ENERGY SAVING AND MODERN SOCIETY

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1. SYNOPSIS

A framework for the analysis of energy saving policies in modern society and a critical assessment of why industrialized countries are finding it difficult with their current strategy to reduce energy consumption to globally sustainable levels.

2. ABSTRACT

The past two decades have seen some significant advances in energy economy. Energy-saving measures have played a significant role in increasing the efficiency of energy use in virtually all sectors of energy consumption and in improving the cost-effectiveness of energy production. In reality, however, total energy consumption has increased markedly in almost all industrial countries during the period under review. The indications are that the same trend will continue in the years to come, and that, according to many international studies, may have disastrous ecological and social consequences.

This paper begins by comparing the results of energy-saving measures with the trend in total energy consumption, with scenarios for future total energy consumption and with the global need to save energy. The main argument is that the conflict between the trends in energy consumption and the need to save energy cannot be explained away solely by reference to hard facts related to the energy system. The paper seeks to demonstrate that the problems of saving energy are closely intertwined with certain fundamental principles that govern the development of modern society and that need to be given serious attention in energy-related studies. The paper offers a framework for studying energy-saving, identifies the main connections between modern society and the energy system, and looks at the question of why the reduction of energy consumption to a level that meets the global need for energy-saving is not possible without a thorough rethinking of some of the most fundamental principles of modern society. The aim is not to offer practical advice on how to save energy or to analyse in detail the energy-saving policies pursued, but rather to develop tools for approaching the problems concerned from a fresh perspective. And further, the aim is to link up pragmatic research on energy-saving with some of the fundamental problems of social theory. Instead of setting out ready truths, the intention is to open up new perspectives

3. INTRODUCTION

Energy-saving, both as a concept and as a concrete activity, is a comparatively recent phenomenon in modern society, but already it has attracted considerable attention both in research and in public debate. During the past couple of decades it has become an integral part of the official policies of modern industrial countries, and it has regularly appeared on the agenda at various international fora. Public opinion attests to the importance of energy-saving: the results of recent polls suggest that people take a very favourable attitude towards energy-saving, particularly in so far as it contributes to environmental protection. Industry has also been showing a growing concern in improved cost-effectiveness in energy consumption -- and at the same time taking advantage of these investments in its marketing and public relations campaigns. Even energy producers and distributors have now begun also to show a growing concern in energy-saving measures and to stress that they, too, have a vested interest in sustainable energy consumption. So it would seem that there is a fairly broad consensus of opinion as far as the importance of energy-saving is concerned.
There are many international studies which have shown that energy saving can indeed produce very good results. Energy intensities (the amount of energy used per unit of activity) have decreased considerably, and the technical and economic potential for decreasing them further is counted in tens of percent (Schipper 1993, Gjelstrup et al. 1989, Goldemberg et al. 1983, Lepistö 1991).

However, the aim of this paper is not to present a detailed energy analysis of all the factors determining energy consumption. Rather, I want to highlight some of the main trends and factors in past and future energy consumption and in this way to demonstrate that there remains a huge gap between the global need to save energy and, on the other hand, past and future trends in energy consumption. This raises the interesting question as to why the comparatively high degree of consensus and awareness about the need for saving save has not led to, and possibly never will lead to, any significant decrease in total energy consumption. By describing some of the prerequisites for a low energy society, I have wanted to concretize what otherwise has tended to remain at the abstract level of social scientific analysis; and to show why in today's modern society energy saved does mean energy spared.

4. THE NEED FOR ENERGY SAVING MEASURES AND CONSUMPTION SCENARIOS

4.1. The global need for energy saving measures

The importance of saving energy has been highlighted from both a natural science and a social point of view in numerous international studies and discussed at a number of national and international fora. For the present purposes it is not necessary to review all the research results.

Perhaps the most significant document in this field which has inspired more national programmes than any other paper is the report of the so-called Brundtland Commission. I shall take just a few examples of the future prospects outlined in this report for energy consumption and compare these with what has actually been achieved in terms of savings measures.

According to the Brundtland Commission, population growth will act to increase world energy consumption by around 40 % by the year 2025, even if consumption per capita were to remain constant at the 1980 level. If energy consumption in the whole world were to increase to the per capita level recorded for industrial countries, we would see an increase of 550 % on the figures for 1980. The Commission concludes that the economic and ecological prospects of an increase in energy consumption just half this size are highly alarming. The Commission believes that the only realistic option for the world in the 21st century and beyond is to adopt a consistent policy of low and sustainable energy consumption. The model of low energy consumption proposed by the Commission would require a reduction of over 40 % in absolute primary energy consumption from 1980 to 2020 the industrialized world (Our Common Future 1987, pp. 147-8).

4.2. The development of energy intensities in the OECD countries up until 2010

How do these forecasts and guidelines compare with reality? Energy intensities in primary energy use have OECD-countries decreased between 1973-1988 approximately by 10-20 % (see e.g. Schipper 1994, p. 137, Meyers and Schipper 1992). It has been supposed that technological development and likely energy price increases will bring a more or less automatic decrease of around 15 % in energy intensities by the year 2010 (Schipper 1993, pp. 267, 269). The scenario outlined by Schipper for the OECD countries says that an active policy of energy-saving and a doubling of energy prices could help to bring an improvement of over 30 % in the efficiency of energy consumption; with a firm and determined savings policy, energy intensity could even be cut by over 50 %. The latter option, according to Schipper, would require sharp (three- or fourfold) increases in current energy taxation levels, far-reaching agreements between governments, the industry and consumers, and heavy investments in a new type of consumption technology, especially in key sectors of consumption. Schipper's model takes account of the economic boundary conditions combined with an active policy (Schipper 1993, pp. 267-269).

This view is probably shared by the vast majority of people; we do in fact have opportunities to save energy and to pursue a more energy efficient society. So is there reason for optimism after all, in so far as we can resort, if needs be, too to all these measures? The picture is completely different if we look at the true development of total energy consumption since 1973 and at how it will develop in the future.

4.3. Development of total energy consumption in the OECD countries 1970-2010

Even though the efficiency of specific energy consumption has increased over the past decades, total energy consumption has nevertheless increased in the OECD countries by 37 % between 1970 and 1992. There is only one OECD country where total energy use has decreased. And even since 1980, by which time the general public and governments and other key actors in society were certainly well aware of the energy problem and the importance of environmental protection, consumption has still gone up by 13 %. And again there is just the single country where figures have decreased and one where they are unchanged.

In spite of a clear decreasing in energy intensities, total energy consumption will probably continue to increase in the OECD countries in the future as well. Even if it is assumed that the efficiency of energy consumption will continue to increase at the current rate of 1 per cent per annum, consumption will still be about 40 % higher in 2010 than it is today as a result of economic growth (at 2.5 % per annum) and changing demand structures. And further, if an active savings policy were to be implemented to give a 1.5 % increase in the efficiency of energy consumption per annum, total consumption would still increase by around 10 %. The only way to achieve a real decrease in total energy consumption by the year 2010 is through an extremely tight, no-compromises savings policy (Schipper 1993, pp. 267, 272).

It is clear from what has been said above that more efficient energy consumption through heavy investments in technology and the application of that technology will not be sufficient to halt and eventually turn the current trend in global energy consumption -- unless these investments are combined with the most rigorous options in terms of energy saving.

From an everyday point of view the situation appears in a highly contradictory light. There are numerous energy reports on individual countries and on the whole world that lend authoritative support to the view that an alternative future of low energy society is in fact possible, and this without the industrial countries having to make any compromises in terms of their current standards of welfare; some go so far as to argue that those standards, as well as the standards of living in developing countries, can actually be raised (see e.g., Nørgård et al., 1983, Johansson et al., 1983, Lönnroth et al., 1977, Carlson 1982, Häfele 1981, Lovins 1977, Goldemberg et al.,1990). The discussion below focuses on the Goldemberg scenario which argues that a low energy future is possible, but also makes a few reservations as to why the future cannot be taken for granted. These reservations provide an interesting subject for a social-scientific analysis.

4.4. The low energy future as a possibility?

The report "Energy for a Sustainable World" argues that, in theory, given both the economic and technological parameters, a low energy future is possible; and that the option of low energy still allows for increasing welfare standards and reducing the gap of inequality between industrial countries and the developing world as well as other global risks. The report submits the following conclusions:

- that it is possible to halve the per capita energy consumption of industrial countries from 4.9 to 2.5 kW between 1980 and 2020; and
- that it is possible at the same time considerably to raise standards of living (Goldemberg et al., 1990, p. 114).

According to the report the following two factors will have a decisive impact on the energy needs of industrial countries:

(1) structural economic changes towards less energy-intensive activities; and
(2) the opportunity to utilize energy more efficiently
(Goldemberg 1990 et al., p. 106; see, e.g., Johansson et al., 1983).

Structural changes in consumption, the report argues, are made possible by the fact that the industrial countries have now moved into what is termed the post-industrial stage of economic growth, which is characterized by the service sector rapidly outgrowing commodity production. At the same time the degree of conversion in commodity production (chiefly as a result of technological development) is rising relative to the amount of raw material utilized; a process of dematerialization has got under way both in production and in consumption. The report suggests that together, these processes will help to reduce the energy intensity of economic activity (Goldemberg 1990, p. 58).

5. PIVOTAL CHALLENGES OF LOW ENERGY SOCIETY

The probability of low energy society materializing will depend on two key factors. Firstly, it will depend on whether current trends in technological development and market mechanisms will really lead to a situation that is characterized as post-industrial society. Secondly, it will depend on whether post-industrial society and the shifting emphasis of consumption towards the service sector will ultimately lead to reduced levels of energy consumption. Both these questions are closely intertwined with one another and require a detailed analysis of the dynamics of social development.

The former problem receives due attention in the Goldemberg scenario, which observes that there are certain weaknesses in the market mechanisms which will act to slow down the development. It is pointed out that the production-oriented energy policy that has been pursued in industrial countries favours energy consumption and that consumers are unwilling to make investments in energy-saving. Further, the report points at the failure of market mechanisms to take into account social problems and long-term development problems (Goldemberg et al., 1990, p. 128). Indeed a decisive question is whether these market-related problems and obstacles can be overcome. There are many signs in current trends of social development which suggest that it might be very difficult to resolve these problems without a thorough reassessment of many fundamental principles of contemporary industrial society.

The latter question, i.e. whether energy consumption in post-industrial society will really come down, has received only very marginal attention in research. The chief problem here has to do with the rebound effect of any savings achieved, with dematerialization and with consumption being carried over to the service sector.

The rebound effect means that energy resources released through more efficient energy use will be employed in other uses (see e.g. Brookes 1990). This is no new discovery, but the phenomenon was in fact first detected in the 19th century (see e.g. Jevons). On the micro level there are plenty of examples of how better insulation has meant higher indoor temperatures, how more energy-efficient cars has encouraged people to travel more, how resources released by smaller electricity bills have been invested in new appliances, etc. On the macro level, the most powerful evidence of the rebound effect is the increase in total energy consumption in spite of more efficient energy use. This clearly goes to show that the energy saving strategy that is based exclusively on reducing energy intensities does not work from the perspective of sustainable development.

The dematerialization of production and consumption does not necessarily mean lower energy consumption. In some cases it has led to unexpected increases in material consumption. A good example is provided by the latest innovations in information technology, which paradoxically have resulted in increased paper consumption. Dematerialization may also lead to a faster turnover of electronic appliances as both durability and reparability have been compromised, as consumers buy equipment they do not necessarily need, etc. (see Herman et al. 1989). There are not many examples that demoralization should have replaced existing energy intensive consumption and production structures. In fact dematerialization may only create new modes of consumption and so increase energy use.

Nor does the shifting focus of consumption towards the service sector necessarily reduce total energy consumption. The research evidence clearly indicates that many traditionally household functions are being taken over by the service sector, but at the same time the energy intensity of many services has started to increase. Many shopping, sports and leisure activities have also become more energy intensive, requiring greater mobility, bigger indoor halls, more equipment etc. than before. The Swedish case shows that during 1973-1988, growth has been fastest in services and travel; at the same time the energy intensity of the service sector has increased by over ten per cent (Schipper 1994, p. 136). Similar trends in development can be seen in other countries as well, but as a highly advanced industrial country Sweden is perhaps the best case for predicting future trends.

The purpose in this presentation is not to give a detailed account of the above-mentioned trends. Rather the discussion below will attempt to explain why the road to a low energy society is as difficult as the above examples give to understand.

My argument is that the main obstacles on the way to a low energy society are neither economic nor technical; the chief difficulties have to do with the fundamental principles of modern society. Therefore it is useful to start with a brief description of the logic that underlies the development of modern society as far as this is relevant to energy consumption. The focus of our discussion is on what may be described as ideological structures and principles which direct society in its development. The outline below reads as a rough programme that requires serious further elaboration on a social-scientific basis. Rather than setting out a fixed model, the description aims to outline a social-scientific frame for analysing problems related to energy saving. A meaningful evaluation of the prerequisites for a sustainable development, of the obstacles to pursuing such a policy and of its impacts will not be possible without a proper understanding of the social-scientific premises of modern society.

6. MODERN SOCIETY: DISTINCTIVE CHARACTERISTICS

Modern society refers here to Western industrialized societies. The following discussion on the main characteristics of modern society touches only upon those aspects that are relevant to understanding energy and environment issues. (Classical sense of 'modern' is a broader concept, see e.g. von Wright 1988)

The most fundamental principle of modern society is its faith in progress: through the application of reason and empirical knowledge, it is believed that humans can be released from the shackles of nature and tradition, resulting in ever-increasing welfare and happiness. Nature is seen as an object of exploitation, which by means of technological innovation can be harnessed with ever greater efficiency to the service of human welfare and development. The precondition for all this is the increasing rationalization of all domains of human life (see e.g. Stuart and Gieben 1992, p. 21; Kellner 1989, pp. 89-90; Garner 1990, p. 50).

Progress constitutes an abstract objective that structures the whole of society, which means that in the building of modern society the focus can be centred on the means of promoting this objective. If a certain means can be regarded as contributing to the objective of progress, it will receive legitimacy in public opinion; and in so far as it enjoys broad public acceptance, it will remain beyond disputes and controversies.and assume a value-free form (see e.g. von Wright 1988, p. 83).

Amongst the means that have acquired such a status in the arsenal of modern society are technological progress to control the physical environment, the division of labour as a factor that organizes the production process, the monetary system, the banking system and economic efficiency as a factor which allocates production resources, and bureaucracy as an administrative system. The principle guiding the use of these means is profit; the yardstick is efficiency; and the objective progress. If these principles were to be called into question, that entire modern project would be in jeopardy.

Rationalization is grounded in the principle of instrumental reason, so called because reason serves only as an instrument in the pursuit of continuous progress. In other words reason is not in itself a part of the meaning of being and a way of assessing the rationale of objectives set, but it is to serve as an instrument for the abstract myth of progress. For the same reason the rationality of modernism is called instrumental rationality (see e.g. Kellner, s 101-102; White 1990 s. 3).

The most serious problems of modern society have to do with the dramatic increase in non-intended consequences resulting from the increasing complexity of its systems and the difficulties in controlling those consequences. On the other hand the current tendency towards instrumental rationalization is making chains of action so long and so complex that it is often impossible to identify the consequences of decisions and action taken.

Consequences evolve as a result of a number of smaller decisions and are filtered through a number of different institutions (e.g. the technological system, the monetary system, the expert system, communication). This has a decisive impact on what kind of responsibility individual and collective actors can and will take for their action. The chain between action and ultimate effects is so long that it is often impossible to empirically single out even the most relevant causes and effects, even though it is quite obvious that they have come about as a result of a number of small decisions. This is the mechanism that we see at work when people say that their individual decisions and action are hardly of any real consequence in resolving the energy problem. Since the consequences of action are distanced from the actor both temporally and spatially, it is easy to externalize any negative effects and simply to leave them out of any moral considerations.

Together with the rationalization of everyday life, this has led to a dramatic breakdown of traditional norm systems in modern society. Consequently it is necessary to have more and more rules and contracts to keep society operative and

under control, but because the system is so highly complex and so heavily dependent on experts those rules and contracts, in a normative sense, will remain alien to the majority of social actors. It follows that the only way to control the system is on the basis of sanctions, without any moral responsibility required on the part of the members of society and collective actors (see e.g. White 1988, p. 105; Stuart and Gieben 1992, p. 263).

The individual's needs and the individual's behaviour occupy a central place in the policy of energy-saving. Herein lies one of the most fundamental contradictions of the policy. There is a very strong tendency in modern society to try and influence the individual's needs from the outside. The autonomy of the subject is threatened by the necessity to confirm to the pressure of opinion and to regulation in the creation of which he has not participated and the sense of which he often cannot understand (von Wright 1988, p. 85). Within the confines of the development of modern society the individual has only very limited (moral and practical) means available to act in the best interest of the collective, the common good. By appealing to individual needs and the individual's responsibility, collective actors can easily evade their own responsibility as well. This is a key factor in the inability of the market mechanism to resolve the energy problem. In this sense the policy of saving energy does not seem very plausible; which in turn makes the issue a highly political one. Below, we move on to look in more detail at how the energy problem is linked up with the problem of modernism.

7. THE ENERGY SYSTEM AND THE DYNAMICS OF MODERN SOCIETY

Anthony Giddens, one of the most prominent social philosophers of our time, has summarized the dynamics of modernism into three interrelated dimensions. He describes these dimensions and their effects as follows:

"Three dominant sources of the dynamism of modernity have been distinguished, each connected with the other:

- The separation of time and space. This is the condition of time-space distanciation of indefinite scope; it provides means of precise temporal and spatial zoning.
- The development of disembedding mechanisms. These 'lift out' social activity from localised contexts, reorganising social relations across large time-space distances.
- The reflexive appropriation of knowledge. The production of systematic knowledge about social life become integral to system reproduction, rolling social life away from the fixities of tradition.

Taken together, these three features of modern institutions help to explain why living in the modern world is more like being aboard a careering juggernaut... rather than being in a carefully controlled and well-driven motor car." (Giddens 1990, 53-54).

The following discussion looks at how energy is linked up with the above dimensions of the dynamics of modernism. The purpose is to provide a more solid basis for exploring and understanding the connections between saving energy and modern society.

7.1. "The separation and time and space" and energy

The development of the modern energy system is a good example of the spatial and temporal separation of different functions in society. In societies preceding the industrial mode of production and large-scale urbanization, there was a clear temporal and spatial link between energy production and energy consumption; and similarly, energy acquisition had close and direct links with the practical activities of everyday life and with the timing of those activities. Permanent settlement and the storage of energy marked the first step in the spatial and temporal separation of energy production and consumption.

The professional differentiation of society, the concentration of settlement and mass production of consumer goods would quite apparently have taken a completely different course had it not been for the discovery of new types of energy sources (coal, and later oil). The important thing is not whether the discovery of new energy sources is the cause or consequence of the development; the important thing is that it has radically accelerated the differentiation of time and space.

Although at first glance they may seem very commonplace notions, time and space are in fact extremely complex dimensions of the energy and environment problem. A number of relevant questions are encountered in practical situations: "In what sort of space of time and to whom will the problems become intolerable, and how soon must the most acute solutions be provided?"; "How does one motivate reduced consumption by reference to environmental factors if it is difficult to nail down their exact regional effects?" "In what sort of regional scope must the problems become intolerable before steps need to be taken, and in what areas must these steps be taken?" It is extremely hard to try and answer these questions without a full recognition of the fundamental reasons for the separation of time and space in modern society.

7.2. "Disembedding" and the energy problem

Another aspect involved in the dynamics of modern society is that of "functional disembedding". This refers to the separation of vital dependencies from social activity and the reorganization of social relations across large time-space distances. Factors that mediate these necessary dependencies in modern society include the technological system, expert systems and various symbolic systems, the most important of which is the monetary system.

The energy system is a typical example of a modern system. The key role of the expert system is evident in the fact that in virtually all energy-related problems that occur even in everyday situations, experts will need to be consulted: the security of an electrical installation, the setup of a heating system, the energy characteristics of power units, feedback data on energy consumption, etc. However, it is not unusual that the expert's average knowledge does not cover the wide variation that habitually occurs in practical situations and that the final solutions need to be made on the basis of lay knowledge. This in itself is an interesting paradox of modernity which Giddens singles out as one potential source of change (Giddens 1990, p. 91).

The influence of the expert system and the monetary system is also seen in the fact that most of the knowledge concerning alternative solutions of the energy problem is of a technical and economic nature (new production technology, technical potential for savings, more efficient power units, economic profitability of savings, etc.). This very much dominates our views on energy and on how we believe we can influence energy decisions. This is perfectly natural in view of the fact that the philosophy of economic efficiency and progress is fully consistent with modern society's own notions of progress, and the energy system has been built upon this very same principle. What is more, it is consistent with the organization of the prevailing institutional system to look for solutions precisely in this direction. The current expert and monetary system does not lend itself very well to dealing with reduced energy consumption levels and closed energy systems.

For the above reason it should be an important priority to examine in more detail the energy and environment problem from the vantage point of the disembedding mechanism.

7.3. "The reflexive modernity" and energy

Modern society requires huge quantities of feedback information in order to function properly. A good example of the reflexive nature of modern society is provided by statistics on energy production and consumption, as well as by various billing systems, bookkeeping systems, administrative records, etc. In themselves all of these clearly highlight the increasing tendency in modern society towards greater specialization and complexity.

In order that the energy system can function smoothly, it needs a continuous inflow of data on energy consumption, future markets, prices, etc. These data need are related to the energy system's internal operation, and the relevant information is largely produced by the system itself. However, the energy problem has also created new needs for information that have to do with the impacts of the system on the environment and on society, i.e. on the effects that the system has tended to externalize. Here, information is required on these side-effects on the one hand, and on ways in which they can be influenced, on the other.

As far as information needs are concerned the problem is that the information system itself transforms into an expert system, which is obviously closely connected to or dependent on the system on which it produces information. This means that there will be problems in defining essential information needs, the reliability of the information provided, the question of who has access to the information, how it is published, etc. The situation is particularly problematic if the new information system does not really fit in with the organization's principles of operation but would clearly be necessary to effect changes.

In the domain of energy an example is provided by informative billing systems of energy consumption. Feedback data of this kind are necessary for consumers to be able to control their own consumption in a planned way. However

energy companies have been very slow to introduce such systems because they simply are not in their own interests. Therefore it has remained a job for outsiders to develop these systems, even though it should clearly be the responsibility of the energy companies to work on them (see e.g. Wilhite et al., 1990).

Least-cost planning and demand-side-management systems are another example that can be mentioned here. These are reflexive systems that have grown up in response to the energy problem between the energy system and society. However, the there have been enormous problems in the practical application of these systems. This goes to show that, in its current form, the energy system is only capable of adopting and utilizing reflexive information that is compatible with its own institutional and organizational principles; it is simply unable to digest information concerning saving, the environment and various social impacts. This suggests the conclusion that it is extremely difficult to implement cultural changes relating to energy production and consumption. Indeed it would be most useful to approach them from the vantage point of the problems of modern society.

One of the problems associated with reflexivity is that the energy system is only recognized as reflexive in so far as it requires increasingly detailed, empirical knowledge (i.e., chiefly technical and economic facts) about the surrounding society and about the environmental impacts. There is a tendency to deny the fact that, as a neutral medium, it might reflect the problems and interests of societal development more generally, or that as a social institution it might itself shape values and create needs (related to energy consumption).

8. THE LINKS OF MODERN SOCIETY TO ENERGY

The links between the energy system and modern society can be summarized in the following points:

- **Firstly**, the energy system is heavily centred on technology (both in terms of production and consumption technology), which ties it up with the modern project of technological progress. At the same time it has evolved as an expert system that is typical of modern society.

- **Secondly**, the development of energy systems is an integral part of the campaign of modern progress to harness nature to the service of human society. In particular, the use of fossil fuels is consistent with the principles of progress, where a key tenet is that material progress and growth can best be guaranteed by conquering and exploiting new resources.

- **Thirdly**, energy is closely intertwined with the modern division of labour, specialization and the principles of increased efficiency. The energy system is of course itself an integral part of the social division of labour and specialization, but it is this system that has ultimately made possible the extremely rapid process of spatial and functional differentiation throughout the rest of society and the greater efficiency of production. Social specialization and improved efficiency have been achieved specifically by increasing energy consumption. Many physical, institutional and organizational structures in modern society would have a very difference appearance to them today if it were not for inexpensive, easily accessible energy resources.

- **Fourthly,** the energy system has been built up on the principles of utilitarianism and instrumental rationality. There has been a conscious policy of avoiding conflicts around the building of this system by stressing the decisive advantages of the energy system to progress as well as its instrumental and neutral nature. It is in these principles that we find the hard core of today's conflicts and contradictions concerning the energy system.

9. DISCUSSION

Composition 1 on the following page outlines in a somewhat crude comparison the differences between the energy saving strategy that is based on the dynamics of modern (prevailing) society, and on the other hand the alternative strategy that takes critical distance from the some key tenets of modernism. It remains for the reader to decide how far the strategy of modern society, as outlined here, corresponds to the policies actually pursued in different countries. No detailed evaluations are presented here of differences at the practical level. The main purpose of our comparison is to shed light on the different dimensions of energy saving and to open up new perspectives and viewpoints.

I. The time-space dimension and energy saving
Temporal perspective. Spatial perspective. Spatially, the energy problem is global; and temporally, it is a long-term problem (next and new generations). The specialization and complexity of modern society have made it hard to

identify these factors. Therefore every effort should be made to highlight these factors and to make them visible in everyday activity. This would give the necessary motivational and moral push for energy saving.

II. The objective-motive dimension and energy saving
Social philosophical goals. Utility based on economy and technology has been a socio-philosophical objective in energy saving. If we do not bear in mind that the energy problem is also a justice and equality problem, then the internal rebound effect will eat away the benefits we achieved through utility. Utility must be seen only as a means to other goals, not as a ranking criterion to choose best alternative.

Interest in saving. The technical controlling of energy systems has taken precedence over the mode of control. This means that energy saving is becoming more and more dependent on expert systems, and that the links between causes and effects are becoming more and more invisible. If this really is the case, it will certainly undermine the moral and normative basis of individual responsibility. More attention should therefore be given to creating systems that people can understand and control. If

COMPOSITION 1: A comparison of the modern and the critical strategy of energy-saving (list of preference)

	Critical strategy	Modern (prevailing)
I. TIME-SPACE DIMENSION		
A. Temporal perspective in energy saving	1. New generations 2. Next generation 3. Current generation	1. Current generation 2. Next generation 3. New generations
B. Spatial perspective in energy saving	1. Global 2. Local 3. National	1. National 2. Local 3. Global
II. OBJECTIVE-MOTIVE DIMENSION		
A. Social philosophical goal in energy saving	1. Justice, equality 2. Security 3. Utility	1. Utility, equality 2. Security 3. Justice
B. Societal interest in energy saving	1. Emancipation 2. Practical control 3. Technical control	1.Technical control 2. Practical control 3. Emancipation
C. Societal goal in energy saving	1. Social organization 2. Environment 3. Economy	1. Economy 2. Social organization 3. Environment
III. DYNAMICS OF CHANGE DIMENSION		
A. Initiator in energy saving	1. Public authorities 2. Organizations, institutions 3. Private citizens	1. Private citizens 2. Organizations, institutions 3. Public authorities
B. Force of change in energy saving	1. Public interest 2. Individual needs 3. Market structures	1. Market structures 2. Individual needs 3. Public interest
IV. MEANS DIMENSION		
A. Mode of saving	1. Level of activities 2. Structures of activities 3. Intensities	1. Intensities 2. Structures of activities 3. Level of activities
B. Approach of saving	1. Structural changes 2. Behavioural changes 3. Technological changes	1. Technological changes 2. Behavioural changes 3. Structural change
C. Method of promotion	1. Public norms 2. Informative incentives 3. Economical incentives	1. Economical incentives 2. Informative incentives 3. Public norms

energy saving and environmental care afforded people a sense of greater control over their own environment, that would put activities on a more solid basis; energy saving would no longer be just one more alienating expert system among many others.

Societal goal. As a societal objective energy-saving is ultimately determined on the basis of economic goals. Economic criteria have defined in many ways the transition to the post-industrial stage of growth. This seems to lead to a more energy-intensive service sector and to increased traffic without any indication of a reduced rebound effect. Therefore it would be extremely important to give more thought to the question of what kind of societal structures could promote a sustainable development.

III. The change dimension and energy-saving
Initiator in energy saving. Force of change. In the prevailing strategy the key position is held by individuals, individual needs and markets. Individual needs, however, are very much affected by markets. For instance, many energy-related needs are shaped by the energy production system, or at least the energy system determines what kind of energy, where and under what conditions you can use. Also, the energy markets often operate in such a way that it simply does not make economic sense for the individual to economize. A good example is provided by energy and water price hikes that follow when people economize; this continues to happen even today.

Theoretical consideration of the Prisoner's Dilemma game and free-rider problems shows quite clearly that markets based on a vulgar conception of human need cannot solve energy and environmental problems. A credible energy saving strategy will require fundamental changes in the practices of certain institutions. There are various obstacles that cannot be overcome without binding common rules. Therefore it is necessary to pay more attention to public interest and public intervention.

IV. The means dimension and energy-saving
Mode of saving. In the prevailing energy saving strategy the main emphasis is on reducing energy intensities. This, however, has not decreased total energy consumption. Earlier research indicates that the most important factors in energy consumption are level of activity and consumption structures. If we fail to pay sufficient attention to these factors, we will lose the historical opportunity that is now presented to us by dematerialization and the other processes of transition now under way in industrialized countries.

Approach to saving. In the prevailing strategy has been very technologically oriented, often focusing on individual appliances. The results of technological innovation have often been eaten away by the rebound effect. Therefore it is necessary to pay more attention now to the whole technological system and to creating such communication systems, housing modes, service structures, etc. which will support energy saving and environmental concern at all levels. We have to create alternative activity and consumption structures, not new technological structures on top of the old ones.

Method of promotion. In peoples eyes energy saving is not always credible. People don't trust that the others (energy utilities, enterprises, authorities and other people) honestly strive for energy saving. This is a message of many surveys. There are many reasons for that. You get all the time conflicting information about what are the best means to save energy, who waste most energy, who make profit with energy saving, how many new utilities we need in the near future etc.. We can say that the normative base in energy savings in very fragmented. In order to that people could trust that the other people and interest groups are honestly striving for energy saving, and that people could get an understandable view about the common good we need public norms to guide both individual behaviour and institutional and organizational development. Therefore in critical strategy emphasizes the role of public norms.

9. CONCLUSION

Assuming that our previous analysis of the relationship between modern society and the energy system is principally correct, we may proceed to suggest the following conclusions. In a theoretical account, these can be seen as the global conditions for formulating a sustainable, long-term energy-saving strategy:

- The time and space perspective needs to be expanded to take in future generations and a global scale.
- Utilitarian argumentation must be discarded in favour moral and security arguments.
- The goal of energy policy must be to match the environment with society.
- The structural determination must be discarded in favour of increased possibilities for conscious free choice in accordance with the ideals of modern society.
- A firm intervention is needed into the mechanisms and interests that create structural based needs, social attitudes and shape the practices of organizations.
- In practice, this means that not only the stepping up of the efficiency of energy consumption but also the growth and the structures of consumption and the whole social organization must be taken as an object of energy-saving policy.

This sort of change in our way of thinking might for its part help prevent us from slipping into an alienated, post-industrial and post-modern society without ever achieving the ideals of modernism. We do not need to throw modern society overboard; we need to return to its original ideals.

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