next step to this session is to add more context and ask the question how can we influence these variables to a greater extent and in a positive direction. Interview step 9 was a hint in this direction and was meant to get you started in thinking along these lines, in a more political or consumer fashion. Either you can make a change yourself, or you can set an example for others, act within part of a larger consumer group, through NGOs or through other political channels, to try to shift the focus a bit to these factors.

The subject agreed it should be possible to address the size of grey energies through channels affecting these organizations.

In S7's case, the order, repetition, and slow build-up through the Type I section seem to have had the positive pedagogical effect of increasing the force of the surprise in the section on Type IIs (see the discussion of S7's "revelation" in Group III of section 5.7.5.8 above). By interview step 6 (where he saw the action of Type IIs on the national level), S7 had reiterated his technological optimist's answers several times since the preliminary questions in step 1, making the change in his opinion at this point seem all the more stark to him – it accentuated

the final lesson more by bringing his previously hardened technologist opinion, reinforced by the early experience with the program (with his profile only), into greater relief with his changed opinion later on.

Generally, the danger of overemphasis may be overcome by the proper balance, order, and equal presentation of Type I and Type II variables. The shortened and expedited presentation in the streamlined interview versions probably better served this end.

### **5.7.10 Subjects' evaluation of the program and the interview session**

#### **5.7.10.1 How useful and instructive was the session?**

Here we summarize the results of follow-up questions evaluating the usefulness and educational value of (1) the program as a whole, (2) exercises involving the generation and analysis of the subjects' conservation profiles, and (3) the sections involving Type I and Type II factors.

The **total** combined average was 94% (overwhelming) approval of the program on these points.

**Group I** average: 94.6%

**Group II** average: 100%

**Group III** average: 83.3%

#### **5.7.10.2 Did the session bring out various points?**

Individual summaries were compiled for these questions:

“Do you feel that energy accounting programs like this one help clarify:

1. How your personal behavior affects your energy consumption?
2. How your lifestyle (group) affects your energy consumption?
3. The variety of other factors that affect your energy consumption?
4. The relative importance of these factors?
5. The connection between your consumption and Switzerland's as a whole?”

Summaries and averages of these (converted) yes/no questions yield the following:

**Total** average: 87.5% Yes

**Group I** average: 86.4 Yes

**Group II** average: 100% Yes

**Group III** average: 80% Yes

Subjects' evaluation of the program and the interview session: A large majority of subjects felt the program was instructive and useful for themselves.

#### **5.7.10.3 How understandable and how complicated did subjects find the program?**

All subjects claimed the program was understandable. Most (15 subjects) ranked it "not complicated" while some among them noted that certain interview questions built around the program were complicated. At least four subjects ranked the program moderately complicated. One (S15) ranked it moderately to highly complicated. The interview built around the program, however, added further layers of complexity. Some subjects admitted this while others' inconsistent answers on certain themes pointed to the challenging overall nature of the interview session.

#### **5.7.10.4 Usefulness of the program for informational and educational purposes with laypeople**

"As far as information and education efforts {for laypeople} go, do you think this program would be a helpful approach to addressing energy consumption?"

The majority answered with at least a qualified "yes." Group I offered mixed answers. Group II generally said "yes" especially for (higher-level) students in a suitable educational environment. Group III members had some reservations about endorsing it for general use.

Viewed generally, five or six subjects gave at least partial "no" answers. Several of these said that the program section with Type I and II non-discretionary variables was too difficult and required specialized knowledge (a comment on content). Others wondered how many laypeople would be able and willing to grapple with the proffered form of graphical displays (comments on the communication medium). Some subjects gave unqualified glowing endorsements. Some said that certain parts were easier to follow while other parts would have to be simplified or shortened for general use. Some endorsed it for older students (e.g. at a high school level), but for younger (or less advanced) students, other tools would have to be devised.

Usefulness of the program for general laypeople: Most subjects felt the program would be a useful tool for informational and educational purposes with general laypeople, perhaps given certain changes or simplifications, or with advanced high school students and/or in a suitable educational environment. Some felt the section with long-term variables was too complicated (for such use).

#### **5.7.10.5 Recommended changes in presentation or functionality**

Considering the subjects as a whole, nine subjects had no changes to recommend, at least at the time of the interview.

Three subjects explicitly mentioned the scale problem, a known deficit of Excel that sometimes produced different scales for the personal (status quo and conservation) profile graphs for the year 2000 and for the year 2030. This problem could be eliminated by writing the application for a more sophisticated web-based platform, which the developers have already implemented in later versions of ECO<sub>2</sub>.

Several other subjects criticized the graphical display. Some subjects had difficulty understanding what certain graphs meant or seeing what changed when input parameters were changed. One suggested users would benefit from an option to juxtapose graphs for comparison, e.g. a button that could juxtapose any two graphs they might want to compare.

S7 suggested including pop-up displays for second scenarios (alternate settings of long-term parameters) and providing the ability to juxtapose them to first scenario results. He and S5 also suggested showing past historical levels for other consumption and parameter values, e.g. 1950s Swiss household size, in order to expand the cross-temporal element of the program backwards as well as forwards. (Supplemental historical graphs of such parameters were originally planned to be offered during the interviews but were omitted for reasons of time and complexity.)

Arguing for a more socially specific and sensitive data approach, S6 noted that he would often have done better to compare his personal profiles to specific data for his household (“lifestyle”) group rather than to the Swiss average. His social group, he argued, has much more influence on him than the Swiss in general or on average. This point was noted earlier.

Criticizing the interview more than the program, S1 said our response framework was sometimes unclear. It took time to understand the point of questions or comparisons and to understand what sort of answer was expected. In writing the interview questionnaire, I had invested a great deal of effort to try to make the response framework clear, and I offered multiple explanations (verbally and as text passages to read) at various points in the interview. Yet, given the inherent complexity of the subject, the novelty of the approach, and the variability of the subjects, some confusion was bound to remain.

Several subjects thought the program could be automated for use on the Internet, although most admitted it would be difficult to use without guidance and would thus require much more textual and visual explanations. These should include better explanations and guidance for choosing levels of the Type I and II input parameters. A “total” value reading on the graphs, eliminating the need to “eye” the right margin on the x-axis, would also be helpful (S16).

## **Chapter 6**

### **Final Discussion, Achievements, Open Questions, and Suggestions for Further Research**

This concluding chapter takes a step back from detailed empirical reporting and selectively reviews what has been learned in this study and how it might be used for sustainable consumption research or applications. To some extent it synthesizes findings from the empirical chapters 5 and Appendix A, especially in light of certain frameworks and concepts from the theoretical chapters 2, 3 and 4. This chapter does not attempt a systematic summary of results but highlights achievements, revisits prominent themes in light of the fieldwork, makes recommendations for policy and research, and poses questions for consumption theory and practice.

#### **6.1 Which questions have we answered?**

In the experimental sections of this study we set out to examine the viability and usefulness of a certain energy communication approach for end-users. The results, especially from Chapter 5, are wide-ranging and could be used to support a variety of conclusions as well as to examine a variety of additional premises. The leitmotifs that sounded variously in the foreground or background throughout these chapters – the individual's relationship to the collective, actor vs. structure, risk communication to spur socio-technical innovation, public deliberation and participation in environmental policy, and others – are the subjects of many more thorough studies than this one. The major innovation here is the novel combination of such themes in a trans-disciplinary application for sustainable consumption, especially bringing a dual individual and institutional perspective to the end-user in a quantitative and holistic fashion.

##### **6.1.1 Top-down or bottom-up**

At the end of the survey of treatments of consumption in Chapter 3, we posed the questions “Which of the two broad types of incentives to alter (the present trajectory of unsustainable) consumption, internal ‘bottom-up’ or external ‘top down,’ are the most motivating and most durable” and, relatedly, can individual behavioral change alone work, or is institutional-societal change necessary? It should be obvious to the reader, and intellectual honesty requires emphasis of the fact, that our favored sociological construct, Gidden’s structuration

theory, in effect answered at least the second one a priori: A structural impetus is also necessary.<sup>76</sup>

Our configuration of the ECO<sub>2</sub> energy accounting software brought technological and social systems into a dynamic interplay with the householders' individual behaviors. It let users discover for themselves how nuanced and changeable is the discretionary border, in different individual life situations and at different levels of aggregation. Concretely, subjects might observe that their diet, for instance, consumed more (combined direct and embodied) energy than their car, decide for themselves whether they could make any changes in their eating habits, and then discover perhaps that improvements in industrial processes or the power generation mix had a greater dampening effect than any dietary changes they might reasonably contemplate. In the aggregate, however, they might then find that Swiss trends towards increasing auto travel, and at low vehicle occupancy, brought collective automobile-related behaviors and norms back to the fore.

A small majority of subjects from the three empirical data sets analyzed in this study (my own and the two past studies reviewed in Appendix A) seemed to put somewhat more emphasis on top-down changes overall; however, by the interview's end, subjects in the ECO<sub>2</sub> sessions could not in good faith entirely "pass the buck" in terms of individual effectiveness and responsibility. This is expanded on in section 6.3 below.<sup>77</sup>

### 6.1.2 Metric for gauging experimental success

As discussed in the annotations to Hypothesis E in Chapter 2, we grappled from the start with the question of how to measure success in our experiments with the software and interviews. Clearly, we could not necessarily expect a commitment from the subjects to make behavioral changes (only a few expressed a new resolve to make changes in the home, and

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<sup>76</sup> As noted, this means that our introductory framing Hypothesis A "Discretionary exists" was more or less a priori confirmed according to the sociological outlook adopted at the outset.

<sup>77</sup> Work in the new field of artificial societies (e.g. Gilbert Nigel and Rosaria Conte (eds.) (1995), *Artificial Societies: The Computer Simulation of Social Life*, London: UCL Press; Rauch Jonathan (April 2002), "Seeing around Corners", *The Atlantic Monthly*, vol. 289, no. 4) is shedding light on the divergence between properties at the micro and the macro levels. Findings from its unconventional sort of modeling may challenge aspects of our information approach for sustainable consumption on both a theoretical and empirical level. In A-society computer simulations, new and often unexpected properties and discontinuous shifts "emerge" on the system level when individual agents are modeled to interact with their neighbors according to simple sets of rules. Positive social transformations often depend on modeling individuals as both diverse and limited in their knowledge to aspects of their immediate surroundings, i.e. qualities of actors in their immediate vicinity. This seems to run counter to the aim in our research to increase people's knowledge of the whole system (and the conventional environmental dictum that one should "think globally and act locally"). We have noted the merit in interview subjects' requests for more data on their peer groups and fewer perhaps about "society at large." Of course, our provision of information on the national level, in terms of aggregate and average statistics, is a far cry from making people "fully informed." And the complicated cognitive, psychological, social, or political uses to which people might put this knowledge are beyond the range of these simple modeled worlds. However, artificial society work also suggests that certain small, targeted interventions can have large, discontinuous results on the macro-level, which argues perhaps for a consumption approach more oriented toward "key" players than toward the masses.

that resolve points to an enhanced behavior *intention* that may not be translated into practice anyway). We took pains in Chapter 4 to explore the theory that elaborates the conditions – personal, situational, and structural – that would be necessary for the translation of enhanced knowledge into behavior. A few participants in the ECO<sub>2</sub> sessions specifically cautioned the interviewer that their new-found understanding of the factors and issues surrounding energy consumption would not lead them to make any changes in their personal consumption choices or habits. Nor of course is that the only positive response one could hope for. The various forms of end-use involvement for the greening of consumption institutions are even more diffuse in space and time and would be harder to measure, although one could imagine – especially in a future application that paired the use of the enhanced ECO<sub>2</sub> with focus groups that discussed specific involvement issues – a post-session questionnaire that asked whether the participants would now be willing to lend support to green consumption: Household conservation in sector *x*, green taxes, purchase of green electricity, environmentally-oriented referenda, and so on. This was pursued to some extent in Dahinden's *Democratizing Environmental Policy*. Discussions are underway with Swiss energy agencies to develop sophisticated, full-scale versions of ECO<sub>2</sub> that draw on large municipal-level databases and can simulate the effects of highly specific political measures [Gregor Dürrenberger, personal communication].

### **6.1.3 Success in researching and applying domestic sustainable consumption**

The consumer-oriented Eco-team programs popular around the world are based on an Environment-Revealing monitoring effort that allows people to track their resource consumption and generation, and compare themselves and exchange conservation tips with members of peer groups. According to the program's founder Gershon, people ask four basic questions about how to change their behavior to help the environment: 1. Where do I start? 2. Which are the most important actions? 3. How do I do them? 4. Will it make a difference? [van den Burg 2001]. By combining Energy-Revealing and Social-Revealing approaches, our ECO<sub>2</sub> sessions provided participants with opportunities to examine, and at least partially answer, questions 1, especially 2, and 4. For question 2, the program allowed users quantitatively to compare the effects of different actions on their energy balance. Using the aggregate displays and scale-up function, they could see what a difference various steps would make and confront issues of critical mass and social traps (question 4). As emphasized, question 3 largely awaits further studies and political actualization of the lessons participants took home from their experiences during the session.

Through the main empirical research of Chapter 5, we also covered at least three of the four basic agenda items proposed by Spaargaren and van Vliet for consumption-oriented research into environmental innovations in household contexts: Lifestyles; evolving or escalating standards of comfort, cleanliness, and convenience; modes of provision of public and private goods and services as well as production; and (only minimally achieved) domestic time-space structures [Spaargaren 2000b]. The last is typically examined in studies on the sociology of technology and is maybe best reserved for practitioners in that field.



#### 6.1.4 Policy implications and endorsements

After our experience in the pilot study, we feel justified in endorsing a broadened information approach for sustainable consumption. The Social-Revealing approach, at least as expressed with a tool like the ECO<sub>2</sub>-interview version, shows some promise for inducing, if only indirectly, personal conservation, consumer-citizen involvement, and (re)consideration of social practices. The ECO<sub>2</sub> might best be introduced into late high school environmental curricula. As one enthusiastic subject put it: "This {program session} is something everyone should experience at least once in their lives." If so, it should be during people's formative years so as to yield the most in behavioral, social, and political dividends. For older, established householders, we might look for times when domestic routines have become temporarily 'de-routinized,' e.g. following utility disruptions, energy crises, strikes, unusual weather events,<sup>78</sup> and the like, when the experience of using the program might actually contribute to a change in direct consumption behavior in the household. These episodes may increase the chance of greater reflexivity, on a personal or social level, according to theory at any rate: Van Vliet and Spaargaren's events that de-routinize ordinarily routine household behavior [Spaargaren 2000b]; moments for collective historical reflection and alternative choices [Wilhite 2000]; Bijker's (1995) reversing technological closure; Wilk's (1999) cultivation process, corresponding to some unusual event, "of opening existing needs {inscribed in the habitus} to question, discussion, and debate." In any such event, prior experience with a tool like ECO<sub>2</sub> may also show the individual to have been primed to participate in a political process of change.<sup>79</sup>

Our approach also answers the United Nation Environment Program's recent call for strategies for sustainable consumption that extend "beyond the conventional economic considerations, to include individuals as *citizens*, not just mere *consumers*" [Manoochehri 2001].

A recent UNEP report entitled *Consumption Opportunities* shows a growing convergence in policy circles with the theories advanced here. *Consumption Opportunities* places consumption "optimization" on equal footing with dematerialization as a vital strategic element for sustainable consumption. Optimization consists of consumption that is *different, conscious and appropriate*, where *different* entails changing the institutional infrastructure to allow for different consumer choices, *conscious* involves greater individual consciousness in "choosing and using," and *appropriate* addresses drivers and levels of consumption.

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<sup>78</sup> Especially the increasingly frequent deranged weather phenomena like record-setting temperatures, storms, floods, and droughts that suggest accelerating climate change

<sup>79</sup> During the 1991 Persian Gulf War [see Goldblatt 1993] and in the aftermath of the September 11 2001 attacks on the US, the American nation experienced crises that could have led to reflexivity on energy use, especially since sizeable portions of petrodollar earnings in the Persian Gulf went towards the financing of terrorist groups and supportive activities of regimes there. National security issues could have opened up the discussion to consideration of the bloated American demand for energy, even without reference to the associated environmental burden. Alas, political tunnel vision (and government corruption) has emphasized the usual tired supply-side approach, and the cultural sense of entitlement prevails. If anything, the (understandably) single-minded prosecution of the war seems to reduce chances of national reflexivity on a range of issues. Switzerland, with its relatively higher national environmental consciousness, seems in a better position for the sort of reflexivity needed for sustainable consumption, but here too the political winds blow foul.

Furthermore, their conception of “systemic” sustainable consumption seems remarkably close to the particular communications effort endorsed by this study:

Sustainable consumption in this ‘systemic’ sense ... engages, economically and socially, from the bottom up, using the actions and perspective of consumers and citizens as its starting point, rather than the big-picture assessments of the global environment of sustainable development discourse ... Indeed, one of the shortcomings of sustainable development since the Rio Earth Summit has been the difficulty in practice of bringing down to the level of communities the visions and commitments elaborated in intergovernmental circles. A ‘systemic’ approach to sustainable consumption is likely to overcome this, by starting at the personal and branching out to the broader issues.

Naturally, UNEP still holds government and industry primarily responsible for structural changes that promote “different” consumption and describes as “misleading” suggestions that consumers could drive this process. However, they propose consumers, communities, and civil society as the major agents for “conscious” and “appropriate” consumption, which is very much in line with this study’s idea of the potential for end-user-oriented monitoring in environmental reform.

## **6.2 Lifestyle groups and differentiated lay approaches to sustainable consumption**

Chapter 5 described how subjects were grouped and how questions and themes were analyzed with respect to these groups and to the whole. These groups corresponded roughly to (one of many possible sets of) lifestyle groups who could make differential use of options “in the ecological modernization of sectors ‘in a way that fits their lifestyle’” [Spaargaren 2002]. Groups I, II, and III showed themselves to be clearly differentiated in their use of energy-consuming devices and services, in their direct reduction potential (willingness to change), in their recognition of the role of factors higher up on production-consumption chains and networks, and in their possible willingness to participate in the greening of these chains and systems.

This has clear policy implications in that different lifestyle groups might use or support certain consumption interventions or “reduction strategies” differentially over other strategies, although preferences here may not consistently correlate with other fixed lifestyle group characteristics. Still, assessing householders with such a tool as our enhanced ECO<sub>2</sub> can reveal which broadly defined lifestyle group they belong to and thus, for policy purposes, which clusters of strategies might appeal to them; and, in applied research, which strategies might be practical to develop with them in a further interview or focus group setting. Van den Burg is pursuing this avenue for Dutch utility consumers (see 6.5 below).

### 6.3 Personal responsibility

Considering the first few hypotheses on (the lay distinction between) discretionary and non-discretionary, the past Swiss studies reviewed in Appendix A reported some cases of people who believed they had no discretionary power over their energy consumption. Some of the ECO<sub>2</sub> session subjects, especially from Group III, held a similar opinion, at least at the start of the interview, in that they claimed they could not change anything about their activities to lower their energy use. However, few to none claimed that this was universally or collectively the case, since most agreed both that Swiss consumption was not purely technologically determined and that across a long enough time horizon, Switzerland could chart its own energy future.

Our treatment of *Energy in Everyday Life* discussed the discretion spectrum more with reference to responsibility since that was emphasized in the interview questionnaire and available transcripts. The ECO<sub>2</sub> interviews, as noted in Chapter 5 section 5.7.5.10, focused more on differentiating conditions where either personal or socio-technical interventions would be more effective, and only in the interview follow-up questions did they explicitly raise the issue of responsibility.

Farhar and Finger's (1994) studies (Chapter 4, section 4.2.3.2) suggest different levels of recognition, understanding, and reaction to non-discretionary constraints in the case of the US and Switzerland, respectively. The resignation, fear, and helplessness in the face of non-discretionary forces Finger reports among the Swiss seem characteristic of a portion of the subjects in Appendix A, but somewhat less true of the subjects generally in Chapter 5, fortunate for our hopes for expanded citizen-consumer involvement. In designing the program and interview sessions, did we manage to avoid the danger of encouraging people to "pass the buck" when it comes to responsibility for conservation or restraint? In several places we noted the possibility of accidentally encouraging this through our presentation, even though the approach clearly intends to assign personal responsibility where it is due (i.e. effective and feasible, e.g. some plane travel). As summarized in the text and boxes on page 127 in Chapter 5, the ECO<sub>2</sub> program showed participants that top-down socio-technical change was often, and in certain cases mostly, more effective than direct alterations in the household (although naturally the social changes could not be effected without the participation of a significant percentage of the population). Then, in ranking actors' responsibility for national energy use, as far as we could tell subjects generally extended this lesson to the question of responsibility and put the onus of change on power brokers like corporations and politicians. If people view these decision makers as uninfluenceable – and all non-discretionary factors as truly and irrevocably non-discretionary on any policy-relevant time-scale – then we run the risk of Finger's and Meijnders' (1994) type of scenarios: High environmental consciousness, problem recognition and concern among the public; and a high level of recognition of institutional and technological constraints, but also a strong feeling of individual powerlessness and helplessness to do anything about them. One consequence is a circle of information gathering as fatalistic confirmation or emotional solace, and because no other avenue is open: "Informing householders *as a substitute for* sustainable energy consumption" because apparently learning about the environmental threats is better than not knowing, even when one

feels they are ineluctable. Other possible end results are cynicism, apathy<sup>80</sup> or disengagement (“shutting out and tuning out”). As noted in Chapter 4, this danger is partly a product of the withering of Western democratic political participation. And matters are made worse if such energy programs accidentally teach users to abdicate what individual responsibility they took previously for their domestic consumption decisions – if, for example, interview participants leave with a highly technological optimist message and forget the lessons of the individual and Swiss aggregate graphs. After all, depending on the person, individual conservation efforts are important and necessary in certain sectors or under certain circumstances, and definitely vital in the aggregate to confront demand escalation or rebound.

This is where the notion of consumer involvement and participation, and its encouragement through “consumer-oriented monitoring” (e.g. counter-surveillance of producers) takes on importance as a form of democratic rejuvenation. The ECO<sub>2</sub> interviews only started (explicitly) to assess participants’ views of possibilities here near the end of the interview (see Chapter 5, section 5.7.8). Views on the scope for consumer-citizen involvement were mixed and not uniformly encouraging. The balance of opinion was towards a limited scope or no individual influence at all, and a limited role for (individual) consumers in any case, which is surprising for such a market-oriented society.<sup>81</sup> Systematically exploring this issue, using statistically generalizable sampling for the Swiss population, is important for any future work of this sort and would be a logical extension of a (shortened) session with the energy accounting software.

## 6.4 Success in risk communication

In evaluating the success of the risk communication (RC) in the ECO<sub>2</sub> interviews we can see how well we took note of Renn’s assertion that “individuals as well as social units make use of a complex variety of internal and external cues to process messages and that the variation of one or two factors may only lead to marginal changes in the outcome” [Renn 1991b]. By combining personal and aggregate/long-term program modules, and incorporating social, technological, and other institutional factors, we tried to provide a measure of comprehensiveness and a large range of changeable factors to achieve a richer variety of outcomes. The diversity and richness of responses and comments across subjects seems to point to success in this objective. However, by experimental standards, changing so many variables, even when done stepwise and cumulatively, may have removed an element of control seen as important for validating results. Since we did not set out to conduct a rigorously controlled experiment but rather a hybrid pilot study, this does not overly concern us.

However, from some risk communications perspectives, our empirical study built in serious limitations, and the application of its results is therefore also limited. Kasperson warns

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<sup>80</sup> Renn notes that personal apathy is one of the possible secondary effects of risk communication [Renn 1991a].

<sup>81</sup> Similar results were recently found in a larger study using focus groups to assess the market potential for green electricity, especially hydropower, in Switzerland [Spreng 2001]. The percentage of domestic customers who actually pay 20% more for environmentally produced electricity is low; the actualised green consumer niche is much smaller than that predicted by marketing studies, although it is expected to increase with the ease of switching providers in liberalized markets.

against RC decomposition that assumes messages can be separated from their context of relationships and social interactions in general. Process – the nature of participants, their relationships and interactions – can and maybe should be an important determinant of which information is exchanged, how it is to be interpreted, and what the continuation of the communication process will be like [Kasperson 1991]. We noted this in the caveats at the end of Chapter 4, where we warned against taking this so far as to elevate process over content and muddle the transdisciplinary aim. In our interview session, the balance between expert and lay input into the process was naturally somewhat weighted towards the expert side, since the generation of energy profiles and their manipulation relies so heavily on the use of model-based software. Lay input increased as we moved to the questions of how people interpret and what they can do with the knowledge and insights they had gathered earlier. Again, concrete political applications, explored only tentatively near the end of the interviews, lend themselves to more social and participatory settings like focus groups, and we do in fact recommend these for future extensions.

As expected, the combination of Energy-Revealing and Social-Revealing approaches allowed risk communication to proceed on several levels. The interviews operated on at least levels one and three, to use Renn's (1991b) categorizations (Chapter 4, section 4.3.2.2). We did not often discuss level one's environmental risks and damages explicitly, but the assumption of serious environmental risks was made clear in the response framework explained in texts offered to participants at the start of the interview. The interesting achievement is the discussions the interview session generated on level three, which involves values, lifestyles, and technology's role in society, among other things. While the interviewees' views on these naturally varied, and values were not often explicitly invoked, the software program stimulated thoughts on the energy implications of different patterns of social and technological development in Switzerland. The juxtaposition of technological (Type I) and social (Type II) parameters (interview step 6) almost forced a confrontation with some elements from level three. And most participants, even orthodox economists and technological optimists, found the program's demonstration of the importance of social and lifestyle factors compelling (or even eye-opening) and were willing to engage the topic on these terms. We believe that the ECO<sub>2</sub> interview version, inspired by the Social-Revealing approach, has contributed to the development of a suitable macro-sociological framework and risk communications medium for Renn's third level debate.

The interviews also probably induced both peripheral and central interpretation of the risk communication messages, with an emphasis on the peripheral. The issue of holistic trust in the model behind the software came up several times in the interviews (Chapter 5, section 5.7.9.2) and a few subjects noted the majority of their conclusions from the program depended on their trust in the embedded model. One subject challenged the breadth of the technological vision embodied in the (highest modeled levels represented by the top drop-down choices for) Type I parameters and said our tailor-made scenarios represented only a small subset of future possibilities. As noted, others challenged this or that statistic that clashed with their notions of what was normal for their circle in Switzerland.

We suggested in Chapter 4 that the peripheral (and Social-Revealing) route might contain the potential to engage different audiences on the question of energy consumption, not just

the environmentally concerned. By keeping mention of specific environmental details to a minimum (largely to the explanatory material in the beginning and the re-invoking of the 2000 Watt environmental threshold at the interview's end) and instead working with ordinary terms involving social practices, technology, and social or demographic activity levels on the input side and energy terms on the output side, we hoped to engage participants on the conservation issue from a broader range of motivations. A few, for instance, saw the ECO<sub>2</sub>'s personal module potentially useful to save money in the home. For the national module, some seemed to view the projected increase in Swiss energy use as economically nationally troubling, while at least a few who assumed an energy coupling with GNP saw it as expected and positive. With only relatively few (non-representative) subjects, we were not able to assess how useful such a tool would be to engage people in energy consumption out of a wide range of concerns. Barring another serious oil shock in the mid-term, we expect environmental concerns will continue to act as the main draw for consideration of energy consumption and reduction. General consumption or consumerism can attract a somewhat larger constituency, as noted in Chapter 3, but is still more a concern for the fringe than the mainstream.

## 6.5 Suggestions for further research

At the end of Chapter 5 we reviewed subjects' suggestions for improving specific design and functional elements of the ECO<sub>2</sub> software. We noted in Chapter 5 that certain questions at the end of our interview were meant to point or contribute to future, more contextual studies, for instance interview step 9, which asked subjects for ideas on how they and others could become involved in improving the energy performance of infrastructures, technologies, and/or social practices. As mentioned, some Dutch work is being developed that uses the social-practices approach involving lifestyles and infrastructural influences on householders' use of electricity [van den Burg 2001]. The researchers will look for groups differentiated by their preference for specific reduction strategies (buying green electricity, DSM/differentiated electricity tariffs, smart metering, subsidies, energy-saving technologies, home-power or co-production, and so on), which may or may not also correlate neatly with established lifestyle groups. They also intend to develop energy accounting software for use in interviews. The focus, however, seems to be on the market-oriented and political details of (implementing) those reduction strategies. The study thus represents the next step, albeit in a setting limited largely to direct electricity use, for which this work can act as useful input.

In future work with the ECO<sub>2</sub>-interview version, shortening and streamlining the presentation further (e.g. by focusing only on certain household sectors using direct power) would help avoid accidental overemphasis of either technological or social factors. In a sector-limited treatment, however, while certain micro-macro comparisons are possible and desirable, overall scale issues would be harder to address (personal energy consumption could just be shunted from direct household needs into goods, leisure, transport, or other services not examined, canceling out reductions in the sectors of focus).

We mentioned in several places in Chapter 5 that future applications should tailor the personal data more specifically to relevant social groups. We suggest more (live) comparison of

one's own consumption with that of one's peer group, and the sharing of experiences and savings success stories with peers. Eco-team's group meetings may be that program's most important source of support and incentives to make enduring lifestyles changes. This feature was notably absent in the ECO<sub>2</sub> interview settings. The next step involving political contextualization should then be in a (focus) group setting. The ideal order may be a shorter individual, interview-guided session using ECO<sub>2</sub> and then a group meeting applying the lessons to end-user involvement in greening the infrastructures of consumption.

"Risk communication is part of a complex communications web in which various groups and cultures possess varying perceptions, values, and interpretations" [Kasperson 1991]. Our empirical study was limited by subject selection and analysis methods; in particular, the influence of different values (especially among cultural sub-groups), while recognized from the start as being important to the question set, was jettisoned early on in the interview planning process as infeasible with our software tool in the chosen communications setting. This aspect could also be developed in future studies along these lines.

Grappling with the difficulties of breaking out of the North's unsustainable consumption trajectory in Chapter 3, we raised a conundrum we called a chicken-and-egg problem: "Whence comes the political stimulus for the necessary restraint-enabling institutional and structural changes, when only these changes would bring home the timely reality of personal and organizational threat?" (Chapter 3, section 3.3.4.1). The theoretical elaboration of politico-economic requisites for sustainable consumption is a job for ecological economists and political scientists. Princen's answer might be independently to convince people of the need and practicality of changing economic institutions so as to restore signals for restraint, among both consumers and important players in the globalized and dispersed production-consumption chains. This would go considerably beyond conventional market mechanisms like energy taxes or emissions quotas, but it is based on the same reasoning that the system should provide the right incentives for players at all levels and that individual appeals to go against the grain are next to useless. Looking back over the interview sessions and asking how close the subjects' responses came to giving a comprehensive description of the whole consumption problem – in other words, how close the subjects' program and interview experience came to the (expert) account of Chapter 3 – we note that such structural economic elements usually played a relatively small role in lay accounts. This is not surprising considering that the modeled non-discretionary variables did not specifically include this type of element. An (Ecological) Economic-Revealing approach to consumption would require a different set, or extended version, of parameters in energy software beyond the technological and social parameters modeled in the ECO<sub>2</sub> program. Applying such an idea to the end-user information approach for sustainable consumption (just as we applied sociological and technology theory to consumer monitoring and information), one could imagine for example its embodiment in an analogous information-modeling tool.

Tailoring this to the end-user, however, in the hope of consumer involvement for change, is likely to be conceptually inaccessible and fruitless. Here there may be no substitute for organized pressure on the new nodes of power both upstream (e.g. institutional investors and speculators) and downstream (e.g. brand-name merchandisers, marketers, and advertisers) in global commodity chains [Conca 2001]. This would reinforce a consumer-oriented

Social-Revealing approach, since consumers' practices and attitudes are increasingly influenced by financial and corporate decision makers such as these.

## 6.6 Some open questions

Here we list or comment on some additional open questions common to both the sustainable consumption agenda [Spaargaren 2002] and our ideas for exploration in future applications.

1. What are the social relations that accompany the socio-technical innovations implied or required by the ecological modernization of consumption?
2. Does the "greening" of activity sectors and social practices like transportation or diet favor expert knowledge over the participation in and influence of laypeople on providers, producers, infrastructure, and technology development? We want to stimulate lay involvement, but in our interviews we went about it in a partially expert manner (cf. 6.4). A related item is evaluating and overcoming cultural resistance to the use of the knowledge gained by lay users through such programs as ECO<sub>2</sub>. We can imagine that necessary institutional change may also have to extend to institutions that hinder people's use of the sort of knowledge we imparted, either in the home or externally by consumer or political involvement. What might these institutional barriers be?
3. A cluster of basic open questions for environmental sociologists researching the greening of institutions is the following: How much lay involvement, co-provision, or co-production of energy related systems, artifacts, and other structural elements can be expected or encouraged (or is already observable), and how much is democratic wishful thinking on the part of green social scientists? Can consumer-oriented monitoring change infrastructures of consumption (individual or collective consumption practices and/or those of providers or producers) in the absence of regulation or other behavior-forcing mechanisms [van den Burg 2001]? That is, how much can even enhanced voluntary consumer information approaches be relied upon? Further, how much of what researchers have seen is idiosyncratic to the cultural and political landscape of their research areas (e.g. the Netherlands) and how much is truly extendable in theory or practice to other industrialized or even industrializing nations? And, if consumer-citizen involvement can be anticipated with confidence in a certain sector and region, what sort of relations or institutions can be looked towards to encourage an environmentally favorable outcome? Consumer-oriented monitoring or end-user involvement does not necessarily or even predominantly imply pursuit of an environmentalist agenda, as sometimes seems to be the implicit assumption of some of its advocates. The tendency to deify consumer sovereignty and neglect the problematic of demand escalation and scale issues (understandably to preserve amity with researchers and policy makers) threatens to distance the ecological modernization agenda from certain fundamental reforms necessary for sustainable consumption. This leads into a discussion of extensions to or departures from ecological modernization.



## 6.7 Divergence from the prevailing environmental framework

This study has often pointed up the close affinity of its agenda, conceptual framework, and experimental monitoring approach with those of ecological modernization (EM) theory, especially the modern Dutch variety represented by Spaargaren and Mol. Chapters 4 and 5 make a contribution to certain fundamental issues and mechanics of monitoring for the ecological modernization of consumption, even though they did not set out to do so: our approach came out of the even broader consideration of the consumption problematique presented in Chapter 3. Moreover, EM has rapidly become influential in environmental social science and policy, and the term is even used more broadly to characterize strategic environmental management, industrial ecology, or environmental improvement in general [Buttel 2000]. It is therefore appropriate to end this reflection on lessons learned by considering how far EM goes in dealing with the problem as laid out in Chapter 3, and what it still leaves to be desired.

Ecological modernization theory itself arose partly in response to shortcomings of sustainable development, formulated originally with regard to policies toward the South and from experiences there, in addressing Northern environmental problems. EM is also to some extent a critique and response to radical environmentalism ('countermodernity'). EM theory is young, still evolving, grounded in historical and political reality, not canonical, and variegated. Generally, EM is optimistic about the malleability of the institutions and technological capabilities of industrial capitalism [Buttel 2000]. Spaargaren and Mol's sociological conception of EM hypothesizes that not only is capitalism sufficiently flexible institutionally to permit movement in the direction of "'sustainable capitalism', but its imperative of competition among capitals can – under certain conditions – be harnessed to achieve pollution-prevention eco-efficiencies within the production process and ultimately within consumption processes as well" ([Spaargaren 1996] as cited in [Buttel 2000]). "The environment becomes relatively independent (now from the economy), ultimately having as a consequence that a capitalist or rather market-based system of production and consumption does not necessarily contradict significant environmental improvements and reforms in any fundamental way" [Mol 2000]. Buttel identifies some potential shortcomings of current EM as a social theory, among them an overconfidence in the "transformative potentials" of modern capitalism and a relative neglect of broader concerns about aggregate resource consumption and its environmental impacts [Buttel 2000]. Princen, Conca, and many ecological economists would probably concur and claim that globalizing capitalism must be changed in several key respects that may amount to more than evolutionary institutional change that leaves untouched certain of its fundamentals.

"In the end, the empirical question will of course remain whether these radical environmental reforms (in the EM vein) will be sufficient to deal with the – to a large extent socially constructed – criterion of sustainability" [Mol 2000]. I hazard to say that the majority of natural scientists working in the broad field of environment and development, however they construct sustainability criteria, would answer the question "no, they are insufficient now and will prove insufficient at least in the immediate future." And to the extent that they are biophysically constructed, sustainability criteria show that whatever case studies ecological

modernizationists adduce as evidence of environmentally oriented institutional transformations thus far, global environmental results are sorely lacking. Most environmental “state” indicators and trends worldwide are dismal.

EM champions the emergence of a separate ecological rationality to judge individuals’ and institutions’ actions in which the “rationally calculating citizen will be just as keen on avoiding environmental risks ... as she is on realising economic benefits or enhancing status” [Spaargaren 2000b]. But it does not seem to advocate the sort of structural reforms which Princen and others say are necessary to restore feedback concerning the ecological risk of their decisions to actors along the consumption-production chain, instead apparently viewing the sort of evolutionary economic changes already occurring as sufficient. Thus, there may be an agreement on ends but a disagreement on necessary means.

Above we noted the tendency towards over-emphasizing consumer sovereignty and considering the lifestyles, wishes, and demands of consumers as sacrosanct. Yet Chapter 3 identified the constant escalation and expansion of those wishes and demands as a significant driver for the environmental crisis. Wilk’s social reconversion of needs to wants and Princen’s restoration of restraint then seem to be extensions of or departures from EM. Following the EM orientation in practice also seems to tend towards, but in theory certainly does not require, neglecting the role of responsibility on the “human agency” end of the discretion continuum.

Dealing with scale and sufficiency in the (global) macroeconomy likewise seems to be out of the scope of EM reforms. EM deals with the macro-level effects of technology on the institutional side, but is it willing for instance to educate about overconsumption through its efforts in consumer-oriented monitoring?

To cite an example from a specialized discipline, a bold engineering professor asks: “How might an engineering educator raise such concerns {about environmental dangers of overconsumption}? The key is not to focus on a toaster, or even a power plant, because the problem of overconsumption arises largely from the overall set of toasters and power plants rather than from any one of them individually ... quantity and variety would still be excessive for a world of 8-12 billion quasi-Americans. *So a class somehow needs to tackle the generic problem, or at least a piece of it that illustrates the larger situation*” [Swearengen 2001 (emphasis added)]. Our interviews incorporated scale when they introduced the 2000 Watt limit. But confronting limits is not likely to be a popular avenue for monitoring for the ecological modernization of consumption, since its implications are too upsetting to the assumptions of the modern neo-liberal order.

This argues again for an Economic-Revealing approach to analyzing consumption chains. As noted, such an approach may not be suitable for a consumer-oriented monitoring tool like ECO<sub>2</sub>. In any realized form, in its necessary embrace of ecological economics, an Economic-Revealing analytic approach would probably represent a departure from ecological modernization theory. The divergence of *policy* from the Economic- as well as Social- and Environmental-Revealing agendas would adversely affect the prospects for environmental sustainability in the North’s future development.

## Appendix A

### Findings from Two Past Swiss Studies

#### 1.1 Introduction

This chapter-length appendix is an empirical excursus in between the theory presentation of Chapters 2, 3, and 4 and the main empirical work of Chapter 5. It reviews findings from two past studies of Swiss householders' views on energy with the aim of seeing what light past Swiss work can shed on some of our hypotheses. One study is *Energy in Everyday Life: Sociological and Ethical Aspects of Energy Consumption* (abbreviated E.E.L.) and the other is *Democratizing Environmental Policy: Citizens' Views on Ecological Taxes* (D.E.P., titles translated). The two studies were conducted in different decades (mid 1980s and 1990s, respectively), and E.E.L. limited itself to French-speaking Swiss while D.E.P. sampled from all three major language groups. Nevertheless, since they explored partly overlapping, relevant themes, their results are discussed together here. In fact, E.E.L. is the dominant source and is reviewed here more comprehensively, while D.E.P. is discussed much more partially and selectively. The findings reported here represent part of the fruits of the author's search for existing data relevant to the hypothesis set (Chapter 2). The author's own investigations and experiments, discussed in Chapter 5, explore some of the themes covered here again as well as testing hypotheses and delving into matters not touched on by either of the two studies.

#### 1.2 *Energy in Everyday Life*: Description, applications and limitations

*Energy in Everyday Life* (*L'Énergie au Quotidien* in the original French<sup>82</sup> and *Energie im Alltag* in the German translation<sup>83</sup>) is the final book-length summary of findings from 56 in-depth interviews with French-speaking Swiss on the subject of energy, conducted as a project in the Swiss Research Project (NFP) 44. (As information sources we used both the French and German versions of the book, an interim report, as well as French transcriptions of a number of the primary interviews themselves. Quotations offered here are my own loose English renderings.)

In the authors' words, the goal of the research was "to examine ascertainable behaviors and opinions in connection with energy consumption, in the context of everyday ways of life." The larger section of the study consisted of sociological research into households' energy consumption resulting from daily activities like lighting, heating, water use, recycling, and transportation. A subset of the interviews was conducted with low-level 'decision

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<sup>82</sup> Claude Bovay, Roland J. Campiche, Francois Hainard, Helmut Kaiser, Yves Pedrazzini, Hans Ruh, Plasch Spescha (1987), *L'énergie au Quotidien: Aspects sociologiques et éthiques de la consommation d'énergie*, Editions Labor et Fides.

<sup>83</sup> Claude Bovay, Roland J. Campiche, Hans Ulrich Germann, Francois Hainard, Helmut Kaiser, Yves Pedrazzini, Hans Ruh, Plasch Spescha (1989), *Energie im Alltag: Soziologische und ethische Aspekte des Energieverbrauchs*, Zurich: Theologischer Verlag.

makers' (*décideurs*): Building managers, owners, concierges, and the like. The discussion in this chapter includes some of the findings from this subset as well.

According to the researchers, the chosen interview technique offered the possibility to “read” a household or multi-family dwelling and make statements about its specific relation to energy consumption. In addition, the methodology allowed respondents to reflect on latent meanings in their energy consumption and to examine their own personal borders between needs and wants. Important decisions-makers in the economic realm – producers and distributors of energy, consumer associations, lobbying groups – were not considered in the study. Political dimensions were also beyond the study’s scope. As with most qualitative research based on in-depth or ethnographic interviews, the results cannot be relied upon to yield statistically generalizable conclusions.

It should be noted among other things that global climate change was not yet an issue in the public eye in the 1980s. This may increasingly limit the study’s application to current Energy-Revealing approaches, but it does not diminish insights provided in the Social-Revealing vein. Several items in the questionnaire concerned respondents’ views on the nature of an ‘energy crisis,’ which the respondents were encouraged to interpret as they wished: The questions about crisis were generally phrased, presumably to allow different interpretations. These various interpretations do in fact follow from different people. Those who thought there was a crisis interpreted it variously as environmental, political, or social in nature. It is notable that some who thought there was an energy (or environmental) crisis actually considered it social in nature – a socially driven energy crisis (of consumption escalation, indefinite expansion, or lack of sufficiency), very much in line with a Social-Revealing approach.

However, the implied starting point of the interviewers was the existence of some sort of energy consumption crisis or at least a problem sufficiently large to motivate this sort of research. In the feedback on one interview, the interviewee challenged this presumption and claimed it made a number of questions difficult for him to answer, since they were not truly applicable if one did not subscribe to the crisis notion. In defending this tack, this interviewer responded: “Normally one does not start from this principal. But one can {nevertheless} pose the question to oneself.”

### **1.3 Democratizing Environmental Policy and relevance of questions for further research**

Given the highly technocratic character of environmental policy making in Switzerland in the past, Urs Dahinden’s *Democratizing Environmental Policy*<sup>84</sup> asks how public input can be combined with expert knowledge to further a “democratization” of environmental policy.<sup>85</sup>

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<sup>84</sup> Urs Dahinden (2000), *Demokratisierung der Umweltpolitik: Ökologische Steuern im Urteil von Bürgerinnen und Bürgern*, Baden-Baden: Nomos Verlagsgesellschaft.

<sup>85</sup> There is thus a propinquity of Dahinden’s focus groups to the author’s own interview experiments: However, one of my central goals was expressly to use energy communication means as a springboard and stimulus

## Appendix A Findings from Two Past Swiss Studies

The empirical case study offered is based on extensive focus group discussions of the role of economic instruments in energy policy. Twenty-four focus groups were run across the three Swiss language regions, each group consisting of six people on average for a total of 140 participants, each group discussion lasting a total of five hours. National future energy reduction goals and policy instruments provided the (expert knowledge) inputs to the discussions. The range of goals consisted of a status quo scenario (121% of current national energy consumption), a stabilization scenario (95% of current consumption), and a strong reduction scenario (33% of current consumption). Policy instruments offered for discussion included information for consumers and energy specialists; appliance and machine consumption standards; non-tradable energy quotas; CO<sub>2</sub> taxes; energy taxes, and another economic instrument. Individual opinions were assessed at two different times ('before' and 'after') and were compared with group consensus.

In this appendix, results and incidental findings from D.E.P. are selectively discussed below and compared with findings from E.E.L.

In the conclusion of D.E.P., Dahinden offers several suggestions for further research that are in fact some starting points for our inquiry:

- What is the connection between individual and collective 'action preparedness' in the environmental sector?
- What {political and} social institutions (e.g. green pricing) can be developed in the environmental sector that consider the wishes of individual, voluntary behavioral options while at the same time overcoming the anonymity of the collective good problem?
- Which incentives beyond market and law could be meaningful for developing environmentally friendly lifestyles?
- Which expert knowledge is at all important for the relevant question set? In what form should it be transmitted?
- What useful possibilities do the new information and communication technologies offer (internet, computer simulation, etc.)?

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ultimately for wider consumer-citizen involvement, while Dahinden was more concerned with expert-lay interaction as well as methodological issues.

**Fig. 1: Summary of E.E.L. interviewee traits**

For reference, the following is a selective summary of characteristics of some of the interviewees discussed in the text:

Subject no. 1: male.

Subject no. 6: female, 26, discussed in text.

Subject no. 9: female, 39:

- Went through period of poverty; is now financially secure.
- Owns a car, has nuanced view of it: Feels there is no real need to have one in the city, but bought one for pleasure and so as not to be dependent on others for rides. Does not drive often or far.
- Her only admittedly conservationist attitude is toward her new car, which she wants to preserve.
- Wanted a small car, but not for ecological reasons, rather to facilitate parking, etc. Also considered fuel efficiency, mainly for financial reasons.
- Leaves window open all the time during winter with the heat on continuously, despite criticisms of others (neighbors, sister). Admits this is because she is not attentive or sensitized to the issue. She would not think to turn off the radiator in the evening.
- Is oblivious of environmental criteria when shopping, although is aware of the general trend towards environmentally sensitive purchases.

Subject no. 12: male, 40, 3 children:

- Often takes a trolley bus rather than the car for practical, not ecological, reasons.
- Uses an enormous amount of hot water, by own admission.
- Leaves radiators on and windows open (and during winter leaves lights on all the time).
- Has never considered any means of energy saving in his apartment or any joint tenant appeal to the management to make energy-saving investments in the building.
- Manifests an opposite, reactionary response to upbringing/socialization: His parents insisted on a very spartan, conservationist mode of using electricity and water, almost to an extreme. As a reaction, his current use of resources tends towards the opposite. Also, he is socializing his children in his manner of resource use, at least by default, by allowing them to take baths as often as they want, for example, and never raising any issues of resource conservation.
- Does not believe there is an energy crisis of any sort.

Subject no. 54: female, 51, one daughter:

- Was a child during WWII. Grandfather's generation was relatively conserving of energy. Has in turn brought up her daughter to conserve somewhat, although her daughter is reportedly much more engaged in environmental issues than herself.
- Does not own a car; travels by bus and train.
- Considers herself a small energy consumer. Interviewer concurs.
- Does not know if there is an energy crisis but says current general consumption is excessive.

We now bring material together from the studies that bears on our hypothesis set.

### 1.4 Hypothesis A: Discretionary exists

*Energy in Daily Life* emphasizes some basic points: In the chain of actors responsible for energy consumption, there is no single locus of responsibility. In addition, the infrastructure plays a central role in enabling saving and wasting measures, quite independent of the views and behavior of individuals. However, everyone who occupies a dwelling has a certain measure of capability to intervene to affect his energy consumption; this capability varies greatly by modality and intensity and in its measure of directness.

### 1.5 Hypothesis B: People distinguish

*Energy in Daily Life* posits a number of typologies of energy consumers throughout its analysis of the interviews. Clusters of behaviors, beliefs, and values among interviewees make for a typology of heating energy orientations featuring energy savers, lax heating energy users, the energy “helpless,” and the resigned. The helpless would like to save energy, e.g. they would keep their rooms at 20° C if they could, but they have no control over the heating in their apartments. Another typology identifies a “green” category whose members orient themselves around an environmental lifestyle and assume “complete” personal responsibility. They also try to set an example for others. For them the absence of state intervention is no obstacle; if anything, it makes it more important to exercise individual responsibility.<sup>86</sup>

An implicit typology that we will bring out here hinges on the extent of people’s belief in discretionary energy consumption and their willingness to apportion responsibility to the individual (i.e. themselves or others on the same social or functional level). An intermediate character type splits responsibility between the individual (themselves) and higher decision makers.

For example, one woman (subject no. 26) is extremely aware of the operation and highest importance of non-discretionary factors. At the same time she seems to use these and society’s demand escalation as an excuse to reject personal responsibility for some discretionary choices. Finally, when directly confronted with this question, she says she thinks it necessary for each to make an effort and at the same time to look to society and its institutions for change.

In another exchange the subject’s (no. 1) emphasis shifts back and forth between discretionary and non-discretionary:

Subject (Answer (A)): Heating consumes almost half the national energy used; thus it’s really necessary to do something here. Cars are consuming more because of the increasing num-

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<sup>86</sup> Cf. [Maniates 2001]. This process of “individualization of responsibility” is now endemic in American environmentalism and serves to legitimize the structural dynamics of consumerism and over-consumption.

ber of kilometers traveled. Industry has a role, but it's above all a problem of each of us.

Interviewer (Question (Q)): An individual question?

A: In confronting industry, one {any individual} affects the level of energy consumed, but less so.

Later in the same interview the question is posed more directly:

Q: Do you think you can play a role in the resolution of (social) energy problems? Personally?

A: Yes, I look to what I can do.

Q: Your actions prove this.

A: Yes.

In D.E.P. a similar opinion group was identified whose members divide responsibility between individuals and larger-scale factors. "The public good character and associated difficulties in addressing the related problems lead this study to focus on the political intervention i.e. laws or economic incentives that could change the situation. {One} group's discussions showed, however, that this description of the problem was not accepted by all as a starting point; rather, the individual behavioral dimension was judged {by this group} to be equally significant."

## **1.6 Non-discretionary dominant: Rejection of personal responsibility**

*Energy in Everyday Life* puts forth a maxim about the relationship between the degree of control and acceptance of responsibility in consumption: He who can determine his own energy consumption also feels responsible for it. In other words, a feeling of capability engenders one of responsibility. A large group of householders interviewed do not feel they have much control over their energy consumption, since in the matter of energy they lack an effective, personal "decision making competence" or capability. Such groups represent a falsifying or at least challenging finding to Hypothesis B. In general there was the feeling among many interviewees that they could not in fact "self-determine" their behavior in the energy sector, and, conversely, many of them felt little responsibility for their energy use. Nevertheless, some of the respondents still felt morally obliged to save energy (in order to save money or conserve resources for the next generation).

In explaining the passivity of most with respect to their domestic energy consumption, the study notes that many people delegate their responsibility for energy saving measures to decision makers, especially to the providers of apartments: They hold them responsible for bringing efficient dwellings on the market and installing the appropriate energy-saving technologies. Decision makers invoked by the interviewees were often described as "an impersonal power whose decisions one anticipates with a sort of passivity mixed with fear." In several cases, the interviewees explicitly invoked the responsibility of the building owner in order to justify their refusal to make any sort of energy-saving investment in their apartment (the "investor-user dilemma" [Goldemberg 2000]). "If the administration doesn't



undertake anything (further to save energy), why should I do anything?" In the matter of heating, the refusal to take personal responsibility becomes more significant in multi-family dwellings where the heating bill is reckoned jointly for the building and individual households lack direct feedback on their own energy utilization.

Similarly, one personality or lifestyle type identified vis-à-vis automobile transportation denies all personal responsibility for energy use and claims the authorities bear full responsibility to take measures to limit their fuel use. They consider their capacities to intervene to affect the energy dimensions of transportation negligible and themselves to have neither the opportunity nor the time to engage themselves personally.

## **Examples from interviews**

### **1.6.1 The state and building owners bear responsibility, not I**

A telling passage on this subject is the following (subject no. 6):

A: I estimate that {energy} is an important subject, but one has limited means to intervene, the only means proposed are to use the car less, ride less fast, heat one's apartment less ... but of the daily level {of energy consumption} and our own consumption there is a huge amount which is not talked about. One threatens people with an energy crisis and the means {for alleviation} one provides are individual means ... but the state takes little initiative. Then there is an intermediate level, the {housing} management, the town ... this is not resolved. It's as if all of the responsibility falls on the individual, whereas the state and its institutions are also there. I don't think the forests will be saved because I personally don't use a car.

Q: Then for you the government doesn't do enough to limit the dangers?

A: But the "government" is rather abstract. Those not doing enough are also the managers, the owners. Me, I'm a renter and at a level where I can't say anything {about the issue} or very little ... {Action} must be at the initiative of the owners.

The subject here knowingly focuses on institutional nodes of influence, the government and the housing entrepreneurs. However, her confidence in citizens' ability to stimulate or effect political-institutional change is obviously quite low. As will be discussed below, despite this interviewee's feelings of impotence at the individual level, she is fully convinced of the pressing reality of a crisis of consumption escalation (see 1.9 below). Denial of discretionary power or importance (the latter, as applied to oneself, is one of the classic behavioral social traps) can be found among individuals with disparate convictions regard-

ing the environment; society's consumption levels; and their causes, dynamics, and implications.

### **1.6.2 The problem lies with large industrial users and needs state intervention**

Subject no. 9 believes the industrial sector is the largest energy consumer (in Switzerland in the 1980s). She recognizes that auto travel is growing, but in her opinion this does not change the significance of industry's contribution. She thinks industry's energy use is the most difficult to restrain, whereas automobiles are easy to deal with: "They address the little causes {autos}, but not the larger causes {industry}." (Strangely, E.E.L. quotes this in the context of saying that automobiles were the easy target, and without noting the irony of a supposition that even then showed signs of becoming the reverse of what actually occurred).

Asked whether she thinks that an energy or environmental awakening by the masses could influence energy consumption on a more global level, notably in aspects of the economy and industrial production, she responds negatively:

I think that while small users could have an awakening, they would not have the means to address other consumers in the economy and industry and that this would make people feel exempt from doing more. One {personally} does ecological things, and that avoids addressing the true problems ... Personally, as a small consumer, I don't see why one has to practice self-sacrifice – turning off the lights, not driving the car, etc. – rather than address the real problems. It seems to me to serve as an alibi.

Thus this subject deflects most personal responsibility in view of the consumption of big players like industry, although not necessarily because of constraints on personal latitude but because of a currently somewhat outmoded perception of the relative size of industry's direct contribution to aggregate energy consumption.

In responding to a series of survey questions at the end of the interview, she says she sees the role of the state in addressing industrial consumption to be "unfortunately by means of laws and regulations." (Her role as part of a democratic polity guiding the direction of the state in these matters is apparently minor.)

As another example, a 35-year-old quoted in the book claims that individual action is not helpful in the face of industrial consumption and additionally cites the prisoner's dilemma of "why should I sacrifice my own comfort when no one else practices self-abnegation?" This is a typical display of feelings of helplessness and lack of influence over industrial and corporate trajectories, as well as the denial of the meaningfulness of individual attempts to save energy.

Some are convinced that broad energy issues are purely political and that no ordinary individual can influence them. Subject no. 12 is adamant that ecological problems are politically manufactured and manipulated by powerful economic interests who stand to gain from

them. It is not clear to what extent he truly believes this or if his protestations just serve to exonerate him of the need to engage himself politically and personally. Sadly, E.E.L. showcases several examples of environmental cynicism and corrosion of faith in the Swiss participatory democracy.

### **1.6.3 Special case: decision makers' understanding and distinction**

The understanding of and distinction between discretionary and non-discretionary factors among the decision makers interviewed for E.E.L. constitutes a special case. The interviewers probed the basis of decision makers' knowledge of energy, their understanding of their role in solving energy-related problems, and their view on the societal stakes involved.

Building owners and managers generally agreed they bear a large measure of responsibility, and they may prefer to exercise it rather than rely on tenants' behavioral change (as described below in 1.8).

The 20th century witnessed an enormous increase in the level of comfort offered and expected (demanded) in housing and other commodities. The authors noted that the "interviewed architects and designers showed themselves aware of this development but paradoxically {sic} laid the blame with the renters and (generally) end-users." They do not feel themselves responsible for having to offer more luxurious and energy-intensive amenities like more toilets and bathrooms, built-in fireplaces, and the like.

Architects and planners, it was noted, must also conform to the demands of the Swiss "security syndrome" in their designs. This cultural fear of insufficiency or loss leads equipment designers to build in excessive over-capacity.

## **1.7 Energy-Concealing/Social-Revealing communication**

In several instances in their analysis, despite their heavy sociological emphasis, the E.E.L. authors promote a starkly Energy(Environment)-Revealing/Social-Concealing approach: "The connection to the alarming signs of increasing environmental damage is the only element that will enable (or motivate) the population [as a whole] to make better use of energy ... But it seems that it will require catastrophic situations to bring about changes" (E.E.L. p. 126).

In another place the authors explain the public's passivity on energy matters as stemming partly from the invisibility of the connection between air pollution and energy consumed in heating – an assumption very much in the Energy-Revealing vein.

Similarly, some advocates of Energy-Revealing information identified in D.E.P. praised its efficiency as a tool for furthering long-term change. In this light information about energy consumption is seen as an independent and more or less direct instrument that should be made part of the educational curricula of youth and professionals alike:

For me, {information campaigns} are the most important {tool}  
in all of energy policy... it's the typical example of a strategy to

use to attain a long-term goal. It's extremely successful in the long-term. And it is supported by the population: That's the most important thing. A solution is only as good as the support it receives from those who must carry it out ... At every level of society environmental consciousness should be raised {paraphrased} ...

(Information is discussed further below in 1.8.2).

Despite these counter-arguments, both studies show the need for a Social-Revealing approach in public information and communication concerning energy. In many other places E.E.L. argues implicitly for such an approach in its sociological interview questions and analytical themes.<sup>87</sup> In D.E.P., Dahinden expressed surprise over the finding that none of the focus group members, regardless of environmental leanings or their profile for any other variable, supported an increase in aggregate energy use as a future national goal. To him, this showed that energy conservation as a national goal has won such wide recognition that no one would dare to take an open stand against it (and support an increase in energy usage).<sup>88</sup> However, de facto, supporting current diverse policies, both active and passive, amounts to taking a stand against conservation, since an increase will be the result: "Just as the questionnaire before the discussion predicted, none of the participants actively supported a goal of greater energy use. This is surprising, since the conditions under which just such an increase in energy use might take place – economic and population growth – is to be found in an almost incontestable extrapolation of current trends." Here then is a willingness to discuss energy consumption directly and visibly and an acceptance of restrained targets but a resistance to confront the driving forces leading imperatively to continuous future increases.<sup>89</sup> Is this then lip service or a misdirected focus (inadequately Social-visibility focused)? These contradictions argue for communication in the Social-Revealing and non-discretionary vein and generally support the contention in hypothesis E: Communication about non-discretionary.

## 1.8 Non-discretionary accounting: knowledge and perceptions

In a section entitled "The Infrastructure Context," the E.E.L. authors analyze decision makers' actions to determine how they constrain the energy consumption of end-users, particularly in their design or choice of equipment.

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<sup>87</sup> These and other inconsistencies or non-cohesive parts in the text may stem from the large number of authors and the diversity of their academic orientations, especially the divide between sociology and ethics (C. Bovay, personal communication, April 2000).

<sup>88</sup> Dahinden notes that an increase could be acceptable to some if it were generated with renewable energy sources. This condition was often coupled with the hope for a technological breakthrough enabling it. Many were skeptical that truly abundant, clean renewable sources could be developed. But were they to be found, these participants would not be fundamentally opposed to their (full) exploitation.

<sup>89</sup> This is akin to the confounding of an energy or environmental ministry's targets by the operation of other variables outside of the ministry's purview and beyond the influence of its traditional policy instrument set.

The long chain of decisions and realizations in energy use in a house – e.g. a developer finances the construction, an architect drafts plans and realizes them, the owner makes further investments and sets other parameters, the renter has an idiosyncratic consumption pattern, and so on – means that the interests are multiple and sometimes conflicting and no single agent controls the whole process.

For an apartment building, decision makers on the next level up from end-users include the property owner, especially in that he is the only one who can approve a substantial modification or renovation; the building manager, who can optimize the building equipment's performance; the concierge, who may control the adjustment of thermal and electrical equipment in the building; and others.

In weighing whether or not to assess heating on an individual apartment basis, most of the building managers or owners interviewed preferred not to install individual household meters but thought it more important rather to install better (central) technical equipment. In our terms, this means the decision makers preferred to manipulate end-user non-discretionary variables under their control rather than rely on end-users' exercise of discretionary monitoring and self-control.

### **1.8.1 Interviewees' assessment of the role of higher actors**

The interviews in E.E.L. sought to gauge the subjects' assessment of the role of such higher actors.

For example, subject no. 54 sees a greater role for the building management and the concierge, for instance to prevent systematic overheating of the building. Subject no. 12 says the tenants must act as a catalyst for owners' action:

Q: Can you measure the responsibility of certain of the decision makers in your building, like the concierge and the manager?

A: I think our concierge and building owner are perfectly indifferent to the problem of energy consumption and distance themselves from these problems, provided the tenants are satisfied.

Subject no. 60 knowingly asserts that building contractors and managers have a definite role to play in modifying energy use, but that they should pay attention to the issue when buildings are constructed, because afterwards it is often too late or very difficult to modify. These questions, she says, are really the domain of people with technical expertise and know-how.

Subject no. 62 suggests that the infrastructure determines the scope or reach of individual behavioral adjustments: For instance, if the building is well constructed and insulated, one can heat to 19 or 20° during the day, stop heating overnight, and wake up to a comfortable 17°. If it is poorly insulated, this is impossible:

A: It's the construction because it's not for the renter to decide ... I think that a private person does not choose his apartment

according to {energy criteria} ... but one isn't really given the chance.

Q: Do you attribute partial responsibility to the management or the concierge, on the matter of energy conservation?

A: Ah, yes, the management, it's they who are responsible for everything since they chose the form of building construction. ... I'm satisfied with what they did here in this building since here they really decided to insulate to the maximum level feasible ... but it's not the renter who can define {conditions}; he can economize, but only as a function of where he lives, because if it's poorly insulated, then the renter will be obliged to spend more (money) and use more (fuel) to heat to a level of 20°.

The interview with subject no. 62 proves to be one of the most fruitful for demonstrating enlightenment into the non-discretionary factors determining energy consumption. The interviewers recognize this and write in a gloss at the end of the transcript: "... {He emphasizes} his opposition to (energy) economizing that touches only on small individual consumers, since according to him, other "economizing" (energy conservation means) are possible. For these he cites, for example, industry and the army which, for him, is a large {energy} waster ... he avoids a harping at all costs on energy saving by the small consumer ..." Questioned on his perception of the most important determinants for pollution and energy consumption, subject no. 62 responds, tellingly, that in these matters we are conditioned to focus on the small consumer; whereas the managers (builders or designers) who constructed the heating and water system are the decision makers, and in order to invest in more efficient but expensive systems and insulation up front, they require tenants who are willing to amortize the costs through higher rents over several years.

### **1.8.2 Economic system and market instruments**

Participants' perceptions of the nature and rigidity of the economy's operational rules also belong in a discussion of knowledge and perception of non-discretionary variables. In D.E.P., analysis of the discussions showed that participants often regarded economic and environmental goals or performance as a zero-sum game: Improvements in environmental quality necessarily come at the expense of economic development. In opposition to this, environmental and social criteria were seen as much more compatible, where joint gains could be made.

In E.E.L., a technical employee of a public service heating company cites a fundamental problem with the consumption-based economy, recognizing that the micro-economic systems that link profit to volume of (material and energy) throughput need changing. Economic accountability, conservation, and saving incentives (feedback) must be restored in the systems, and distancing and separation reduced (very much along the lines of Princen's recommendations (see Chapter 3, sections 3.3.3.3 "Restraint and sufficiency" and "Structural economic factors"). However, the interviewee notes the need to address this in the Swiss

context, mindful especially of the Swiss' desire for overcapacity as part of their "security syndrome."

Lay opinions on market instruments and other policy tools for modifying energy demand were a primary object of research in D.E.P. The relative merits of three economic instruments (energy tax, CO<sub>2</sub> tax, and certification with an environmental bank) and their advantages over traditional tools were heatedly debated in focus groups. The energy tax was the most supported of the three, despite the associated significant reduction target and the resulting high tax level. Most thought the CO<sub>2</sub> tax was too narrow since it did not address problematic non-fossil fuel carriers, mainly nuclear power.

On the topic of instruments, the most salient finding for our purposes was that in general, the information tool was discussed with the greatest interest and engagement by the participants, in comparison with the other instruments. Dahinden concluded: "The many concrete suggestions for improvements here that the participants brought indicate that the potential for devising improved information campaigns is not yet exhausted."

The absence of any obligation or coercion in information provision was the greatest attraction for many. Some proponents championed a conventional notion of information as feeding into a discretionary mechanism: Information "endeavors" can lead to a change of consciousness and opinion that in turn can change behavior. Information can trigger a rethinking necessary as a basis for further steps in energy policy. According to one participant:

{In the long-term information brings about} an unconscious energy savings that one doesn't perceive as deprivation but rather as behavior that seems self-evident. Perhaps through a painless process of separation from the quantity of energy one {previously} needed.

Others offered a range of criticisms of the conventional information approach embodied in this sort of thinking:

The danger is that information is used as an excuse (for inaction). 'Let us inform ourselves,' that takes five years until it's entered into the last head, 'let us inform ourselves, then at least we'll be doing something.' {Informing} is necessary but not sufficient.

{Information gathering} is what we've done in the last 20 years. People have the consciousness, they have the means to get information, but it's not used. {Further measures along these lines} do not profit us; they are a promise of carrying on business as usual.

Another criticism comes from the observation that information campaigns are heeded most strongly by the already informed, that they do not lead to attitude changes but rather the confirmation of pre-existing behavior patterns.

Another dissatisfaction is with the quality of the transmission: "There's no lack of information, but it doesn't reach me properly. I wouldn't know whom to ask in order to inform myself about the energy sector."

Recent (Swiss) energy information campaigns like Energie 2000 were viewed critically by some for concentrating mainly on energy specialists like engineers and architects. It was disputed on both sides whether such campaigns should concentrate on wide, non-specific audiences or a more narrow, specialized public. Proponents of the wide audience strategy argued that a long-term shift must begin in many places and thus that energy conservation should not be delegated solely to the experts. Proponents of targeting concentrated, specialized audiences insisted that such wide campaigns would be less effective:

Such campaigns must be targeted; otherwise they don't lead to anything. I don't believe in (the effectiveness of) such generalized information. *I believe in purposeful change (in energy usage) but not in the first place in that of end-users; rather I believe in the {necessity for} change of producers, property-owners/developers, i.e. the causers/decision makers. I think that here much more happens {emphasis added}.*

The question is whether end-users can influence decision makers, in which case it might be beneficial to include them in an information campaign. By providing end-users with a "non-discretionary accounting," such communication would elevate the information policy tool well beyond its traditionally limited, direct conception.

## **1.9 Evolution of comfort norms: normalization, awareness, and possibilities for change**

In the discussion of perceptions of non-discretionary factors above, subject no. 62 was singled out for his perspicacious view and knowing emphasis on the large players. Yet while subject no. 62 is concerned about energy conservation, his concern stems from reasons of hypothesized limited supply, and he is completely convinced of the efficacy of, and need for, technological progress to allow greater economic consumption levels with lower resources. His reasoning, as it comes out in the interviews, is totally devoid of references to culturally determined levels of demand and any case for attempting to address them. Subject no. 62's view is one of the perspectives on cultural determinations of demand and evolution of norms, especially those of comfort, explored in this additional chapter section.

Subject no. 62 is an advocate of technological development, especially of alternative energy sources, and energy efficiency. He seems to see the escalation of demand among the developing countries (in imitation of the North) as natural, unavoidable, and perhaps desirable. When questioned, he is in favor of limiting aggregate Swiss energy consumption but purely



by technological means. Normative and cultural issues do not figure at all in his consideration, nor is there mention of any problem or contribution to problems from this quarter. In commenting on a scenario he asks:

And if we can create new things {through technologies} that are clean, that don't pollute at all, why then conserve energy? Use it normally, don't waste, but why conserve?

Q: And this seems possible to you? We can arrive at this type of development? ... discover technical solutions to resolve the problem?

A: Yes, we have to ... we must.

A contrary view is represented by subject no. 6, who pinpoints the problematic of the manufacturing and escalation of demand, while viewing technical fixes skeptically:

Q: According to you there's a crisis?

A: Yes ... Everyone has to make an effort, everybody has to restrain himself, but at the same time it's utopian because the needs evolve, people have more and more needs, the mode of life demands more and more energy ... I have the impression one prolongs this crisis so long as one doesn't take radical solutions.

Q: What is this crisis, a war?

A: A War with a capital W ... It's like a cancer that one tries to deal with a little here, a little there, but it constantly evolves everywhere ... but in this vital situation when one could speak of essential things, people suggest nothing but 'look at your heating level' [i.e. limited individual remedies] ... {and regarding renewable energy sources} rather than reaching an end or solution, people accelerate the crisis and hope to get out of it by means of renewable energy development.

### **1.9.1 Non-recognition of demand escalation, role of social norms, and views on the need for restraint**

One might expect a stronger correlation of the first view – the technological optimist's, which denies the significance and problematic of culturally-socially determined levels of demand – with high-consumption individuals. We do find subjects like no. 12 holding these views. He uses an enormous amount of hot water and energy, by his own admission, in taking three or four baths a day. Moreover, he says he considers it an absolutely normal comfort in "a society like ours, to be able to shower and wash freely when one wants."

Q: You never asked yourself, what about the scarcity of potable water?

## Appendix A Findings from Two Past Swiss Studies

A: No, never. We have water and energy in abundance here in our society. I never tell the children to conserve {freely translated and summarized}.

Similarly, for subject no. 60:

Q: Might we have to rethink our lifestyles?

A: No. That's not to say that we must consume extravagantly, in excess, more than we need. But I think that we can always live normally without worrying ... that there are changes possible to resolve (any) possible problems of a lack of energy.

Q: Do you call the current situation normal living?

A: Yes, o.k. I find that we live well. The people around me seem to live well. I know there are others who live less well, that's true. But in the end ... it's always like that ...

Yet this view can be found among conservative energy users as well, since such behavior patterns often co-exist with the dominant technocratic vision of societal progress or problem solving.

### **1.9.2 High recognition of demand escalation as a societal problematique**

The authors of E.E.L. note how hard it is to address escalation of norms of comfort without seeming to call into question standards for the quality of life. The car, for example, is increasingly viewed as necessary to support a minimally acceptable living standard (even in Switzerland in the 1980s). As detailed in earlier chapters, this quality of life, and the freedom and individualism that stand as central values of Western society, are so defined as to demand unfettered access to such goods and service provision, which are historically (although not ineluctably) highly resource and energy-consumptive.

For an example from E.E.L., witness subject no. 54:

Q: And this excessive energy consumption, is it subject to or capable of being modified?

A: Yes, but will it be a positive change? I don't know.

Q: Do you think it possible to avoid {escalating energy consumption} ... or that it is necessary to avoid it?

A: It's necessary, yes ...

Subject no. 6 is asked whether she thinks it necessary to return to a society in which individuals were more restrained. Interestingly, she does not imagine it to have been consistently more restrained in the past because, she offers, while most of the time Europeans lived quite modestly, there were also festivals in which people exulted with great consumption; however, on balance there was a sort of equilibrium. "Now we lack these highs and lows; it's equally high all the time."

E.E.L. notes that the decision makers interviewed, for their part, were aware of the socio-economic phenomenon of demand-escalation. However, most seem to place the fault on the renters, without recognizing their own potential role as producers or providers in restraining or resisting the unsustainable draw on the resource stock.<sup>90</sup>

### 1.9.3 Possibilities for shaping future energy demand: *Machbarkeit*

A related dimension on which is arrayed a range of views across the participants in the two studies concerns possibilities for changing (or even reversing) the course of social development and associated demand trajectories (see the discussion of social shaping and reversibility in Chapter 4, section 4.2.3.1). E.E.L. describes it thus: "One who has a positive 'adjustment' in considering the possibilities for shaping the future has a future vision of a higher change potential." D.E.P. terms this potential *soziale Machbarkeit* (societal feasibility).<sup>91</sup> Dahinden describes it in the following terms:

Some of the participants were convinced that a (collective, societal) choice of the {national energy reduction} goals was possible. They rejected the claims that social and economic development followed their own {internal} inevitable processes that would automatically or inevitably lead to an increase in energy consumption. They claimed rather that these processes could be controlled. This reasoning can apply at both an individual and a collective level. The choice of energy reduction (conservation) as a goal can act as an expression of social *Machbarkeit* because the very act of choosing to work towards its reduction suggests action, choice, and power rather than helplessness and paralysis, as described by one focus group participant:

I reject the 121% {national growth} scenario also for myself personally because it leaves me in the role of paralysis. If I carry on as before, even though I know that it somehow causes harm, then I feel like I'm paralyzed, because I know I can't do anything. But if I am shown some means by which I *can* do something, even when it doesn't always lead to the desired result, then I feel better, because then I can in some way become active.<sup>92</sup>

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<sup>90</sup> Cf. Princen 2001.

<sup>91</sup> A parallel concept is *technical feasibility*, which in this context is associated with the typical economics-engineering view on the central role and efficacy of efficiency increases as a policy solution.

<sup>92</sup> Elsewhere Dahinden summarizes: "The general statements concerning the shaping of possibilities for the future are concretized with statements that emphasize the social and technical feasibility of an energy reduction. A

## Appendix A Findings from Two Past Swiss Studies

(We note in this subject's search for a psychological salve the possibility of a shift from an aggregate to an individual action focus, suggesting a substitution of collective political mobilization with individual "consumption as social-action" typical of (American) environmentalism [cf. Maniates 2001].) A strong vision of social *Machbarkeit* vis-à-vis Swiss energy consumption might be associated with the ambitious aim of reducing national consumption to 33% of current levels (the most ambitious of the goals). However, this aim, and the implied social changes necessary, were rejected as impossible by most focus group participants, many of whom associated them with a "positive utopia with strong social(ist), romantic elements" – desirable as some of the associated social developments might be, they were simply not feasible. The majority of participants thus had a relatively restricted notion of social *Machbarkeit* for Switzerland. Thus the lay view shown here on the prospects for reversibility tends to match Bijker's (1995) view fairly closely but is perhaps less optimistic than Wilhite et. al.'s (2000) (Chapter 4).

This feeling of the lack of *Machbarkeit* and possibilities for reversal was well formulated by several interviewees in E.E.L. It might be necessary to stop the continuous escalation of energy demand, but it cannot be done: "... {Yet} it cannot be avoided ... one cannot go into reverse. In the end one can stop {completely}, that's all" (from subject no. 54). Asked explicitly whether she thinks societal trends towards ever more consumption can be reversed, subject no. 6 demurs: She is admittedly pessimistic and says there are some values which cannot be replaced by other values.

Several subjects in both studies blame the times and geographically specific cultural demands for this phenomenon:

Q: If we are consuming too much energy, is it a problem of the times {we are in}?

A: I think so. We're forced into this life rhythm. If you want to have another {life} cadence, you can't have it. You have to follow {the prevailing one}. You have to go along {subject no. 54}.

However, this is regionally variant within Switzerland. The interviewee cites Ticino where, in her experience, life follows a more relaxed pace.

Similarly, the D.E.P. focus group participants speak of the commanding imperative to pursue comfortable lifestyles and the lack of non-monetary incentives for energy-saving behavior (or non-market alternatives to commercial consumption) in daily life:

But if someone doesn't {keep up with the purchase and use of the latest electrical appliances}, most treat him as if he were not

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central social feasibility argument is the decoupling of quality of life and energy consumption ... Older participants emphasize how in the 1950s, when aggregate or per capita energy consumption was a third of current levels, a pleasant life was also possible."

Appendix A Findings from Two Past Swiss Studies

a normal person ... they don't understand why someone would deny himself, since everyone normally {behaves this way}.<sup>93</sup>

And elsewhere:

Currently everyone lives this way. Even when someone has the feeling that she should save, in actual daily living, someone who actually drives less ... I don't know anyone {who does this}.

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<sup>93</sup> Cf. [Kaufmann-Hayoz 1999].

## Appendix B

### Outline and Abstract for Chapter 3 “Northern Consumption”

#### 3.1 INTRODUCTION

#### 3.2 ISSUES

##### 3.2.1 *Is (over-)consumption a problem?*

*Environmental concerns over consumption's role in global degradation, and particularly that of industrialized nations' consumption, stand in strong contrast to mainstream economic views of the subject.*

*3.2.2 Consumption or production: Which is the better focus for addressing environmental problems?*

*Arguments for concentrating on the producer side are presented and counter arguments adduced attempting to justify at least a joint focus.*

##### 3.2.3 *Consumption definitions and environmentally significant consumption*

*The type of consumption of concern here consists of human transformations of matter and energy that affect the stability of biophysical systems or otherwise reduce the future health and value of natural resources.*

##### 3.2.4 *Development paradigms and the North-South relationship*

*Prevailing consumption and development paradigms are sketched. Their application as a means of confronting North-South disparities illustrates philosophical differences concerning the pressures of resource constraints.*

##### 3.2.4.1 *Disparities, resource constraints, and development paradigms*

##### 3.2.4.2 *Example for the populace in the developing world and the lower strata within the developed world*

##### 3.2.5 *Patterns of Consumption*

*Altering patterns of consumption in favor of less energy and material-intensive products and services can ameliorate environmental effects and is the major thrust of mainstream environmental policy recommendations.*

##### 3.2.6 *Levels of consumption*

*Large improvements in energy efficiency and a relative dematerialization are certainly possible and may be highly desirable, but the current state of implementation falls greatly short of the technical potential. Evidence suggests that even such improvements would be inadequate in the face of the increasing scale of the Northern (and global) consumption economies.*

##### 3.2.6.1 *Efficiency and dematerialization*

##### 3.2.6.2 *The case for scale: Aggregate sufficiency, not just increased efficiency*

##### 3.2.7 *Description of consumer society*

*The final two sections in 3.2 offer a review of preconditions for and characteristics of consumer societies and consumerism and a review of resource consumption trends, focusing on households in Western European countries.*

### *3.2.8 Developments and trends in Northern societies*

*A conclusion of a major Dutch study on household metabolism, probably applicable to other Western countries as well, holds that given rapidly increasing metabolic rates since the 1950s, householders are continuing on a thoroughly unsustainable path, at least in the short term.*

## 3.3 DRIVING FORCES, DISCIPLINARY ANALYSES, CRITIQUES, POLICIES, AND ALTERNATIVES

### *3.3.1 Disciplinary approaches and analytical possibilities*

*Numerous, diverse theories of consumption have yet to prove robust enough adequately to explain or predict the phenomenon, in part because of the lack of an adequate interdisciplinary conceptual framework. Recently, interdisciplinary approaches to household consumption like the HOMES project have attempted to incorporate biophysical, technical, economic, spatial, and behavioral aspects, as well as specific social institutions and administrative policy measures affecting household consumption flows.*

### *3.3.2 Types of consumption critiques*

*Many insights into consumption and innovative policies for ameliorating its environmental effects come from critiques of consumer society; yet critiques and assumptions embedded in consumption theories can also stymie interdisciplinary communication and cooperation. Critiques can be grossly classified as those that emphasize one or more of the various underestimated costs of consumption or over-consumption and, perhaps just as important, those that question the extent of presumed benefits of that consumption.*

### *3.3.3 Disciplinary treatments and approaches in the social and behavioral sciences*

#### *3.3.3.1 Psychological/behavioral*

##### *Studies of behavior*

*This section samples concepts and findings from micro-oriented behavioral and cognitive studies in psychology, although the behavioral underpinnings of consumption remain largely unexplored in research. A recent study of the connection between environmental awareness and consumption found that the Dutch show neither gross ignorance nor denial of their role in environmental damage but a combination of inability and unwillingness to change their behavior patterns. Other studies investigate patterning of behavior and energy use; self-awareness and accounting for energy consumption; and bi-directional influences of consumption behavior and attitudes.*

##### *Needs and wants, identity and meaning*

*The psychology of needs within societies, the connection between needs and wants, and the relationship between economic consumption and the satisfaction of needs are exceedingly complex. Many critiques of consumption associate its huge increase to attempts to fulfill through consumption various underlying psychological needs that are no longer being fulfilled through other social forms and mechanisms; consumption may provide identity, a sense of community, and other forms of meaning. If wants are pliable or satiable, scarcity is largely a function of the level of wants.*

### 3.3.3.2 Social

#### Culture, society, and lifestyle

*Technological systems and the patterns of life they serve are highly socially constructed; yet individual choices become bounded by entrenched socio-technical frameworks. If the proper social structures can be created, success, well-being, and betterment can be defined in less material ways. Positional consumption tends to foster a sense of non-satiability. Human behavior in a social context is also important in energy consumption. The environmental impact of the lifestyle of higher income groups seems to be disproportionately larger than would be predicted simply by their greater spending ability; however, variable lifestyles within single income level groups also seem to account for measurable differences in consumption intensities.*

#### Anthropological/sociological treatment of needs, wants, and restraint

*Reversing the social transformation of luxuries to necessities involves inducing reconsideration of practices which are taken for granted by bringing them into the realm of discourse and questioning where "needs" can be reconverted to "wants." This kind of targeting holds particular promise for "discretionary" energy consumption that is driving a significant portion of the most recent consumption explosion, but it is probably more easily applied before the consumption behavior has undergone a long period of cultural naturalization.*

### 3.3.3.3 Economic

#### De-coupling consumption and welfare

*Some studies challenge the conventional assumption that individual and aggregate welfare is necessarily served by increasing consumption in the developed world. The strongest critiques assert that reduction of material profligacy in the aggregate can directly improve human welfare, even apart from environmental and global equity arguments in favor of reduction. If consumption has a large positional component, then it is impossible to raise aggregate welfare by increasing consumption of this sort: Positional consumption is a zero-sum game. There are theories and tentative empirical evidence that national welfare leveled off or declined at much lower levels of aggregate consumption than current levels in North America and Western Europe.*

#### Restraint and sufficiency

*Social limits to consumption may best be imposed by constraints internal to individuals or groups. To instill restraint in the use of a resource, it is necessary and sufficient to receive negative feedback from resource consumption as to the consumption's impact on the resource stock. The exercise of restraint yields non-material benefits and under the right circumstances occurs at all levels of income and material wealth. The practice of restraint among social groups determines points of aggregate sufficiency for resources, and the collection of sufficiency points for all resources theoretically defines aggregate material and energy sufficiency for society as a whole.*

#### Break the work-and-spend cycle

*There seem to be natural restraints inherent in the traditional organization of work, restraints in both personal labor input and in the scale of output produced. The labor-limiting restraint mechanism operates by workers' limiting their needs and desires in order to reduce the amount they need to work*



*in the economy to satisfy these desires. But employees must be given the opportunity to limit their work time. Instead, many workers are caught in a cycle of "work-and-spend," although polling shows a desire for less work and more leisure time. Institutional changes should permit greater (energy-extensive) leisure instead of longer hours and concomitant higher consumption.*

### Structural economic factors

*Various structural and institutional reforms to the economy have been proposed to facilitate sustainable consumption, including restoring feedback to decision makers by establishing property rights and reducing systematic obscuring and distancing of costs; shifting the market/non-market border in favor of non-market consumption; full-cost pricing, elimination of resource subsidies, combating systemic planned obsolescence, shifting taxes from work to resource consumption, and, fundamentally, reforming the monetary and financial system to control the growth of money and debt.*

#### 3.3.4 Conclusion: Policy syntheses and political agendas

##### 3.3.4.1 Altering consumption: Top-down or bottom-up?

*Change in a society's consumption trajectory requires personal, social and institutional change. Political or economic incentives in the absence of modification of personal or social practices are superficial and ineffective; but individual or localized action such as voluntary simplicity alone is unlikely to work societal changes either.*

##### 3.3.4.2 Political agendas and alternatives

*An immediate aim is to garner public and political recognition and support for the need for, or benefit inherent in, a change in the direction of sustainable consumption, in a time frame that responds to the exigencies of the environmental impacts of consumerism. Examples of alternative paradigms can be found in the literature and in the history of social and economic development.*

## Appendix C

### Energy Modeling for the ECO<sub>2</sub> program

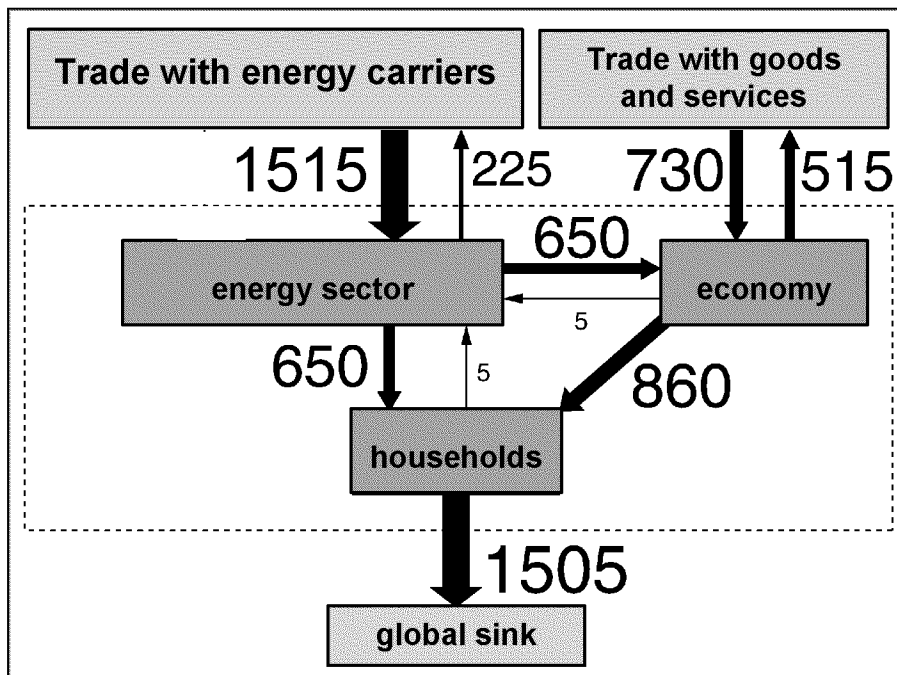
(This technical appendix was provided by the software developers Gregor Dürrenberger and Christoph Hartmann.)

#### 1.1 Introduction

This modeling work is based on material flow analysis [Baccini 1996]. In this approach, systems and models are described by flows and processes. For our purposes, the relevant flows are defined as energy flows. The model distinguishes between direct energy flows associated with the consumption of energy carriers (including electricity) and embodied energy flows related to goods and services consumption. The relevant processes are defined as those associated with energy production and consumption. We built a baseline model, which represents Switzerland, and a baseline scenario (2000-2030), which embodies Swiss trends. Personal budgets are constructed for embodied energy flows by adapting Swiss average per capita values to personal situations and for most direct energy flows by entering the current consumption levels or consumption behaviors into the database. Our model strongly benefited from previous modeling work [Schlumpf 1999], [Dürrenberger 2001].

The figure below represents the overall structure of the model. Processes are shown as rectangles, energy flows as arrows. The embodied energy of a commodity is defined as the fossil energy required for producing the commodity. In the figure, for reasons of clarity, embodied and direct flows are added to form total energy flows.

With regard to processes, the model differentiates the energy sector (domestic energy production, energy distribution), the economy (goods and services production), and households (household demand). The two main processes (goods and services production, household consumption) are divided into sub-processes in order to allow detailed modeling. External processes (trade with energy carriers and trade with goods and services) account for import and export flows and the global sink accounts for the overall net-output flow (heat losses, net energy embodied in waste)



CO<sub>2</sub> emissions are derived from the flows of energy carriers (for direct emissions) and from the flows of commodities (for embodied emissions). The model uses separate emission factors for the energy carriers. For emissions embodied in imported commodities, a mean emission factor, which reflects the production conditions of the main Swiss trading partners, is applied.

## 1.2 Description of the Model

### 1.2.1 Systems Description

#### Direct Energy Flows

The model differentiates among 10 energy carriers (oil, gasoline, diesel, kerosene, gas, coal, electricity, firewood, waste, and distant heat) and between end and gross energy. Gross energy flows, which include pre-combustion, are calculated on the basis of non-renewable energy requirements. All flows are separated into import, export, and internal flows.

Fossil fuels and uranium are imported and consumed by the system. After consumption, direct energy is exported as heat. Gross electricity imports are calculated with the European production mix (UCPTE), gross exports with the domestic production mix [Frischknecht 1996], [Habersatter 1996].

Internally, direct energy flows from the process “energy distribution” to the processes (and sub-processes of) “goods and services production” and “household consumption.” The process “domestic energy production” delivers direct energy (electricity, heat from firewood, heat from waste incineration, and district heat) to the process “energy distribution,” and households supply domestic energy production with waste for incineration.

All data for modeling direct energy flows stem from official Swiss sources. For the status quo description, data were selected from the National Energy Statistics, reference year 1995 [BfS 1996a].

### **Embodied Energy Flows**

All fossil energy used for the production of commodities is allocated to these commodities. It is called embodied energy. With regard to imports and exports, the model discriminates among 29 baskets of commodities. For each basket, embodied energy is calculated with the help of trade statistics, domestic energy statistics and LCA data. For calculating export values, all non-renewable energy used by the domestic economy for the production and/or upgrading of export products is allocated to these products.

With regard to household demand, the model operates with 20 commodity baskets. 9 baskets relate to goods and 11 baskets relate to services. All net-energy (direct as well as embodied) consumed by industry is allocated to the commodity baskets of household demand. Allocation is made top-down and takes into account cross-sector exchange (see below).

Data stem from two sources: LCA data, including data for the energy carriers, are taken from the database ecomc of ESU-services, a leading Swiss consultant for lifecycle assessment. Trade data stem from official Swiss trade statistics [BfS 1994, BfS 1996b]. In order to minimize economic fluctuations, the model uses mean values of the years 1994 and 1996 instead of the 1995 data only.

### **Process “Economy”**

The process “production of goods and services” consists of 28 sub-processes (economic sectors). Each sub-process consumes direct as well as embodied energy. Direct energy is supplied by the process “energy distribution,” while embodied energy stems from imports and/or other sub-processes. Output flows consist of embodied energy only (exports and deliveries to other sectors and households). Cross-sector trade is modeled with 6 different exchange patterns. Exchange rates are based on employment data.

Net energy consumption of the sub-processes is allocated to commodity baskets of household consumption (see below). Retailing enters into most of these baskets. Where no data (sector output by products) for allocation were available, economic insiders were asked for their expert judgment.

### Process “Households”

The process “household consumption” demands direct energy from the process “energy distribution” and embodied energy from the process “production of goods and services.”

Output flows are heat and energy embodied in waste. Part of the embodied energy feeds back into domestic energy production (waste incineration).

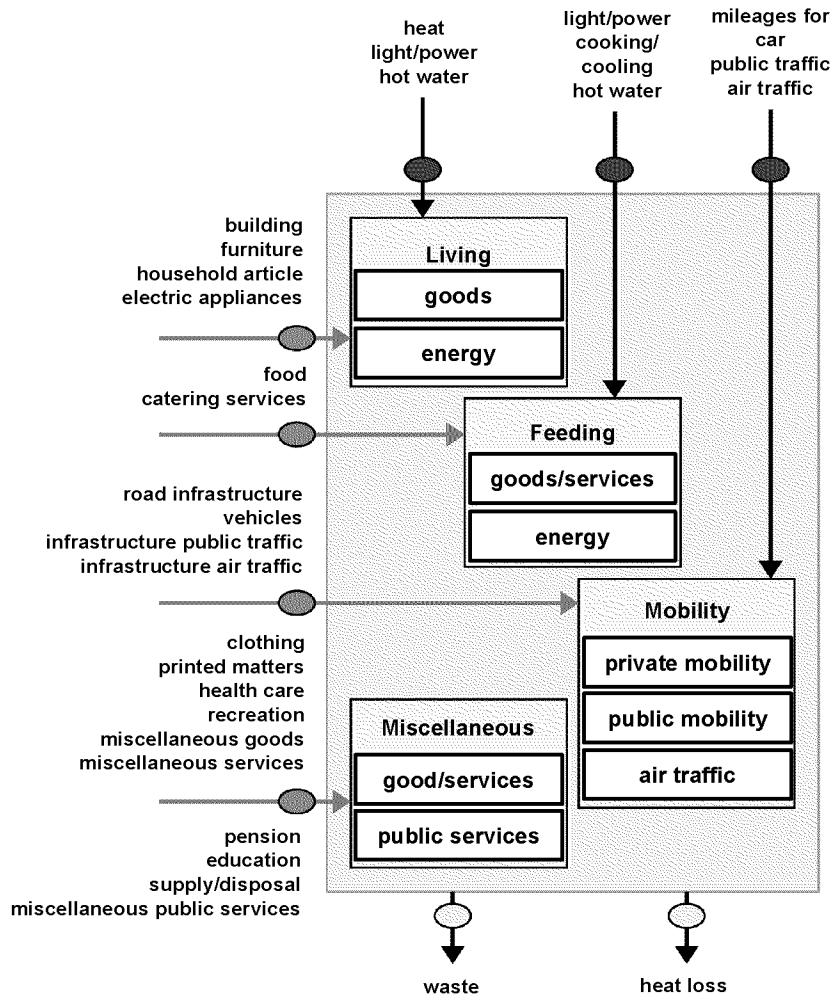
The figure below shows the energy flows associated with the process. Direct energy is differentiated into 6 domestic energy services (e.g. heating, warm water, cooling, etc.) and 3 mobility services (private mobility, public transportation, air mileage). Embodied energy is grouped into 20 commodity baskets (e.g. food, furniture, clothing, building, health care, education, vacations, etc.). In the figure, direct energy flows are listed at the top of the rectangle (process boundary), embodied energy flows are placed at the left side of the process boundary. For reasons of clarity, flows are aggregated and attributed to activity categories (living, food, mobility, and miscellaneous).

The process is divided into sub-processes of lifestyles. Lifestyles differ with regard to activity patterns and are defined by 4 dimensions:

1. household size:
  - 1 person
  - 2 people
  - 3 people
  - 4 people
  - 5 people
  - 6 or more people
2. income:
  - <3,500 CHF per month
  - 3,500-5,500 CHF per month
  - 5,500-8,500 CHF per month
  - 8,500-12,000 CHF per month
  - >12,000 CHF per month
3. car:
  - yes
  - no
4. accommodation:
  - apartment
  - house

By combining the values of these dimensions, 120 different lifestyles can be generated. Delineation is based on statistical data and, where data were lacking, on conservative guesses. The latter was mostly the case for income-related discriminations.

## Appendix C Energy Modeling for the ECO<sub>2</sub> program



### Treatment of Stocks

The model does not account for stocks; all stocks are handled as flows. The building stock is modeled as average annual energy flow from the building sector into other economic sectors (commercial buildings) and into households (residential buildings). Economic growth of the building industry is set at the mean value from the mid-1990s. The same procedure is applied to other stocks of infrastructure.

### 1.2.2 Variables and Parameters

#### Variables

All energy and CO<sub>2</sub> flows are variables. Import flows of direct and embodied energy are calculated with the help of 3 parameters: quantity (in kg), production energy (in MJ/kg, fossil

component only), and calorific value (MJ/kg). Export flows and internal flows are calculated with linear equations.

The model handles 344 output variables. These variables are grouped into 5 topical and 8 accounting categories. Users simply choose a topic and an accounting category, and the model selects and calculates the relevant variable subset. All results are presented graphically.

An accounting category is defined with three choices. One decides, first, whether the model should calculate gross or net consumption; second, whether energy use or CO<sub>2</sub> emissions should be budgeted; and third, whether the model should compute gross energy or end-energy requirements.

Topical categories relate to subsets of thematically grouped variables. The following subsets are defined: Energy carriers (10 variables:); mobility (8 variables: Private mobility and freight traffic differentiated into the modes road, rail and air; business traffic differentiated into road and air); domestic consumption (5 variables: Consumption of heating, mobility, other energy services, goods, and services); consumption of economic sectors (12 variables, each representing a sector); overview of regional consumption (8 variables: agriculture, industry, service sector, private mobility, business traffic, freight traffic, household consumption differentiated into direct and embodied flows).

### **Parameters**

The parameters for calculating imports were mentioned above. Parameters for modeling cross-sector flows within the economic process are defined on the basis of exchange patterns and sector employment. Parameters for calculating flows from the economic sectors to the households are derived from economic statistics. In cases where no data were available, parameters were defined with the help of economic experts.

### **1.2.3 Uncertainty**

#### **Model Validation**

A full-scale model validation cannot yet be presented. However, first results are encouraging. This section focuses on the baseline model, i.e. Switzerland, on overall consumption, and on household consumption.

In our model, net-consumption of gross energy (direct and embodied energy) amounts to 1505 PJ for 1995. According to Knoepfel (1995) and Zacheddu (1997) who used input/output data, Switzerland consumed 1260 PJ in 1990. According to a study that followed a similar approach to our own [Biedermann 1992], consumption amounted to 1400 PJ in 1991. Adjusted to the reference year 1995, the difference between these studies and ours is about 5%.

With regard to CO<sub>2</sub> emissions, the validity of our results falls in the same order of magnitude. In a recent study [Frischknecht 2000] that used a process-chain approach, overall per capita net emissions were found to be 11 tons in 1998, which is very close to our 10 tons for 1995. According to the Swiss greenhouse gas inventory, gross emissions of CO<sub>2</sub> stemming from (direct) energy consumption amounted to 43.8 million tons in 1995. Our model calculates 40.7 million tons. The difference is approximately 7%.

	Food	Clothing	Housing	Furn.	Health	Mobility	Leisure	Misc.
<b>Model (%)</b>	15.4	3.8	19.1	7.0	10.0	18.7	7.3	18.7
<b>I/O-Table (%)</b>	16.1	4.4	17.8	6.1	11.1	19.5	8.7	16.3
<b>Difference (%)</b>	4.5	17.2	-6.9	-13.1	10.8	4.4	19.1	-12.8

**Table 1: Distribution of household energy consumption by commodity categories, in percentages. First data row: model results; second data row: results from input/output analysis; third data row: difference between the two approaches**

With regard to household consumption, we compared our results for embodied energy with corresponding data from an input/output analysis. We limit discussion to a comparison of the energy distribution into commodity baskets. Such limitation is acceptable because overall energy consumption is almost equal in both approaches.

The input/output analysis for this comparison was done by ESU-services. The main results are presented in the Table 1. There is a surprising match between the results of our model and the data derived from the input/output table.

Findings from a detailed process-chain analysis of the food sector [Jungbluth 2000] further validate our model data: According to Jungbluth, annual per capita energy requirements for food amount to 21 GJ; our model computes 24 GJ.

### **Rough Estimation of Uncertainties**

Due to the model structure, uncertainty propagates linearly. For direct energy flows, uncertainty is approximately 10%, while for embodied energy imports it is approximately 20-30%. These uncertainty ranges are derived from comparisons between different data sources and from uncertainty estimations given by LCA experts. Against this background, overall uncertainty of embodied energy demanded by households amounts to roughly 15%, which is the order of magnitude observed for the commodity basket “food” (see above). Small baskets are more uncertain than larger ones (see Table 1). For tiny baskets, uncertainty is approximately 30%.

Data with regard to household types are less reliable than aggregated data about the household sector at large. Uncertainty is set to 20%. This figure is a subjective assessment – a best guess due to the lack of empirical data. As a result, uncertainty for commodity con-



## Appendix C Energy Modeling for the ECO<sub>2</sub> program

sumption by household types amounts to 25-30% in the case of goods and services and to 20-25% in the case of energy services.

With regard to CO<sub>2</sub> emissions, uncertainties are of the same order of magnitude as those of the respective energy flows because the physically and technically defined emission factors do not add significant new uncertainty.

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