

ENERGY AND SUSTAINABLE DEVELOPMENT

AN ENERGY EFFICIENCY STRATEGY

1. ENERGY: RESPONSE TO NEEDS OR FACTOR FOR POWER AND PROFIT?

The degree of development of a society can be expressed in terms of its increasing ability to meet a certain number of needs: food; housing; health; clothing; travel facilities; education; information; culture; exercise of civil rights; quality of the natural environment; sports and leisure; etc.

Most of the activities mentioned above require energy in varying degrees. Energy is either consumed directly by users or is necessary for production of the goods and services associated with the activities.

Availability of energy is therefore a pre-requisite for economic and social development.

For thousands of years, and still today in many parts of the world, the heat needed to cook food – and to provide a minimum of comfort in cold regions – has been obtained by burning wood, with mechanical energy being provided directly by the work of men and women. Use of animals only took over from human energy a few thousand years ago. The mechanical power of running water and that of the wind then made their appearance, driving mills and swelling out sails.

The combination, during the industrial revolution, of steam engines and coal and later of turbines and large-scale hydraulic dams and of the combustion engine and gasoline multiplied the capacities for production and transport of energy products. The energy industry thus became one of the basic components of industrial development, making those who controlled it rich and powerful.

In less than a century, energy has become a major economic and strategic element, a reason for armed conflict those who wish to possess it, and the symbol of a civilisation dedicated to productivity, in both capitalist countries and in those with centrally planned economies.

Instead of being a necessary means for development, energy came to be seen as an end in itself, the symbol and measure of successful development. Economic progress was measured in terms of a regular and unlimited increase in production and consumption of coal, oil, gas and electricity.

Energy systems are dominated by increasingly powerful enterprises – either private multinationals or stated-owned concerns – deploying their own dynamic for market domination.

Energy has become a factor for power, and energy policies – most often developed by companies in the sector – have almost exclusively been based on increasing the means of production ("energy supply"), to the detriment of the notion of service to the community and to individuals.

The massive increase in the production and consumption of energy has not, however, resulted in the provision of "energy for all". Great inequalities exist between the industrialised and developing countries (average per capita consumption in North America is twenty-five times greater than in India or Africa) and between rich and poor within individual countries. Two billion people do not have access to modern forms of energy, especially electricity.

The development of energy industries has not met needs adequately. In addition, the excessive nature of development has resulted in serious damage to the environment and health, in economic imbalance, and in grave political crises.

2. ENVIRONMENTAL DAMAGE, ECONOMIC IMPASSE AND POLITICAL CRISIS

2.1 Environmental damage

Damage to the environment, to life and to health resulting from production and consumption of energy has had consequences on a considerable scale:

- 0* Major accidents: dam failures; fires in facilities producing, transporting or transforming hydrocarbons; explosions in mines; accidents in nuclear power stations and facilities; etc.
- 1* Air and water pollution by emission of polluting substances (sulphur and nitrogen oxides, dust, radioactive material), temperature rise in water bodies, and leaks or uncontrolled discharges of dangerous substances.
- 2* Enhancing of the greenhouse effect by emission from energy-related activities of "greenhouse gases" contributing to climate change, with grave consequences (carbon dioxide and methane are the most important of these greenhouse gases).
- 3* Deforestation and desertification caused by consumption of wood or charcoal for fuel in regions where the natural resource is not renewed. This problem is of particular importance because for many rural or peri-urban populations "fuel wood" is the main or only resource available.
- 4* Land use and destruction of sites by large hydroelectric schemes, mining operations and electricity transmission grids.
- 5* Production by nuclear power stations of radioactive wastes which will remain dangerous for centuries or even thousands of years.

2.2 Economic and political risks

The oil supply crises of the 1970s ("oil shocks") were very revealing, from several points of view:

- a) Awareness grew that fossil fuel resources were not limitless, that their reckless consumption would cause them to become rare and increase in price, and that the concentration of major resources in certain geographical areas could lead to grave economic and political crises.
- b) The community of rich countries showed itself ready, if necessary, to engage in military operations to protect its "interests", i.e. freedom of access to its sources of energy supply.
- c) The countries most affected were the poorest ones, often spending most of their resources to import energy. They are powerless in the face of fluctuations in international prices which can de-stabilise their fragile economies.

The most advanced industrialised countries were able to respond to the "energy crisis" by making efforts to develop alternative energy sources but above all – and with by far the most significant results – by introducing energy saving policies.

The oil crisis led, in the 1980s, to the observation that the investment necessary for production and transformation of energy, especially construction of power plants, would – if previous trends were followed – become unaffordable for most countries. The levels of debt in the energy sector alone were becoming an objective barrier to economic development.

2.3 The legacy of energy development inherited from the past is not sustainable

In spite of a very clear reduction in the growth of energy consumption in developed western countries since the 1970s, and in the countries of central and eastern Europe (due to the economic crisis) since 1990, current trends would lead to a doubling of energy consumption in all countries of the world in just a few decades if they continue unchanged.

Reductions in resources which are easily accessible or their concentration in certain highly sought after areas, the increase in the cost of energy products and the use of more dangerous energy technologies (justified by the threat of energy crisis) would lead to aggravated environmental damage and to depriving the major part of the world of development.

Today, environmental requirements are reinforcing economic constraints making necessary the development of a global strategy that satisfies both the needs of sustainable development – ensuring the quality of life of all inhabitants of the planet and allowing future generations to do the same – while reducing to a minimum the environmental damage and the economic and social costs resulting from production and consumption of energy.

3. AN ENERGY EFFICIENCY STRATEGY

3.1 Energy needs

The consumption of energy products – fuels, electricity, etc. – results from the consumption of products and services of which the production or provision require an input of energy.

The quantities of energy products required to satisfy a given need vary greatly depending on the method chosen to meet the need, the equipment or device used, the way in which they are used, and the energy product consumed.

For example:

- 6* A building used for housing, commerce, offices, or industrial or craft activities, if it is well designed and built (orientation, solar gain, openings, insulation of walls) will consume, for its heating, cooling and ventilation requirements, far less energy from external sources than an ordinary building. In some climates use of external energy may be avoided altogether.
- 7* For a given lighting level, a compact fluorescent light bulb will consume five times less electricity than an incandescent bulb. Use of the best household electrical appliances already on the market (refrigerators being the greatest consumers, without taking into account electrical space/water heating) would save 40 per cent of consumption of electricity in relation to the present situation.
- 8* For a given level of production, improvements or changes in industrial processes would yield gains in energy consumption reaching 30-50 per cent in most sectors.

- 9* Urban mass transport systems, especially trams and metros, consume much less energy, pollute far less and have less accidents than the private car. The same is true for rail transport of freight by comparison with its transport by road.

For a same use and level of service and, more generally, for a same level of development, it is possible to consume far less energy products than at present, even in countries with the most efficient economies and technologies, at a "service provided" cost which is lower.

An efficiency strategy consists of the development of policies and the implementation of measures and means making it possible to alter the conditions of energy consumption in every area of the economy and of society, by improving the efficiency of methods and of consuming items. The objective is to improve the response to the needs of development with a consumption of energy much lower than that resulting from present practices.

3.2 Energy efficiency is a "win-win" strategy

Energy efficiency is a factor for development: in all sectors of activity, means exist to save energy or to avoid its consumption at a cost less than producing or purchasing it. This means that the financial resources that would have been used by the consumer or community to provide for energy needs could be used for other requirements thus improving the nature of economic growth: building of housing, amenities for education and health or development of public transport, etc.

The positive consequences for the environment are obvious: the least polluting energy is the one that, for an equal level of service, is neither consumed nor produced. Whenever, for any given use, energy consumption is reduced, pollution and the risks related to energy production are also reduced.

Actions which improve energy efficiency are the cheapest where environmental improvement is concerned, whether considering local pollution or risks, or global issues such as the enhanced greenhouse effect or nuclear risks. In fact, these actions are of themselves profitable given the resulting savings in energy spending.

Energy efficiency is a win-win solution.

By basing economic development on an energy efficiency strategy, mankind will be able – without courting ruin (in fact, just the opposite) – to avoid the unacceptable wager of trading off risks against one another or of waiting for a technological miracle that would provide a definitive solution to everyone's energy problems throughout the world.

If they apply such a strategy, industrialised countries – first among which are the greatest wasters of energy resources – could reduce their energy consumption significantly. Developing countries need to increase their consumption, but they can do so with levels of consumption growth far lower than those experienced in the past by the rich nations, with the consequences of which we are all now aware.

3.3 New methods and new players

Energy issues have traditionally been dealt with by the companies producing and selling energy products, generally backed up by state authorities.

The dynamics of growth of these companies and the energy policies they have imposed *de facto* have led to economic and environmental impasses. The energy user has been assigned a passive role, reduced to paying energy bills when energy is provided and when the user is able to pay.

The main characteristic of an energy efficiency policy is that it breaks this closed circle and extends to all human activities, economic and social. Consumers, who are also citizens, regain their rights. The scope for action in energy efficiency is not limited to the energy sector, it extends to industry, building, transport, consumers' behaviour and to patterns of consumption.

In this new context of "re-appropriation" of energy issues, new stakeholders are appearing with a determining role: households, companies, local and regional authorities. The state has a role to play, but much more as regulator rather than controller. Energy companies must also change their practice and move from being just suppliers of energy products to providing a global response to a service need, dealing equally with actions affecting demand as well as those relating to supply.

Experience has shown that energy efficiency programmes can only succeed if they are designed and implemented by all of the economic players involved. In fact, they constitute sets of diverse and decentralised actions applied by local authorities, administrative departments, service companies, households and companies (either by control of their own energy consumption, or manufacture and sales of high-performance equipment).

4. KEY QUESTIONS

4.1 Barriers to energy efficiency

Obviously, situations differ from one country to another, but it is generally observed that many steps to energy efficiency are not taken, even though their cost is far less than the cost of providing the energy they would save.

Examination of these diverse situations and the experience gained from work and exchanges with partners in numerous countries reveal clear trends which are barriers to effective implementation of energy efficiency policies.

The basic barrier to the spread of energy efficiency is, in general, the appropriation of energy policies and the means used for their implementation by traditional energy companies. The mechanisms for decision making, the systems for financing of investment, and institutional and human resources remain oriented towards development of energy supply. Only a few energy companies, either by necessity or from strategy, have understood that their own interest should lead them away from a situation in which they are exclusively producer and vendor of energy to adoption of a service approach, with a balance between supply and demand.

In both market and controlled economies, the institutional, regulatory, economic and financial environment creates considerable inequalities between the possibilities for actions relating to production and sales of energy products and for those relative to improving efficiency of their

use. The capacities for self-financing, especially the borrowing capacity of major energy producers, are infinitely greater than those of consumers, with the exception of large companies.

Among political authorities, heads of companies, national or regional elected representatives, managers of local authorities and their technical personnel, as well as among consumers, there is a persistent lack of information and training in economics as to the potential of energy saving and of the ways in which it can be introduced. Often even the most basic information, energy consumption by different activities, is not well known. This is also the case for the existence and means of obtaining efficient equipment. At every level of economic activity, indicators allowing assessment and comparison of energy consumption in relation to service provided are sorely lacking. Without this knowledge, appraisal of policies proposed can only be qualitative.

A fundamental barrier remains the difficulty which political and economic decision makers have in perceiving the advantages of an energy efficiency policy, as the productivity culture inherited from the industrial revolution is so firmly anchored. Energy efficiency suffers from a formidable handicap: it is neither immediately visible nor spectacular. Insulation of thousands of homes does not offer the same spectacle of power and so-called progress as the inauguration of an electrical power plant.

4.2 Partners and objectives

The partners in potential actions are the consumers, makers and distributors of appliances and equipment, investors, manufacturers, local and regional authorities, administrative departments, and ministries responsible for infrastructure, housing, transport, industry and agriculture.

Energy efficiency is directly linked to the choice and organisation of infrastructures and their quality (buildings, means of transport, urban planning) and to the quality of equipment and appliances used.

Time scales must also be taken into account in assessing the potential for energy saving when developing and implementing programmes. Adopting more economical patterns of behaviour (less use of cars, more careful use of electricity) can have results in the short term. Replacement of household or industrial equipment, on the other hand, will have effects which are globally significant in a few years, transformation of industrial processes within a decade.

Technical aspects are not predominantly important as many products and technologies already exist. They should not however be overlooked, as the products available on the market are not necessarily suited to every situation: their quality and price require serious expert examination. The main difficulty remains the inter-play between technology, economics and stakeholder behaviour.

Dissemination of methods and efficient appliances and equipment is, on the other hand, a central problem implying the need for targeted efforts on information, promotion and communication, and on dialogue with consumers and decision makers.

Energy efficiency operations of which the global cost is less than that of supplying the equivalent energy with the same level of service must be a priority. They are numerous but conditions of financing are not generally favourable to them. Questions of economics, especially those relating

to financial mechanisms and "financial packages" are essential. In many cases, the choice of certain types of actions or projects must depend on the possibility of their financing as much, if not more, than on their technological or even economic advantages. Information is sadly lacking in this area and it is well known that countless "energy audits" of industrial concerns have been carried out throughout the world, often at great cost and without them leading to tangible results, simply because questions of financing of investment in energy efficiency were not studied seriously beforehand.

A wide variety of professions such as architects, engineers, craftsmen, design engineering practices, teachers, administrators, bankers, etc. will have to incorporate energy efficiency into their activities.

Efforts are required on information and training, both in conventional teaching and via special sessions on particular aspects of technology, economics, finance and organisation.

Even in favourable conditions and in spite of the economic advantages, it is rare for energy efficiency to develop spontaneously. It requires the creation of new functions in the area of energy: promoters, leaders and coordinators.

The form these new functions will take, given the diversified and decentralised nature of energy efficiency actions, must be suited to actions in the field, to local situations and to the area of activity in question. They may, for instance, be represented by: *a person* in a company or small local authority; *a unit* in a large local authority; or *an agency* at regional or national level. The question of responsibility for these functions is central: the answer will depend on the scope of their activities, the degree of decentralisation of institutions and of responsibilities, the administrative structure, and degree of implication of the state in economic life, etc. It is in the search for the most efficient form of organisation of such functions that the various situations of consumers, local authorities and of countries will make themselves felt the most.

The key to success of an energy saving policy is the organisation of partnership relationships and of the tools and means required for its implementation. The aim is to disseminate decentralised and diverse actions leaving much to initiatives by individuals and communities of all sizes, within the framework of an overall coherent strategy and permanent exchange of experience gained and of means.

5. AN ALLIANCE INITIATIVE: A SITE AND A NETWORK FOR ENERGY EFFICIENCY

The energy sector remains largely dominated by a supply oriented approach and by the systems of production and sales of energy: centralised decision making, large-scale projects, massive investment, etc.

The success of energy efficiency will be determined by the level of the capacity for intervention of the new stakeholders from all parts of society. Intervention is characterised by decentralisation of initiatives, adaptation to a range of situations, synergy between specific aspects of local development within a global strategy, and inter-play of actions taking account of the time scales for the expected results.

The changes to be brought about and to be implemented relate to institutions, economic orientations, financial modalities, regulations and tax regimes, areas of competence and forms of organisation.

The concept of energy efficiency was developed in the 1970s. Since then, there have been many experiments and there is now a large recorded body of information on successes and failures. Much remains to be done, but some countries, towns and rural communities have implemented programmes and projects and have introduced remarkable policies. We are not starting from zero, but an enormous amount of work remains to be done to disseminate and enrich this knowledge.

The diversity of situations and stakeholders, combined with the need for a global strategy, has led us to propose, within the framework of the *Alliance for A Responsible and United World*, the organisation of an "Energy Workshop" on the theme developed in this document, *"Energy and sustainable development: a strategy for energy efficiency"*.

This Workshop will provide a forum for exchanges of information and experience, for the development of proposals addressed to decision makers at different levels, and for debate on the means for transformation.

Participation to the Workshop by partners from different countries and cultures, with different backgrounds either as activists or professionals, is essential. Everyone – citizen, consumer, technologist, producer, financier, trader or political or administrative manager – has a point of view, and ideas and proposals to formulate. Each participant will contribute his/her own analysis and experience, an understanding of barriers and proposals for how to overcome them in contexts with which they are familiar.

For their part, the organisers of the project will have the task of feeding reflection on the main aspects of the problem, making known significant examples of successes and failures, and of organising circulation of the flow of ideas and proposals.

This document has been drafted by the team of project leaders chosen by the Alliance. The team consists of experts on the political aspects of energy and on development and implementation of energy efficiency programmes in the western industrialised countries, those of central and eastern Europe, and in developing countries. The competence and experience of this team are mainly in the areas of organisation, institutions, information, training, and development of policies and programmes.

This first document constitutes a starting point for the discussion forum, of which the aim is to formulate proposals for each level of intervention.

The document is intentionally general in nature and aims to outline the concepts and orientations in a relatively concise way while demonstrating their coherence. It will be completed by a set of information sheets which have the dual purpose of giving further information on important aspects which can only be presented briefly in the basic document and of providing examples of actions which illustrate the general presentation. Of course, one of the aims of the forum will be to complement and enrich this first set of information sheets based on the experience of each of the participants.

The workshop will also discuss the interest and possible modalities of the creation and organisation of a worldwide network for dissemination of information, training, exchanges of experience and debate on these questions.