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Editorial

Today, energy efficiency and energy conservation are top priorities for the global economy. They provide opportunities for solutions to global challenges such as the growing shortage of energy resources and the negative impact of climate change on the environment.

According to recent studies, major sectors of the world economy have the potential to reduce energy consumption by 40%. Rapid measures to improve energy efficiency may diminish the level of harmful emissions by 30–40% in the short term. Although significant energy-saving measures may require relatively minor capital expenses, they can sometimes be cost-effective.

However, there are considerable obstacles on the road to energy efficiency. Some are the following:

- inadequate international regulatory frameworks for improving energy consumption;
- a lack of integrated standards for energy-consumption management;
- subsidies that distort market transactions between various countries and inconsistent pricing systems for energy services;
- insufficient incentives to integrate energy-saving programs into the practices of major companies;
- too little available information about energy use.

This issue of the Energy Bulletin, in discussing the principles of improving energy efficiency in the global economy, offers ways to overcome these obstacles.

In the next year the International Standard Organization (ISO) in cooperation with a number of national institutions will issue ISO 5000, the new standard for energy consumption management that will have far-reaching consequences. The new standard may provide a 20% global increase in energy efficiency over the short term. Project finance may become an effective tool in developing energy infrastructure and sustainable energy consumption that are essential in today's crisis. Regarding the application of energy efficiency principles, according to the experts the effort should focus first on buildings, given that in the developed countries buildings — including residences, offices or industrial enterprises — are the major energy consumers.

Many important initiatives and projects will be presented at the United Nations climate change conference in Copenhagen on December 8, 2009. There may be some agreements that will replace the Kyoto protocol and will have a considerable impact on the development of measures for the sustainable and environmentally friendly management of natural resources that is essential for our future.

Policies for Industrial Energy Efficiency

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The industrial sector is responsible for nearly 40% of annual global primary energy use and a similar share of global energy-related carbon dioxide emissions (Bernstein et al. 2007). It is often assumed that industries are already relatively energy efficient because they have both the financial incentive and technical capability to use energy efficiently. However, many studies and actual experience indicate that this is not the case. There is still significant potential to reduce the amount of energy used to manufacture most commodities. These reductions can often be achieved at low cost, or can even be profitable. The International Energy Agency (IEA) and the Intergovernmental Panel on Climate Change (IPCC) have estimated reduction potentials of 10% to 40% for five energy-intensive industrial subsectors.

Historically, energy-efficiency improvements have increased economic development and reduced emissions significantly. Energy efficiency is an integral part of national socioeconomic development and is the most urgently needed option for mitigating greenhouse gases. Accelerating energy efficiency to meet mitigation goals can hasten the socioeconomic development needed to combat poverty. According to the IEA, 56% of energy services supplied to the world economy (from 1990 to present) was due to efficiency improvements. If those efficiency improvements had not occurred, either fewer services would have been delivered (retarding development) or more conventional fuel would have been produced and burned, creating higher emissions.

Capturing the potential end-use energy-efficiency improvements is essential if greenhouse gas concentrations are to be stabilized at 450–500 parts per million (PPM) by 2050. The IEA estimates that end-use energy efficiency will provide 36% to 44% of the emissions reductions needed for such stabilization scenarios. In the IEA's stabilization scenario of 450 ppm by 2050 9.2 gigatonnes (Gt) of CO_2/year come from energy-efficiency reductions in the industrial sector; this is more than 25% of all energy-efficiency reductions (IEA 2008a). The IPCC estimates that by 2030 between 2.5 Gt and 5.5 Gt CO_2-equivalent/year can be avoided through industrial energy efficiency and other options, at a cost of $100 per ton of CO_2-equivalent compared to a business-as-usual emissions scenario, and that much of this potential is available at lower costs.

Since the 1970s, numerous energy-efficiency policies and programs have been implemented in many countries around the world. Successful implementation of such policies and programs is essential to increase the adoption of energy-efficient practices. They help to overcome informational, institutional, policy, regulatory and market-related

barriers, and they provide enabling environments for industrial enterprises to easily implement energy-efficient technologies, practices and measures. Successful elements from these programs can be identified and more widely disseminated.

A key element of successful energy-efficiency policies and programs is upper management commitment to energy efficiency. One of the barriers to adoption by industry of energy efficiency is a corporate culture that understandably focuses more on production. Therefore, policies and programs must raise upper management's awareness of energy efficiency's key contribution to achieving and sustaining competitiveness in global markets.

Establishing ambitious energy-efficiency or greenhouse gas emissions reduction targets — either legally mandated through government programs or adopted by high-level corporate management — typically provides a strong incentive for adoption of energy-efficient technologies, practices and measures. Such targets can be established at the national or sectoral level, or individual corporations can set them as part of governmental or non-governmental programs.

Most industrial plan managers focus on producing industrial commodities and do not have time to thoroughly investigate and evaluate the many industrial energy-efficiency technologies and measures that can be adopted in their facilities. Information dissemination programs can address this barrier by developing and disseminating a variety of technical tools, such as energy-efficiency assessments and self-auditing tools, and information sources such as case studies, reports or guidebooks and benchmarking tools (Galitsky et al. 2004). Energy audits or assessments can assist plant managers in understanding their energy use patterns and identifying efficiency opportunities. Case studies on specific industrial energy-efficiency technologies and measures provide plant managers with insights into implementation costs, energy savings and experiences of other industrial facilities. Reports or guidebooks can provide more comprehensive information on numerous industrial energy-efficiency technologies and measures available for specific end-use sectors or addressing specific energy-consuming systems. Benchmarking can be used to compare a facility's energy use to that of similar facilities or to national or international best-practice energy use levels. Sharing information about energy-efficiency technologies and measures among industrial organizations is a key element of a number of government programs. Delivery of industrial energy-efficiency products and services can be provided through government programs, utility programs and energy service companies (ESCOs).

Adoption of mandatory minimum standards for energy performance for industrial equipment can be effective to increase market penetration of more efficient equipment. System assessment standards can provide a common framework for conducting assessments of industrial systems, where most of the energy-efficiency potential exists. Furthermore, certifying the energy-efficiency performance of facilities provides a standardized approach for identifying, developing, documenting and reporting on energy-efficiency progress in industrial facilities and provides a framework for continuous improvement.

In general, access to capital for industrial energy-efficiency projects is weak even in markets — such as the Clean Development Mechanism (CDM) and other carbon finance markets — that were developed specifically to provide such funding. Energy-efficiency projects are often small and dispersed, creating larger transaction costs than more traditional investments in energy supply. Investors and financiers often do not have an adequate understanding of the potential financial returns from such investments and, along with project managers at industrial facilities, are not adequately trained in preparation of industrial energy-efficiency project loan documents. In addition, risk associated with assessing and securitizing revenues generated through energy savings needs to be reduced. Finally, if energy prices reflect actual costs — by removing subsidies and applying charges to reflect environmental costs of specific energy sources — energy-efficiency investments become even more lucrative.

A number of financing mechanisms and incentives have been developed to overcome barriers and promote the adoption of the untapped industrial energy-efficiency opportunities that exist in many industries and countries. The CDM was designed specifically to provide funding for green-

house gas mitigation projects in developing countries and transition economies, including industrial energy-efficiency projects. The World Bank and many United Nations agencies have also established energy-efficiency financing projects. In addition, a number of governments have promoted investment in industrial energy efficiency through various financial instruments such as taxes, subsidies and programs that improve access to capital.

To date, the CDM has not catalyzed significant investments in industrial end-use energy-efficiency projects, although some progress has been achieved following various efforts to address the problem. Industrial energy-efficiency projects have difficulty in the CDM framework because each project is subject to a stringent and complex baseline, additionality (that is, that the project would not have happened without CDM involvement) and monitoring requirements. Transaction and carbon credit development costs tend to be the same regardless of whether a project generates small or large emission reductions. Since most energy-efficiency projects generate small emission reductions, they are not developed (Tiktinsky 2008). In addition, industrial energy-efficiency projects are typically profitable, making it difficult to meet the CDM additionality requirements. Also, it can be cumbersome to quantify emissions reductions for small, dispersed actions implemented under industrial energy-efficiency programs. In addition, approved methodologies focus on individual energy-efficiency projects while methodologies for the types of energy-efficiency programs with the greatest impact are lacking (Arquit-Niederberger 2007).

A number of countries have policies that combine a variety of industrial energy-efficiency financing mechanisms and incentives into a national-level program for mitigating greenhouse gas emissions. These policies either increase the costs associated with energy use to stimulate energy efficiency or they reduce the costs associated with energy-efficiency projects investments. Incentives for investing in energy-efficiency technologies and measures include targeted grants or subsidies, tax relief and loans for investments in energy efficiency.

Once targets have been established or corporate management has made a commitment, energy management must be institutionalized as an overall framework for implementing energy-efficient technologies, practices and measures, if a culture for sustained improvement is to be created. Industry uses very complex systems, consisting of equipment and their human interface, which are organized to meet the production needs of the business. To make energy efficiency programs in industries effective and sustainable requires a systems approach, which optimizes the integrated whole while meeting primary business requirements. Companies that treat energy as a manageable resource and integrate their energy programs into their management practices have an organizational context in which to continually seek opportunities to optimize their energy use.

An energy management system standard provides guidance for industrial and commercial facilities to integrate energy efficiency into their management practices, including finetuning production processes and improving the energy efficiency of industrial systems. The International Organization for Standardization (ISO) has identified energy management as one of its top five priorities for standards development. The American National Standards Institute and Brazil's Associação Brasileira de Normas Técnicas are leading the ISO's Project Committee 242 in the development of ISO 50001-energy management standard, to be published by the end of 2010. The new standard will establish an international framework for industrial and commercial facilities, or entire companies, to manage all aspects of energy, including procurement and use. The standard is likely to have far-reaching effects on the energy efficiency of industry, achieving major, long-term increases in energy efficiency (20% or more) in industrial and commercial facilities and reducing greenhouse gas emissions worldwide.

ISO 50001 builds on national standards already developed in Denmark, the European Union, Ireland, Korea, Sweden, Thailand and the United States, as well as draft standards in China, Brazil and Spain, and energy management practices in Japan, the UK and elsewhere. To be compatible with ISO 9001 and ISO 14001, and allow for integration with them, ISO 50001 will foster the same management system principles of continual improvement and use the Plan-Do-Check-Act approach.

Project Finance in the Energy Sector in Times of Recession

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The availability of energy is a prerequisite for the survival and development of human civilization. Some of the characteristics that define an advanced economy and society are a well-developed energy infrastructure and the rational and productive use of energy. Furthermore, large energy systems (which involve expensive infrastructure) require long-term planning and coherent social goals. However, very often such plans and goals are influenced by political changes and shifts in priorities, economic and financial turbulence, or the availability of resources and new technologies. For example, Russia, which has invested heavily and by the late 1980s had one of the largest electricity systems in the world, has added only about 2,000 megawatts (MW) of new capacity since 1991, despite the estimated need of an additional 20,000 MW.

How can such a capital-intensive sector be turned into a viable investment alternative in the current financial and economic climate?

One aspect of the current crisis is the more or less concerted action of the major economies to try to avoid a prolonged recession and alleviate the effects of the credit crunch. However, in a globalized economy with the easy movement of capital, their efforts are hampered by the ability of hedge funds and other private funds to manipulate the capital markets. The task of central bankers and governments is made even more complicated by the fact that most of the capital in these funds is effectively virtual — a remnant of the artificial liquidity created earlier by the same central banks. Short of banning or tightly regulating such practices, governments have limited instruments for dealing with these basically speculative and ultimately unproductive uses of capital.

The policy of reducing the base rates will further exacerbate the problem, as it will cause further flight of capital to speculative instruments promising higher returns. As the hedge funds exploit the "inefficiencies of the market," the logical conclusion is that enormous amounts of capital (almost $2 trillion at the end of 2008) would be chasing fewer such inefficiencies in a contracting market. It is not difficult to assume that these funds can be employed to manipulate the market for their own benefit — in other words, creating inefficiencies to exploit. There is nothing new in that — 1992 and Soros were not so long ago — but the difference now is the amount of money involved.

An alternative policy, adopted by the Russian government, is to keep the base rates high and prevent the flight of capital from domestic markets. This tactic is equally damaging in the long term, as it makes the investments in long-term assets using local capital, which is very expensive.

What can governments do to prevent even more capital flows to speculative instruments, apart from implementing restrictive regulation

and pumping liquidity into the markets? There is a lot of talk about a new "New Deal" to revive the economy through large public projects. Of course, like most of the projects funded with public money, such a new deal comes with the temptation of using such projects for political, rather real economic, benefit.

One of the mechanisms to prevent profligacy is to return to the basics of finance and to facilitate and deploy capital in productive assets through prudent mechanisms such as project finance.

Project finance has a number of advantages in a climate of depressed equity markets, volatile capital markets, currency fluctuations and economies in recession. It is usually used to finance large infrastructure projects — power, energy, transport, construction and so on. These projects contribute to the development of basic infrastructure on which a country can build a sustainable economy, creating long-term employment and the need for an educated work force. If properly conceived and implemented, such projects should have a positive net present value — that is, they deliver productive tangible assets over a long period.

Another advantage of project finance is that, being off the balance sheet, it does not burden the budgets of the government and companies. In the present situation of increasing current account deficits and government indebtedness, project finance offers a more efficient way to leverage of a government's guarantee.

Project finance also offers a possibility to de-couple the government's assistance and investment from the vagary of the equity markets. If the issuing of bonds is not involved in raising the initial equity, the movement of equity markets has little effect on project finance.

Project finance relies on the cash flow generated by the project itself, which is usually based on a long-term product purchase agreements. Such predictable, revenue-based investments could bring more stability to capital markets and offer an alternative for investors who are looking for predictable returns over a long run (for example, pension funds). As the availability of sufficient cashflow to service the debt is required for sound project financing, these deals should not normally require regular renewal and therefore are less exposed to the ups and downs of availability of money on the capital markets.

Moreover, project finance should result in tangible and productive assets and deliver basic and essential goods and services such as energy, water, communication, education. These assets too are less affected by the cyclical nature of the markets. The value of such assets is less likely to diminish over time and indeed will increase the net present value of the economy not only because of their intrinsic value, but also because of their broader effect on education, health and increased mobility.

There is some risk, however. If the speculative nature of the capital and equity markets is not curbed, the world's trade and economic system may fragment further, as each country tries to insulate its economy from wild market fluctuations and the possibility of a run on its banking system by speculators.

Nonetheless, the legislative and fiscal incentives to use capital for productive investments may be a part of a stimulus package to return the global economy to a more stable mode. Today's social and environmental imperatives require wide-ranging (and expensive) measures to deal with overpopulation, food and water shortages, and climate change. Preventive and adaptive actions require multi-billion-dollar investments. One of the obvious priorities is energy generation, but others include sustainable transport, education, water and agriculture. Most of these priorities will exert an enormous pressure on public finances and would be difficult to finance without tapping into a wider capital base. Implementing such large infrastructure projects through schemes such as the United Kingdom's Project Finance Initiative (PFI) or private-public partnerhips (PPPs) offers an opportunity for the deployment of private capital that may otherwise be employed in financial derivatives. Of course, this is only one possible mechanism, and governments must ensure that the well-known pitfalls of PFI are avoided.

To make project finance a viable alternative for public and private investment, governments need to strengthen the national and international framework for project finance through:

- establishing and enforcing a clear legal and technical framework for project finance;
- strengthening and standardizing the project finance contract base, including power purchase agreements and engineering, procurement and construction contracts as well as their arbitrage and enforcement;
- establishing special guarantee facilities to reassure investors and strengthen the local and international guarantee agencies.

There are significant challenges facing project finance in different countries — planning laws, environmental regulations, property laws, investment protection, tax laws and so on. Overcoming these will require determination and persistence. However, the results from using public money for infrastructure activities supported by project finance, particularly in the field of energy, will likely be more beneficial than pouring public money into propping up failing financial markets. Maybe this time governments will take concerted action to direct capital flows to build real assets.

Financing big projects is nothing new in times of recession. Even the ancient Egyptians probably did so, to keep the population busy while Nile flooded. What should be done this time, however, is to make sure that the investments should adhere to the sound principles of project finance. The participation of private capital should ensure that the projects deliver profits and results. It is the government's task to make sure a proper institutional and legal framework exists to attract private capital and put it to productive use.

With the right policies and incentives, the current financial crisis may spur the development of necessary energy infrastructure and lead to a technological revolution to meet the challenges of overpopulation and climate change. Let us hope that today's policy makers make the right choice.


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The Important Role of Buildings in the Energy Revolution

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Introduction: Predominance of Buildings in CO_2 Emission.

In developing countries buildings, including living quarters, offices or industrial premises, account for more than a third of energy consumption. They are the largest consumers of energy in countries like France, where, similar to the majority of neighboring countries, buildings account for 40% of consumed energy, or 46% if the energy consumed by heating networks is taken into account. By comparison, means of transportation, which are often blamed for carbon emission, lag behind (29%). Buildings are primary emitters of greenhouse gases (GHGs): carbon dioxide (CO_2) and nitric oxides. Measuring building emissions in terms of CO_2 demonstrates that the gases from emitted by buildings lead to global warming. It is common knowledge that, for example, one ton of methane in heating ability equals 21 tons of CO_2.

1. Energy Consumption and Greenhouse Gases at the Global Level: From Kyoto to Copenhagen

Inequity at the global level

During the recent conference of the American Association for the Advancement of Science (Chicago, 12–16 February 2009) devoted to climate change, the Intergovernmental Panel on Climate Change (IPCC/GIEC) emphasized that since at least 2000, possibly even since December 1997, the date of the signing of the Kyoto Protocol, GHG emissions increased more than had been predicted, particularly in carbon dioxide rates (an increase of 3.5% annually).

Nevertheless, the relationship between size of population, energy consumption and CO^2 emissions is unequal between countries, and the numbers show a glaring inequity. For example, in Niger, CO_2 emission per capita is a hundred times less it is in the United States.

A look across GHG emissions by country in 2003 reveals a critical difference in energy consumption: 23% of GHG emissions was accounted for by energy consumption in the United States (which refused to sign the Kyoto Protocol); 1.2% for Brazil; 1.7% for Mexico; 0.7% for Algeria; 1.5% for France; 1.8% for Italy; 2.2% for the UK; 3.2% for Germany; 1.2% for Poland; 5.1% for China; 1.2% for Indonesia; 4.9% for Japan; and 5.9% for the Russian Federation.

In 2006 the consumption of primary energy resources approached 11 billion tons, 21% accounted for by the United States. Consumption in Germany, France and the United Kingdom ac-

counted for 70% of the United States' total consumption. The most widely used primary energy resources are oil (36%), followed by coal and gas; nuclear and hydro power account for only about 6% of total consumption.

To be more precise, in 2006 fossil energy resources was 88% of total world energy consumption, and 83% in the European Union. Further, oil accounted for 36% of world energy consumption and 41% of European consumption, 98% of that accounted for by transport emissions. Gas accounted for 24% of the world energy consumption, including Europe, and in the Russian Federation that share reached 53%. Coal accounted for 28% of world energy consumption: 18% of consumption in Europe, 70% in China and 56% in India.

Countries with Developing Economies: New Opportunities

Different factors affect energy consumption and gas emissions, and taking them into consideration allows a scenario to be developed that can help countries to quickly diversify energy sources and to develop relationships between numerous different energy sources. Those factors are demography, level and type of industrial development, regulation framework in the field of environment, and rates of growth. Possible scenarios can develop by bringing these considerations together, based upon an economy model with low energy consumption or with consumption that follows the modern trend. Nevertheless, it is possible to predict, with some accuracy, that without any initiatives at the global scale, by 2030 world energy production will have grown to a level where it accounts for 60% of consumption. This growth in consumption associated with economy growth, in China, India, and Brazil in particular, will inevitably result in a 50% increase of CO_2 emission by that time. The share of industrially developed countries that currently accounts for more than half of world energy consumption will be less than a third.

This shift of economic development to Asia and the Eurasian region will probably be the focus of discussion at the Copenhagen conference on climate change in December 2009. That meeting will take place two years after the Bali meeting where a new roadmap was drafted to coordinate approaches after 2012. In Copenhagen they will discuss ways of attracting developing economies, and will be doing so for the first time in the presence of the United States, since the new president has committed to the climate change issue. According to the climate change study by the consulting firm Accenture, conducted among 10000 people in 22 developing and so-called developing economies between September and October 2008, consumers in developing countries were more concerned with climate change than consumers from developed countries. They also were more inclined to embrace concrete measures to check global warming. More than half of respondents (53%) from developing countries claimed their readiness to substitute the current proposal for another one that would have a less harmful impact on the environment, while in the developed countries this group accounted for just 24%. Similarly, 61% were ready to substitute their energy services supplier for one that would provide services with less contaminating effect in relation to CO_2 emission if they had an opportunity, against only 39% in the developed countries.

Contributions from the developing countries at the conference in Copenhagen will turn the balance in favour of reaching climate change goals. Actually, the main goal set in Kyoto in 1992 to reduce GHG emissions by 5% compared to 1990 within the 2008 to 2012 period will not be reached. In 2005, we barely approached a reduction of 2.8%. To make up for lost time, we must double our efforts between now and 2012.

2. European Leadership in Energy

Energy at the Center of the European Building Industry: The European community of Coal and Steel…

In 1950 energy for the European building industry was affected by the establishment of the European Coal and Steel Community by Jean Monnet and Robert Schuman. In 1957, at the same time the Treaty of Rome was signed, another agreement was signed concerning the

Euroatom that promotes cooperation in the field of civil nuclear energy. Commencing in 2000, on the initiative (initially) of Loyola de Palacio, the treatment of European energy as a renewable resource began to take shape in spite of delays from some states and protection from the historical monopoly of suppliers.

After the meeting of the European Council (EC) under the presidency of Germany in 2007, transformations in the energy sphere began to evolve. Developing a focus for energy consumption in the EU became a priority for all member-countries, even for the most reserved in commitments to the community (the UK, Czech Republic, Poland), as well as for partners of the European Union, whether they were Kyoto Protocol parties or those who remained indifferent to the discussion of climate change, as the United States was until recently.

…to the Complex Energy/Climate

When the energy crisis reached its highest peak so far, the first proof to the world that governments were treating climate as critically important was a complex approach combining energy with climate, formulated by the EC on 23 January 2008. It would require a whole year, until the next meeting of the EC on 12 December 2008, to adopt—one year to persuade governments to avoid building egoistic advantages to their own industries. That's not too long.

When the EC convened on 12 December 2008, in spite of compromises made on the issue of a complex approach to energy/climate, it applauded other major world powers and some of its neighbors as well as the regions with developing economies.

Despite the difficulties that new regulations will provide for consumers and the costs of energy changes, Europe is an undisputed leader in changes in energy use. Positive results of Czech diplomacy aimed at dispute settlements between the Russian Federation and Ukraine have also strengthened the authority of the European Union.

Speaking to the point, the unanimous agreement among member-states (approved in the first reading by the European Parliament on 17 December 2008) enables the revised EC directive on emission trade, applicable between 2013 and 2020, to set the goal for GHG emission reduction at 21% of the level in 2005, measured from now until 2020. A number of consumption allowances issued annually in the EU will be reduced regularly and hence will annually reduce the global level of emission.

Continuing Lack of Energy Market Transparency

At the European market of energy resources on 10 October 2008, ministers agreed, according to European policy, to provide protective measures that allow every member-state to choose between re-merger and simple "actual unbundling" between energy generators and suppliers. Talks with the European Parliament may enable a compromise on the issue in the second reading of the agreement by the end of June 2009 and by the time a new Parliament is elected.

The member-states admitted that a competitive and properly functioning internal market can provide essential advantages in the security of supplies. They also realized the necessity of more substantial investments to build a real European gas and electricity network. The principal task of regulations proposed by the European Commission in September 2007 and then approved 10 October 2008 by ministers of energy was to make the internal energy market subject to competitiveness and efficient regulation. Concerning the EC the European chain shall definitely function as an integrated chain. "That pertains both to services in relation to competitiveness and to internal market owing to the more precise division between production and energy supply. These are exactly three variants approved by the Council," claimed Andris Piebalgas, EU energy commissioner.

3. Energy Efficiency and Energy Complex

Building energy efficiency

The Council has emphasized the need to intensify activities that logically fit the plan of economic rehabilitation and that also improve

the energy efficiency of buildings and energy infrastructures, promote "green production" and support efforts to produce more environmentally friendly vehicles.

The Council also has been entrusted with consideration of the action plan on energy security and solidarity that was submitted by the European Commission in light of the meeting in March 2009 on the bases of tasks defined in resolutions of December 2008. It also reaffirmed the EU's commitment to reduce GHG emissions to 30% by 2020, provided that other developed countries would take the same commitment within the world agreement in Copenhagen in December 2009.

The EC's alteration of its directive in relation to the energy efficiency of buildings, energy conservation should rise from 60 to 80 toe by 2020, i.e., reduction of total energy consumption from 5 to 6% in the European Union. Currently, energy consumption differs enormously depending on type of construction. The average consumption per square meter of an existing building is five times more than in new energy-efficient buildings and for some, 10 to 12 times more.

According to the measures taken by the EC, it is important to address heating services or hot water supply (among others) as well as to improve energy efficiency through the use of more efficient innovative technologies and materials. As a rule, these savings exceed the annual investments costs. It is exactly at the stage of building and reconstruction where it is possible to manage energy and struggle against climate change. A consumption reduction of 5 to 6% in 2020 equals the total consumption of Rumania and Belgium, including CO_2 reduction of 5%. In addition, for the first time within the European plan of rehabilitation, funds will be allocated in 27 member-states with the support of European Investment Bank for energy-efficient structures based on renewable energy.

Distribution of Better Energy Resources

Besides activities related to buildings, the European Union intends to support fairer and ready access to various energy sources. According to Eurostat, in 2005 hydro, solar, wind, biomass and geothermal energy accounted for less than 7% of total consumption. In 2020 energy of renewable sources energy share should account for 20% of the total energy consumption in the EU, depending on the combination of energy/climate changes. In Belgium the share will increase from 2.2% in 2005 to 13% in 2020, in France from 10.3% to 23% and in Luxembourg from 0.9% to 11%.

According to the document approved in December 2008, the member-states will attain the goals more easily if they encourage energy efficiency and energy conservation. One more new directive will determine nationally binding goals will be attainable with governmental support in every country through the application of renewable resources for energy production for heating, cooling as well as transportation.

Concerning transportation, the approved document stipulates that by 2020 the renewable energy share—biofuel, electricity, hydrogen produced from renewable resources—will not be less than 10% the EU's total fuel consumption by all forms of transportation. Every member state shall thereby increase the share of renewable energy for transportation by 10%. According to the Eurostat, in 2005 biofuel accounted for only 1% of the sector's consumed fuel. New legislation will also set indicators to guarantee environmentally clean and sustainable production of various biofuels.

Producers, suppliers and consumers: proper balance

As Claude Mandil emphasized in April 2008 in the report on energy security drafted for François Fillon, the French Prime Minister, as part of France's preparation to preside in the EU, concern regarding the security of fossil fuels imports had no foundation: "It is considered good manners to raise concern mentioning that the European Union today imports 50% of the consumed energy, and that share can reach 70% in 2030", he stated. "This is what is called dependency rate. In spite of the accuracy of the figures it does not seem that they describe the real difficulties the EU is encountered with. In the global and

opened economy the energy import is not a problem itself; the so called "energy independency" is not attainable for the majority of industrially developed countries and application of the rate of dependency bears risk of decisions absurd to economy growth and environmental protection." The expert provides the example of Japan: "Finally Japan economy has gained prosperity with nearly complete dependency on import for energy supply provision (excluding nuclear energy). Besides that postulate that internal energy production provides more security than imported energy is beneath any critic if we consider energy supply disruption for the recent thirty years. It was exactly a destruction of oil refinery plants in Texas and Louisiana that resulted in chaos in August and September after Catherin and Rita hurricanes. It was exactly a draught that instigated problems with hydro resources that resulted in serious disruptions of electric energy supply in Spain and Greece for the recent two years. It was exactly improper settlement of dangerous nuclear incidents endangered Japan electricity supply and that resulted in the Prime-Minister order to refuse ties in summer." Claude Mandil appreciated "Russia as reliable gas supplier." According to his report, the European Union should, in order of priority, undertake to do the following: increase the number of links between energy systems of member-states, improve the features of energy consumption in building operations, and develop joint European standards to support an "ecoconcept." He also strongly insists on establishing mutuality in supplier-countries relations: "We demand Russia to open its energy market for the international companies. And how we in Europe respond to acquisition attempts from the foreign investors?"

Conclusion: The Need for an Energy Revolution

Cooperation between consuming and supplying countries is clearly the way to a strategy of joint contemplation of and responsibility for all energy issues. In the last 15 years, both the European Union and Russia have more clearly realized that energy has its own cost and it should be paid to producers. But that cost should not be covered with the illusion that the price of energy from the fossil resources is reduced due to the world recession. If, and there are many reasons to believe it will new economic growth bears fruit, double vigilance will be required and a continuing struggle against energy waste in buildings, including residential, office, industrial and trade, so as to obtain environmentally clean routes along the path to settle the mortgage crises that threatens the entire world economy, which looms as a ghost of beggary, perhaps by 2050.

In the first half of the 21st century, three problems must be settled. First, inventions must be found for new materials, new, less energy-intensive building technologies, and more efficient domestic lighting, heating and conditioning systems. Second, there must be new potentials to invest in the distribution networks, production facilities and transportation of energy resources. And finally, we must develop the use of alternative energies (biomass, hydro resources, wind and solar). Solutions to these issues will require the mobilization of knowledge potential among the society of experts—at universities, laboratories, and engineering institutes, professionals in the field of construction and energy diagnostics at the European or even world levels.

Sharing and Distribution of Resources: Hope for Globalization

The energy revolution is proceeding apace. May be this the dawn of a new and brilliant century, and may the prophecy of comte de Saint-Simon come true, two hundred years after his death: "The goal of all social institutions shall be improvement of moral, physical and intellectual future of the most numerous and the most poor class." Today that improvement can be gained through equal access to energy and its rational utilization.

European Investment Bank:

An Indispensable Partner for Managing Energy and Preventing Climate Change

The 1957 treaty that established the European Community promised "to strengthen the unity of … economies and to ensure … harmonious development by reducing the differences existing between the various regions and the backwardness of the less favoured regions." The European Investment Bank (EIB) was established in 1958 to correct the imbalance between the six member countries of the Community and, specifically, to finance the recovery of Mezzogiorno, the poor Italian South.

The current support by the EIB allows the EU member countries to implement large-scale transport network projects, particularly trans-European ones, and to invest in consolidation of energy systems. Some loans issued by EIB to support sustainable development account for 75% of the investment costs and mature in 35 years. As the EIB's Cees Post says, "the energy issue has become a priority for the EU's policy and the bank's operations." The minimum amount of loans €4 billion annually, of which between €600 million and €800 million are to be allocated to renewable energy sources. This article reviews two instruments related to this policy.

JESSICA and the Building Industry

A new instrument, the Joint European Support for Sustainable Investment in City Areas (JESSICA), promotes sustainable investment projects in urban areas. In May 2007 members of the European Parliament initiated a meeting between the European Commission and the EIB to implement this plan and develop a strategy for improving energy performance of buildings, in particular in the new EU members. The economic revival plan that was approved by the EU heads of state and government in late 2008 allocates €2.1 billion to support environmentally clean transport, energy-efficient buildings and high-speed internet. The new risk-sharing finance facility (RSFF) will facilitate an increase in financing of innovation and investigation projects, beyond classical methods. This will allow supporting such unprecedented projects as, inter alia, the construction of Andasol, a heliothermal station to be installed in Spain 60 kilometres southeast of Granada, in a wide valley in the northern part of Sierra Nevada. This project is promoted by Spain's ACS/Cobra, a major civil engineering and industrial services company, and Germany's Solar Millennium AG.

The European Carbon Fund

Working with other financial institutions, the EIB has implemented two new mechanisms for financing transactions in EU's emissions trading scheme (EU ETS). These are part of the more global aspects of the Multilateral Carbon Credit Fund created by the EIB jointly with the European Bank for Reconstruction and Development. Launched on 20 March 2007, the European Carbon Fund (ECF) helps countries meet their obligations under the Kyoto Protocol in compliance with the EU ETS. The World Bank will share its experience of operating in the carbon market and its estimates, whilst the EIB will contribute its in-depth knowledge of the European economy and its vast pool of emerging-economy projects.

Owing to the ECF, which was designed to establish fair competition in the energy industry, the EIB and the World Bank will be able to facilitate development of the private sector in the emerging carbon market, while searching for resources capable of supporting the evolution of the private emissions-trading sector. As many as 12,000 European companies are expected to reach their individual emissions limit under the EU ETS. The carbon program of EIB and German banking group KFW provides excellent opportunities for companies seeking a strategy for managing carbon dioxide emissions, such as guarantees for emission allowances to small- and medium-sized businesses. Emission allowances will be acquired at competitive fees, with their allocation procedure to become more transparent. All projects except those related to industrial gas emissions will be eligible, unless they meet the exclusion criteria defined in the Kyoto Protocol. The overall amount of current and planned projects supported by the ECF is assumed to remain the same after 2012.

The EIB has thus become a key partner for overcoming the crisis intelligently.

Sustainable Development and Energy under the French, Czech and Swedish EU Presidencies

It was obvious that the trio model — that is, the distribution of power within the framework of the 18-month presidency of the European Union, used during the presidencies of Germany, Slovenia and Portugal — would be picked up by France, the Czech Republic and Sweden. Each national program fits into the joint working scheme: a package of climate/energy and immigration programs for France; energy market consolidation and integrity of the domestic market for the Czech Republic; and social issues and sustainable development programs for Sweden, culminating in the Copenhagen Conference of the Parties to the Kyoto Protocol beginning 8 December 2009.

Energy challenges, especially issues with energy supply and the settlement of conflicts between Russia and the Ukraine, emerged during the presidency of the Czech Republic that commenced in early January 2009. In this respect the Czech Republic follows the trend set by France: energy savings, justified replacement of imported and fossil fuels, investments in the development of new and efficient technologies, and the final implementation of a consolidated internal electricity and gas market. In particular, the Czech Republic is planning to stabilize relationships with Russia and other key EU suppliers, primarily those from the Caspian Sea area. This policy explains why the Czech Republic wishes to establish partnerships with the countries in their own neighbourhood: the Ukraine and Caucasian countries. Accordingly, sustainable development will be the common theme of all three presidencies. “The Swedish priorities include the climate/energy project and signing of a number of agreements on 8 December in Copenhagen that are to replace the Kyoto Protocol,” said Gunnar Lund, Sweden’s ambassador to France.

Efficiency within Dutch Policy

Rob Kool and Renée Bruel
SenterNovem

The rational use of energy has been an important topic since the early 1970s. It stays high on the agenda mainly because of concern for the climate and security of supply.

This article begins with a review of the history of energy and environmental policy in the Netherlands, a member of the European Union. It continues with a discussion of the integration of EU and Dutch policy, especially given the Energy End-Use Efficiency and Energy Services Directive (ESD), adopted by the Netherlands in March 2006. It will also look at the wider scope of international collaboration. It will continue with a discussion of the implementation of the ESD, drawing on the experience of SenterNovem, an implementing agency. The article will then elaborate the options and choices for realizing policy goals as well as the advantages and disadvantages of the obligations involved in the EU and Dutch policies, and concludes with recommendations.

Energy and Environmental Policy in the Netherlands through the Years

The Netherlands has had an environmental policy since 1972, when the government issued the Urgentienota Milieuygiëne (the Urgency Policy Document on the Environment). It started as a policy on separate environmental aspects, with an emphasis on legislation. In the decades that followed, the policy broadened, in terms of both topics and instruments. It is updated every five years.

In recent years environmental problems were dealt with on the basis of two policy documents, the National Environmental Policy Plan (NMP) and the National Energy Policy Plan (NEPP) (see Egmond 2006). Although the policies have had positive results, total energy use has kept growing, with only the use of coal stabilizing (see Figure 1). Recent NMPs and NEPPs have have focused more on specific groups than before, with more emphasis on instruments other than regulation, such as financial, behavioural and voluntary mechanisms.

The 2006 plan, “New Energy for Climate Policy: The ‘Clean and Efficient’ Program” specifically describes the importance of European cooperation. Environmental problems are international problems, and therefore cannot be dealt with solely at the national level (Geel 2006). The most recent NEPP was presented to Parliament in 2008.

Energy Policy

In the Netherlands, the overall responsibility for energy policy lies with the Ministry of Economic Affairs. Important parts of the policy, including implementation, are delegated to other departments such as the Ministry of Housing, Spatial Planning and the Environment (VROM) and the Ministry of Agriculture. Energy policy is thus integrated into other policies.

The overall goal of the energy policy has changed over the years. Thirty years ago, en-

Figure 1. Primary Energy Use in the Netherlands, 1995–2007
Source: Energy Research Centre of the Netherlands.

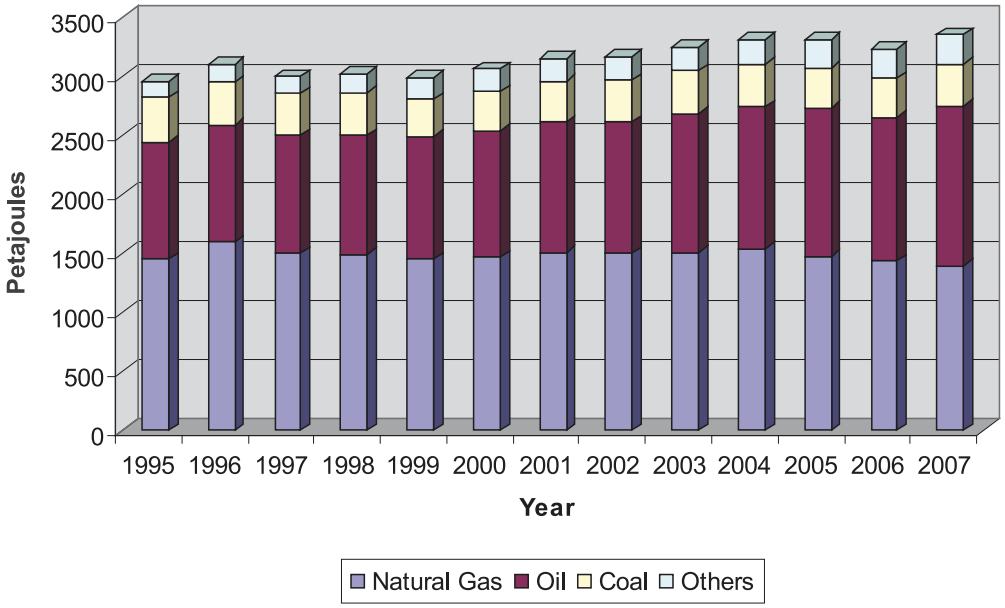
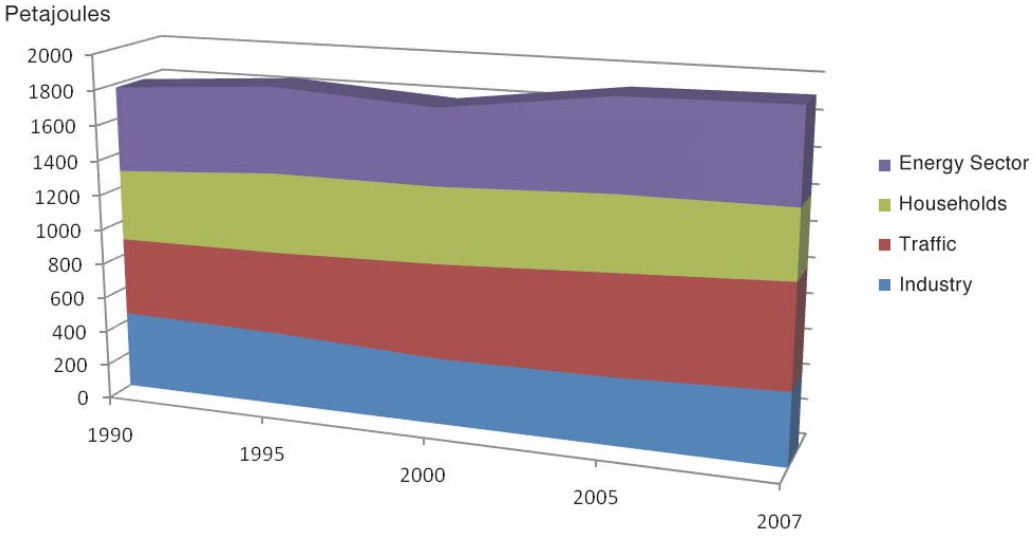


Figure 2. Energy Consumption in Different Sectors in the Netherlands, 1990–2007 (Petajoules)
Note: Industry data do not include combined heat and power or feedstock.
Source: Environmental Data Compensium, 2009 <www.mnp.nl/mnc/index-en.html>.



ergy policy was about security of supply. Then the limitation of natural resources was a major concern. Today, global warming is a significant driver, and security of supply remains an issue.

Environmental and energy policy come together with the Kyoto protocol. Under Kyoto, the Netherlands was obliged to reduce greenhouse gas emissions by 6% by 2012, a target that seemed realistic at the time the treaty was signed. This target equals approximately 200 metric tons (Mton) of carbon dioxide per year during the period of 2008 to 2012. Half of this reduction will be realized through Joint Implementation (36 Mton) and the Clean Development Mechanism (64 Mton). The other half must be realized by measures within the Netherlands.

Progress is measured annually by the Energy Research Centre of the Netherlands (ECN), and the climate policy is evaluated every five years. The 2005 evaluation showed the results of the national effort: emission reduction was 5% higher than what might have been expected without these efforts. The ECN energy report of 2007 showed the Netherlands on track to fulfill its Kyoto obligation.

As one of the EU-15 (the 15 members of the EU until May 2004), the Netherlands must to reduce greenhouse gas emissions by at least 6% by 2012. At the moment, according to the European Environment Agency, it will achieve a 7.4% reduction by 2010. With extra measures, a reduction of 11.4% by 2012 is possible. So the Netherlands will meet its Kyoto goals.

However, the results of monitoring by ECN and the Netherlands Environmental Assessment Agency (PBE) add a more gloomy tone when they look at the present, more ambitious policy goals of 2% a year and 20% in 2020 (Elzenga and Dril 2008). Their 2008 evaluation indicated the targets will not be met. Unlike ECN's Energy Report 2007, there is no overall prediction (such as 16% in 2020). The ECN and PBE analyses reveal a crucial point: traffic targets are not sufficiently stringent and take too long to come on line. Also the full deployment of renewable energy techniques does not meet the original expectations.

The most important reasons for this trend are the usual suspects (Ybema et al. 2006):
- increased energy use by the transport sector;
- reduced carbon efficiency as more coal used;
- more industrial emissions due to economic growth;
- the high price of renewable energy;
- the lack of biofuels.

Latest Policy Developments

In 2005 the Dutch parliament asked the government to set an annual energy efficiency goal of 2%. The minister of economic affairs stated on 24 May of 2005 that this goal could be reached in the coming years.

An energy saving target of 1.5% is economically profitable in the Netherlands. Effective implementation of EU policy delivers another 0.2%.

An increase to 1.7% per annum will cost about €125 million, which will increase to €4.5 billion at 2.3% in annual energy savings. This steep rise is due to the fact some measures that are not cost effective but must be taken to get beyond 1.7%. An ECN paper indicates that a set of measures to save 2% of energy use can realistically be defined (Daniëls et al. 2006). This paper concludes that the greatest contribution will be made by introducing strict European objectives in transportation, built environment and appliance fabrication. It stresses that these measures must be implemented as soon as possible. The next most important requirement is enforcement. Also, a great effort will be required from industry.

The national cost for a set of measures to reach 2% in annual energy savings will approximately be €3.5 billion on an annual basis, of which the bulk relates to existing housing and utilities[1]. Costs for government will amount to

1 The national cost includes the yearly cost of all the measures taken to reach 2% energy savings, excluding costs for policy. Social costs and benefits are discounted at 4%, and the valuation of energy use is based on world market prices. The national cost does not include benefits in improved supply security, reduction of CO_2 emissions, reduced transport congestion and lower emissions of acidifying elements and particulate matter.

€1.4 billion, while the gains for households and companies will measure €1.5 billion (mainly in avoided energy costs). These amounts consist of significant positive and negative components.

As such this plan does not conflict with the conclusion of the Stern Review on the Economics of Climate Change, which assumes that taking action now is the best option economically (Stern 2006).

After what can be achieved is determined, the next step is to realize this potential. First and foremost, the market must be stimulated to take responsibility in this matter. Many things occur in this field, both with individual companies through initiatives such as the "triple bottom line" and "bottom of the pyramid." These market-driven actions, however, are outside the scope of this article. Implementation programs are particularly significant for cooperation between government and society. In the Netherlands, SenterNovem has researched the best ways to influence the market in various areas, and the results of these studies lead to change through its implementation programs.

The NEPP of 2008 did not add a lot to energy efficiency. It simply stated that the 2005 Clean and Efficient policy had set the right course for energy efficiency. The 2008 NEPP concentrated on security of supply as an innovation of the energy sector and makes it clear that the private sector has a huge responsibility to invest in a clean future. At the same time it "officially" starts the discussion on carbon capture and storage as well as nuclear energy use in the medium term. By using these techniques the Netherlands can bridge the period between the present and the future when new clean technologies will be available on a large scale, such as fourth-generation nuclear reactors with sustainably produced hydrogen and fission.

In summary, the Netherlands has a long history of planning and successfully implementing environmental and energy policies. In more recent years, cost-effectiveness and reduced administrative burden for the market have played an important role in policy formulation and realization. Although the Netherlands has lost its leading position in energy efficiency as a consequence, its current policy is still rather successful.

Environmental issues were an important topic during the 2006 election campaign. Since then, a wide majority in the Dutch parliament supports a more stringent policy, which will be fleshed out during the next few years.

Apart from the technical measures to be taken, the government must start a publicity campaign to broaden public support. This is advised in a recent report of the Dutch Energy Council (2006). Lack of support is seen as the biggest probable cause of failure in achieving a rate of 2% energy savings per year.

Given the Commission's recommendation in the "Integrated Energy and Climate Change Package" to cut emissions, the necessity for national support becomes even bigger. With the 2020 goals — a 20% increase in energy efficiency and a 20% increase in sustainable energy — a simple advertising campaign will not be sufficient. Only a continuing and systematic message to all levels of society, in combination with specific feedback, will influence public opinion to act in more energy efficient and environmentally conscious ways.

Formulating New Energy Policies to Match the European Framework

The previous section shows that the Netherlands has a good framework for developing and implementing energy policy. There is always a set of extra policy measures in the drawer that can be further developed and implemented if the current set does not deliver its objectives. Combined with a good monitoring system, this framework results in a policy that is easily adaptable if more stringent objectives are set, or if the goals set will not be reached with the present policy measures. Table 1 summarizes the main points of Dutch energy use.

The goal of the ESD, which sets out the cost-effective improvement of energy efficiency with the end users of energy, fits very well with the present focus of the Dutch energy policy. The

Table 1. Overall Energy Balance in the Netherlands, 2005

Summary: General Trade System, in Petajoules						
	Coal and coal products	Oil and oil products	Gas	Electricity	Other energy	Total
Extraction	–	98	2,357	9	165	2,628
Import	554	7,259	688	85	–	8,586
Export	206	5,187	1,565	19	–	6,978
National use	342	1,249	1,480	75	165	3,311
Consumption balance	342 (10%)	1,249 (38%)	1,480 (45%)	75 (2%)	165 (5%)	3,311 (100%)
Consumption energy companies	247	187	496	–265	–3	662
Final-use energy consumers	89	1,055	849	372	247	2,612 (100%)
Industry	85	507	276	145	174	1,187 (45%)
Transport	–	481	0	6	–	486 (19%)
Households and others	4	68	574	222	72	939 (36%)

implementation of Dutch policy, however, differs partly from the descriptions in the ESD, so some adjustments must be made.

In particular, special attention must be paid to the ESD's core elements that play an unimportant role or do not exist in the Dutch policy. Three topics must be checked in detail: indicative target figures, the removal of market barriers, and market stimulation for energy services.

In addition, the EU's 2007 Action Plan for Energy Efficiency has had stimulating as well as limiting effects on Dutch policy development, particularly because of the goals it sets. With regard to policy formulation in Europe, as much time is spent in negotiating goals and the underlying figures as in giving actual substance to the policy. Still, the consensus in the Netherlands is that the European message requires an accentuation of Dutch policy. The Netherlands actively propagates this notion, in consistency with the National Environmental Agenda.

In 2006 Jan Peter Balkenende, the Dutch prime minister, asked the European Council — at that time led by Finnish prime minister Matti Vanhanen — to lead the way (Balkenende and Blair 2006). The period beyond 2012 should be addressed in the next three years by taking a ground-breaking approach, based on, for example, the scientific knowledge of climate change, technology and economy. Furthermore, the Stern report is seen as a solid basis from which to discuss clean and secure economical development (Stern 2006).

However, this does not mean that there is no debate on the Stern conclusions. A more structured debate must held in order to come to conclusions that will prevail despite the present economic crisis.

Nonetheless, support for obsolete industries and techniques is losing ground. Despite this encouraging support for the mid- and long-term development, the problems of shaping the short-term actions to fit the long-term goals appropriately remain.

The restraining element is the timing and form of the EU's Action Plan. The schedule for

member states to submit their implementation plans to Brussels does not fit with the Dutch policy cycle. Of course, the Netherlands is not unique in this situation. The European Commission has set up a new policy cycle, with the National Energy Efficiency Action Plans, which does not coincide with the policy cycles in all member states. Undoubtedly, this will be streamlined across Europe for the action plans of 2011 and 2014.

For its first National Energy Efficiency Action Plan, the Netherlands has chosen a pragmatic solution. Existing policies were mathematically translated to the goals of European policy. New elements of the European strategy will be added to strengthen Dutch policy, thereby securing the country will live up to its obligations. The ESD allows early action in the national plans, and consequently the results of earlier measures can be used as long as the results still contribute in 2016 (for instance, strict building codes). The Netherlands decided not to use early action as its goals were more ambitious than the EU goals from the start.

Details of the Dutch Approach

The Government as a Model for the Public Sector

According to article 5 of the ESD, all Dutch public buildings must display the building labelling in a public area as of January 1, 2008.

In the Netherlands the government's role as a model is considered very important. The current Sustainable Operational Management Authorities (DBO) program, in effect from 2006 to 2010, was created with this in mind. It aims to make sustainability an important part of all governmental investment. The program fits very well in the consensus-driven Dutch culture and, rather than imposing legislation, promotes reaching agreements between a sector and government. In its range of ideas it is comparable to voluntary agreements with industry, which have been highly successful in the Netherlands.

Among DBO's strong points are cooperation with authorities, the development of guidelines on energy efficiency and procurement, and the exchange of best practices. The program is an excellent role model.

DBO develops and updates guidelines for sustainable public procurement for different types of products and services (such as appliances, catering, printing, communications hardware, public transport vehicles). These guidelines can be used freely by governments. Furthermore, DBO provides information about how governments can take up sustainable public procurement in their policies, provides best practices and serves as a forum for governments.

DBO is a voluntary agreement, however, and as such it is at odds with the rules-based ESD. Further analysis of the legislative requirements of the ESD and the proven, non-legislative methods in the Netherlands is necessary, as the legislation is not completely clear on the possibility of using long-term agreements.

Early in 2007 the program results of the first two years were made public. At that time nearly 50% of all ministries had integrated the program into a ministerial policy. Almost 50% of all purchases were done on a sustainable basis. Municipalities and provinces lagged behind, however, but aim to achieve a rate of 50% by 2010.

In 2009 the results of the new monitoring process will be published. Some ministries have already achieved their 2010 goals. For example, the Ministry of Foreign Affairs and the Ministry of Defence used green certificates to buy 100% green electricity.

Regulation for the Energy Sector

To fulfil the requirements in the ESD's article 6, the Dutch government has set an objective for energy suppliers to achieve energy savings by implementing energy efficiency measures at their customers' premises. This draws on the concept of white certificates, which certify that a certain reduction of energy consumption has been achieved. However, in this case, these certificates cannot be traded. As has been seen with the International Energy Agency's Demand-

Side Management (IEA DSM) program, white certificates are promising, but the Netherlands has chosen to start slowly, without a fully liberalised market on certificates. This method is similar to the one in Great Britain, which has clearly demonstrated effects.

For combined heat and power (CHP) — that is, the simultaneous generation of usable heat and power — there is still room for improvement. For a long time, deployment of this option has been very successful in the Netherlands (53%, the highest percentage in Europe). With the present market penetration, the potential of CHP is of course declining.

Still, further growth in this industry sector is still possible. Micro CHP is possible in households and experiments with it are underway.

Energy Service Companies

The use of energy service companies (ESCOs) is another option to fulfil the energy suppliers' obligation. ESCOs have never been very successful in the Netherlands. The reasons for this are not completely clear, although one reason is probably the very active government role in promoting energy efficiency. Anticipating the ESD, the Netherlands joined the IEA DSM's Task 16 on Competitive Energy Services. SenterNovem and Essent, the biggest energy companies in the Netherlands, participate in these tasks, so the utilities have direct access to the best practices in Europe.

Governments must create a level playing field for energy services, according to the ESD. The Dutch government commissioned research into the importance of ESCOs, which demonstrated the importance of the energy savings objective for Dutch industry (De Haan and Benner 2005).

SenterNovem has developed a model contract for energy services that can be used by both supplier and customer. The success of energy services will depend on the market reaction. Essent and Uneto/VNI, which oversees technical installations, are working to create an ESCO market. They are looking not only for new markets for themselves, but also for creating stable market conditions in collaboration with banks and government. They are currently focused on a broad part of the market and are addressing both industry and the private sector (although not yet single dwellings).

These ESCOs are looking for possibilities to improve their services for clients. The inclusion of financing makes it easier for clients to implement energy-efficient measures than it has been in the past. While the government will stimulate an ESCO market as much as possible, it will not subsidize such a market. Such subsidies have been tried twice already but did not result in a (financially) independent market. In today's recession, a revolving fund would make more sense.

Better Information for Clients and Smart Metering

The provision of information is well organized in the Netherlands. A foundation financed by the Dutch government, MilieuCentraal, focuses specifically on consumers regarding environment and energy. They advise in the fields of sustainable energy, energy savings and selection of energy suppliers. It also contributes to the development of a competitive market for energy-efficient appliances, by counselling on labels and average energy rates. Without committing to specific brands and types, MilieuCentraal provides the people with the means to reach sustainable decisions. As in most European countries, specific market information in the Netherlands is the responsibility of consumer organizations.

Figure 3 illustrates an example of market information about energy use based on the size of the household and compared to a national average. Besides internet information MilieuCentraal offers practical support such as the rental of energy meters to determine the efficiency of appliances.

SenterNovem provides information on the rest of the energy users market, adapted for each target group. Examples can be found on the organization's website at <www.senternovem.nl>.

In addition the government stimulates the market to take responsibility for product information. The government is supported in this by the aforementioned organisations.

In 2008 the law was changed to allow for the installation of smart meters (digital meters that create instant feedback about energy usage). The method of data collection, the technical requirements of the meters and organizations that deal with the data are described in this addition to the Electricity and Gas Law. By 2016 all Dutch consumers will have a smart meter installed.

Although not all the details are settled, the Dutch approach is referred to as an example for the rest of Europe (Jones 2007).

A related issue is the regulation of the energy market, particularly the separation between energy suppliers and energy distributors and the position of energy measurement companies.

With regard to smart meters, the net regulator — a state entity — owns the equipment. It has been decided that smart meters be installed on large scale in three periods of two years each, with an evaluation after each period to keep the process on track.

In a letter to the House of Representatives, the Minister of Economic Affairs stated that smart meters are primarily a means to stimulate a competitive market (Brinkhorst 2006). Billing will be much cheaper and it will become easier to change suppliers. It is estimated to have very little influence on energy efficiency. Price elasticity is, in the vision of the government, much too small to make a difference based on information only. All parties thus agree that smart meters do not themselves save energy. Extra research, demonstration projects and testing will be necessary to examine the technological possibilities.

Implementation in the Netherlands: SenterNovem

Most EU members have a national implementation organization. These organizations differ widely

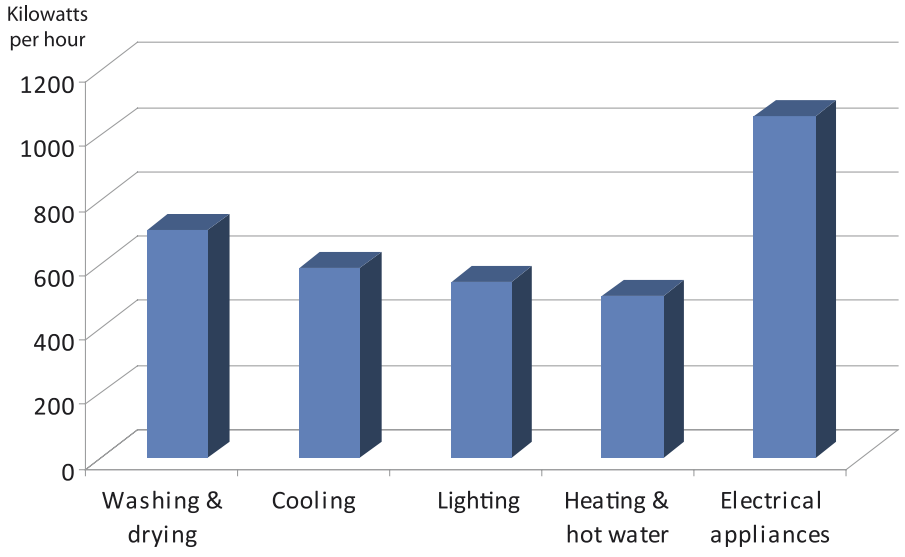


Figure 3 Electricity Use in the Netherlands, 2006
Note: Based on an average family of 2.3 people.
Source: MilieuCentraal.

in size and administrative distance to their national government. Some of the agencies are housed within a ministry, others are limited companies. In the case of the latter, the state is usually the principal or sole owner. These organizations constitute the European Energy Network (ENR). Russia and the United States have similar arrangements.

In the Netherlands SenterNovem is the principal implementation organization. It is an integral part of the Ministry of Economic Affairs, but executes programs for nearly all ministries as well as the EU. It also develops programs, such as the BANS subsidy for energy and climate change policies for regional and local authorities or long-term agreements for industry. These programs are "exported" to other countries through the EU and also through bilateral memoranda of understanding.

Monitoring

The Netherlands has its own method of evaluating its policy and policy implementation. (Zalm 1999). Under the supervision of the National Court of Audit, quantitative and qualitative data are collected to evaluate the success rate of policies and programs. As part of this method, huge amounts of data on energy policy and programs are collected by ECN. With these data, a significant amount of top-down monitoring, required by the ESD, is already in place. SenterNovem develops monitoring protocols for a number of market sectors. It also plays a major role in the voluntary agreement programs with industry.

Both ECN and SenterNovem take part in the Evaluation and Monitoring for the EU Directive on Energy End-Use Efficiency and Energy Services, the European monitoring program under Intelligent Energy Europe. As the national designated authority SenterNovem cooperates closely with the European Council for an Energy Efficient Economy and other European partners to develop the monitoring schemes.

Conclusions and Recommendations

This article has briefly described the recent history and new developments of Dutch energy and environmental policy. It has shown that the Netherlands has a good basis for drafting a National Energy Efficiency Action Plan to fit its national goals within the European framework.

This article has also described a few elements of the Dutch Energy Efficiency Action Plan. The goals and the dates for implementation of parts of the ESD so far have been achieved. This conclusion can be drawn from the analyses of the Energy Efficiency Watch (Schüle and Becker 2007).

Such administrative achievements, however, do not mean that reaching the final efficiency goals will be an easy task. We need to go against the grain to increase the level of energy efficiency to the pace that is inevitably needed. There is a willingness both in policy and society to act on climate change, but to be successful, a long-term commitment to influence society is essential.

It is most important that policy making and implementation are stimulated from the top down as well as from the bottom up. World leaders cannot be blamed of ignoring climate change of energy the last couple of years. The G8 put energy on the top of the agenda at Gleneagles in 2005, St. Petersburg in 2006 and Hokkaido in 2008, and consecutive presidencies of the EU have done the same.

Former American president Bill Clinton is promoting awareness of the need for change with his 40-city initiative, and he is supported strongly by his former vice-president, Al Gore. The latter certainly had a tremendous influence on public awareness with his book, An Inconvenient Truth (2006).

After the Hokkaido Summit Russian president Dmitry Medvedev made it clear that it is not sufficient to develop alternatives to meet increasing energy demand and that the only way to avoid greenhouse gas emissions is to use more nuclear energy. In his inauguration speech in January 2009, U.S. president Barack Obama also clearly addressed the problem: "We will harness the sun and the winds and the soil to fuel our cars and run our factories" (Obama 2009).

So the topic is on the agenda now. On the European and national levels, major steps still need to be made in order to secure and strengthen long-term support within society. Research and more policy and, more importantly, the effective implementation of these policies are inevitable.

Recommendations

It is not acceptable within the European political arena for the European Commission to prescribe how national policies should be developed. This has led to the curious solution to the problem of monitoring the results of legislation and after national policy plans have been created. Consequently, the issues on which member states must report, as well as how they report, are determined later.

In a political context this makes sense, but it leads to sub-optimal programming for policies and implementation plans. It also makes it difficult to define individual policy goals and their relation to the final energy efficiency goals of the ESD. The promotion of energy efficiency and the possibility to celebrate its successes are thus much harder and more a matter of improvisation than planned actions.

This problem should be solved before the second NEEAPs have to be written.

The schedule for member states to submit their plan of action to Brussels does not coincide with the policy cycles in those states. The European Commission has established a new policy cycle with the NEEAPs. These processes should be streamlined before the EEAPs of 2011 and 2014 are set out.

Another flaw in the ESD is that there is no certification system for ESCOs, such as the ISO certification. It is left to the member states, while at the same time the European Committee for Standardization (CEN) is working on models for harmonization. Although SenterNovem filled part of this gap for the Netherlands in 2007 through a set of model contracts, a clearer EU signal to the market would been useful for the Dutch ESCO market and would promote the concept of energy services (Scholma 2007).

Furthermore, there is inadequate regulation for smart metering. There are no minimum requirements for smart meters, plus, with the liberalization of the energy market, the metering market is liberalized too. Consumers can freely switch energy suppliers, even when a supplier has recently installed a state-of-the-art smart meter on the premises of the customer. The Dutch government has proposed a practical solution by declaring the meter government property.

To achieve the 20% reduction in greenhouse gas emissions by 2020 as stated in the EU's "An Energy Policy for Europe," more actions are needed. One important option, which lies beyond the scope of this article, is to increase the efficiency of generating energy. Fuel substitution may provide an important contribution to CO_2 reduction, according to the ECN study (Daniëls et al. 2006). In general, switching from coal to gas is the most important option for the energy sector, as shown in Table 1. About 20% of total energy consumption in the Netherlands is used for generating electricity. However, emission reduction is contrary both in terms of economic motives as well as motives of security of supply. Although the world's coal supply is many times larger than the supply of gas and the potential of gas is almost twice that of other options, it does not seem probable that this path will be firmly followed. Therefore, other options are even more necessary.

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Conventional and Alternative Energy in the Kyrgyz Repuplic

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The Kyrgyz Republic has an energy system that includes 18 power plants with installed capacity of 3666 MW: 16 hydropower and 2 thermal power. Maximum capacity of annual generation reaches 15 billion kW-h. However the potential capabilities of this fuel energy complex are not realized completely and operation efficiency of many energy companies has decreased. As a result, the industry experiences enormous difficulties and is not able to meet consumers' demand of energy carriers. The Republic's dependency on imported energy resources is substantial and negatively effects the country's economic efficiency.

In hydro resources the Republic ranks third in CIS countries (following Russia and Tadzhikistan). The electric energy sector (EES) within the Federal Energy Commission (FEC) structure consists of seven joint-stock energy companies of which state-controlled stock includes one in each of generating, electric supply, and heat supply and four in electric distributing, as well as private joint-stock companies.

However, only 11% of hydro energy potential is currently being utilized, which is completely insufficient. Rivers, for example, have an exclusively high concentration of potential capacity for every 1 km of stream. In installed capacity, the river Naryn exceeds the Volga and Angara. Hydro energy potential of the Republic accounts for 142.5 billion kW-h, of which only 9% is utilized. The present technical condition allows the utilization of 72.9 kW-h, but the utilization of only 48 billion kW-h is cost-efficient.

With electric energy consumption per capita of 1439 kW-h, the Republic lags considerably behind the average world rate (2343 kW-h per capita). Even though the EES exerts a key influence upon the condition and development aspects of the national economy, its share in the GDP is about 5%, 12% of industrial production, and 10% of the Republic budget revenues. At the same time, the last 15 years have seen a permanent drop of investments allocated for sector upgrades and technical renovations. By now the wear on primary equipment of electric power plants and grids has fallen to 50 to 80%.

There is also no provision to reduce system losses of the electric energy in power grids, which have increased steadily to 40%, including 25% of commercial losses and thefts.

The geographical situation of Kyrgyzstan has determined the division of its energy system into the north and south, connected by the TL 500 kW Toktogulskaya hydro power plant (HPP) in Frunzenskaya. According to capacity balances, the southern part of the energy system is energy abundant and the north one, energy scarce. The principal lines of development for the Kyrgyz energy system are:

- provision for fuller capacity of power plants, both those existing and those under construction;
- modernization and reconstruction of existing grids and substations;
- actions to codify energy accounting at all levels of voltage;
- reduction of energy losses.

At present, the south of Kyrgyzstan is provided with electricity through its own grids, carrying 110-220 kW, as well as through the grids of the Uzbek and Tajik energy systems. The southern Kyrgyzstan organization of 220 kW grids, the NES of Kyrgyzstan JSC, operates according to the necessity to maintain the existing connections with the Uzbekistan energy system so as to provide export opportunities for the Kyrgyz Republic, parallel system operation, assistance in case of emergency, and upgrading the main electricity power grids in the south of the Republic that enables to provide capacity and energy distribution.

The principal internal problems of energy include poor financial management of commercial instrumental accounting; energy theft; corruption in the energy system; poor discipline of electricity consumers regarding payment; and lack of appropriate attention and secure financial sources to cover costs of equipment rehabilitation and modernization.

Nevertheless, electric energy for Kyrgyzstan is a promising sector because the mountain terrain favors HPP building and deep narrow canyons make dam construction very efficient.

But the operation of any water reservoir is very harmful to the environment. For example, when the operation of the Toktogul water reservoir is in irrigation mode, Kyrgyzstan suffers annual damage of 154.9 million USD. The high rate of water resources applied to other modes results in serious complications in the Syr Darya basin both in winter and summer seasons.

Fig. 1 Toktogul HPP.

Electric energy in the south of Kyrgyzstan is generated by the Naryn river and its branches. Among the operating HPPs are Uch-Kurganskaya, Kurpsayskaya, Toktogulskaya, At-Bashyskaya. The annual amount of electricity generated by power plants in the south and by the major northern heating plants exceeds 11 billion kW-h. The hydro-electric energy potential of the country is great (potential reserves -15.5 million kW). New Kambaratinskaya HPPs and some others are in the project development phase.

In Moscow in February 2009, the governments of Kyrgyzstan and Russia signed an agreement on construction of Kambaratinskaya HPP-1. At present construction of Kambaratinskaya HPP-2 is in the final stage, a project also developed in cooperation with Russia.

Fig. 2 Construction of Kambaratinskaya HPP-2.

Nearly the entire fuel industry of the Republic is concentrated in the south and central regions of Kyrgyzstan. Brown coal prevails there. The Osh region ranks first in coal production. Similar to other countries of the former USSR, Kirgizia's development of that resource is diminishing. Of undeveloped coalfields the most promising for opencast mining are Uzgenskiy (South Kirgizia) and Kavakskiy (Internal Tien Shan). Seventy coalfields are known in Kyrgyzstan. The expected reserves of the fields have been estimated at more as 2.2 billion tons with balance reserves of 1317 million tons in 2006.

At present, the coal industry comprises 18 joint-stock and private coal companies as well as small business companies. About 60% of total coal consumption in the country occurs in the energy sector, for heat and power generation.

Negative events in the coal industry have resulted in fuel shortages for heating stations, boilers and the general population. An expansion of the Kara-Keche strip-mining is in the works, which will provide fuel for the planned Kavatskaya State District Power Plant whose capacity of 1200 MW will provide the northern area of Republic with basic electric power, partially support the load of TPP of Bishkek and thus limit the export of expensive gas and coal. These operations could be accomplished with foreign investment.

According to the forecasts, unexplored oil and gas reserves in Kyrgyzstan account for 289 million toe. At present, the oil industry is in a state of profound stagnation and is almost completely devoid of government subsidies and financing. For steady oil production to meet the market demand, the local stock is insufficient. That is why crude oil and its components have been imported, although it is restricted by high rates of excises for oil, gas condensate and petrol. The production of oil products from local stock is therefore problematic and cannot compete in price and quality with the imported ones.

The suppliers of gas to Kyrgyzstan are Uzbekistan and Kazakhstan. On 16 May 2003 an agreement was signed supporting the cooperation in the gas industry between the Government of Kyrgyz Republic and public joint-stock company Gazprom. The agreement was the result of t he parties considering the issue of establishing a joint Kyrgyz-Russian company that could provide supplies of natural and liquified gas and oil products to Kyrgyz Republic. Strategic investors in the Kyrgyz Republic are Gazprom JSC and KazTransGaz JSC.

A drop in domestic hydrocarbon resources production, together with the prevailing import restrictions and the rise in prices for energy carriers, provide favorable conditions to develop alternative renewable energy resources (ARER) and small HPPs. The increase in the use of alternative renewable energy resources deserves attention. The use of such resources will result in the decentralization of energy production and will provide advantages to mountain communities. The mountain communities should participate as much as possible in the development and realization of energy installations. The local management of energy installations ensures both independence and the trust of energy suppliers. It requires the establishment of regulation frameworks and the realization of small energy programs.

Potential applications for alternative energy resources should be studied. According to assessments, the potential ARER energy resources actually available through the current level of technology accounts for 840.2 million toe a year. Actual use of ARER is minor, however, and in the country's energy mix it accounts for only 0.17%.

Alternative energy resources in the Kyrgyzstan territory are the sun, wind, geothermal waters, small water flows, biomass and others. For Kyrgyzstan conditions the most promising areas for the application of ARER are facilities in remote mountain and rural areas without centralized energy supplies (farming and livestock complexes, pump stations, hunting facilities, tourist and health installations) as well as houses, community, consuming and trade facilities, etc.

Among the most technically suitable energy sources for widespread practical application are solar radiation and biogas technology heat supply projects and wind energy and small waterflow power supply projects. Kyrgyzstan is situated to the north-east of Central Asia, in temperate and partially subtropical zones (39-43° NL) on approximately the same latitude as Bulgaria, Albania and central Italy, which receives significant solar radiation intensity. The solar heat in Kyrgyzstan accounts for 120 to 160 kcal/cm^2, which exceeds similar values in other regions of the Commonwealth of Independent States (CIS). It is characterized by sunshine of long duration. Sunshine ranges from 1700 hours in narrow valleys to 2965 hours on the szyrts or high tundra plateaus of Verkhniy Naryn. The range extends 900 km from west to east and 410 km from north to south.

A center for renewable energy resource utilization issues (CPIVIE) in Kyrgyzstan ensures a complex approach to the development and utilization of new technical means and technologies operating from RES. The center's primary activity is associated with issues of solar energy, small waterflows, wind, and biomass utilization.

In the field of solar energy the center develops and installs thermal solar collectors for hot water supply and heating. The use of photovoltaic converters is designed for the power supply of household appliances in individual rural houses.

Fig. 3 Heliodrier specimen.

Standards are being developed for energy efficient buildings construction. Wind resources of the Republic at an altitude of 100m are estimated at 2 billion MW-h/year, though this resource is spread unevenly through the country. Unfortunately, wind energy has only been developed in theory. Bioenergy is being actively developed. Many farm yards contain biofuel, which is used both for heating and for cooking.

Kyrgyzstan industrial companies are capable of producing annually (with annual increments of 10 to 15%):

- solar collectors—100000–150000 m^2
- microHPP—2–2.5 MW
- wing stations—250–300 kW
- photovoltaic converters on the available base of 2–3 MW
- biogas units 70–100 million m^3 for a total 775 million soms

Important factors in hydroenergy development are the restoration and construction of small HPPs. The total hydro energy potential of 172 rivers and streams surveyed, with water consumption ranging from 0.5 to 50 m^3/sec, exceeds 8 billion kW-h. Those that possess technically suitable potential for development account for 5-8 billion kW-h/year.

All these plants may have special significance for the energy supply of dispersed facilities in mountain and rural areas through the development of a hydrographic network where construction of large power grids is not cost-effective. However, the payback period of a small HPP with low operational efficiency and tariffs in the range of 1.0-1.5 US cents is 7 to 10 years, a fact that so far does not attract potential investors.

Alternative energy in Kyrgyzstan is only at the very beginning of its development, however. A concept is required that should be elaborated together with the local population, taking into account the low prices of energy generating systems and the minor costs of their installation. It needs a reform of the social energy development system for the rational use of energy resources. For the time being, the purchasing capacity of the population is very low, so increasing control over the State energy company (for instance, from consumers' associations, which may participate in management and control of energy generation) should be a part of the reforms.

In addition, investments are required to upgrade and improve the efficiency of large energy stations and distribution systems. This will result in the reduction of current wastage of limited energy resources. However, large investments are needed. They could be found through regional cooperation.

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The Added Value of Multilateral Action on Energy Efficiency

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When the Energy Charter Treaty between the former Soviet Union and Eastern Europe came into force in 1998, it included the Protocol on Energy Efficiency and Related Environmental Aspects (PEEREA). A leading-edge instrument complementing this unique treaty, the PEEREA recognised the diverse benefits offered through improved energy efficiency to reduce greenhouse gas emissions, improve productivity and enhance energy security through existing technologies and practices. Since 1998, the PEEREA Working Group of the Energy Charter has been a forum for the Energy Charter's 51 member countries and numerous observers to discuss energy efficiency policy developments, share experiences and work together to improve institutions, policies and measures through international cooperation.

Energy efficiency has delivered massive benefits to the global economy. The International Energy Agency (IEA) has estimated that if energy efficiency had not improved from 1973 to 2004, global energy use would have been 56% higher than it actually was. So energy efficiency has been the largest contributor to growing energy service needs, more than coal, oil, gas and nuclear combined (Bradley 2008). Under the Energy Charter, many countries have implemented significant steps to improve energy efficiency. For example, many transition countries now have government agencies dedicated to energy efficiency with secure funding and a long-term role in their economies. Audit programs, subsidies for energy-efficient upgrades, appliance standards and many other measures are now operating in many countries. A few have implemented white certificates schemes, which certify that a certain reduction of energy consumption has been achieved, in part to support the growth of an energy services industry. And even countries with less developed programs are adopting national energy strategies that recognize the importance of energy efficiency.

But which countries are really achieving their full potential in energy efficiency? Probably none, as most analysts agree that significant options for cost-effective energy efficiency continue to exist. International comparisons of en-

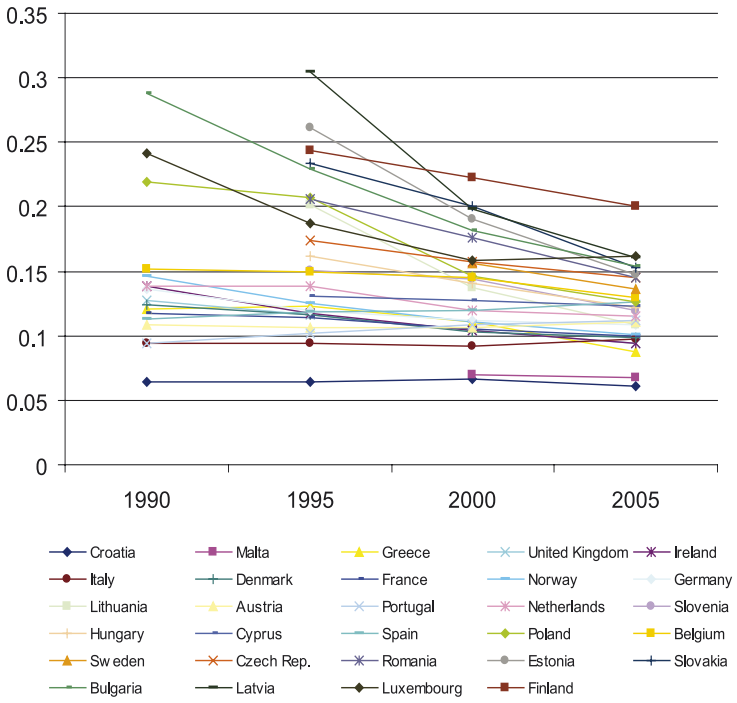

Figure 1. Final Energy Consumption per Unit of Gross Domestic Product, European Union Member Countries.
Note: In €2005, at purchasing power parity.

Source: ODYSSEE Project Database, Energy Efficiency Indicators in Europe, www.odyssee-indicators.org (February 2009).

ergy efficiency are difficult to make due to different national circumstances, climates, economic structures and other factors. But a broad comparison may give some indication of whether any countries stand out in terms of their energy efficiency performance.

Figure 1 shows the final energy intensity of European Union member countries and Croatia and Norway, based on data compiled for the ODYSSEE project. It indicates that intensity is improving in all countries. But how much of this improvement is due to policies and measures? In the new EU members it tends to be much more rapid, but from a higher level; the similarity of this pattern across so many countries suggests it is largely due to the generic factor of the washout of old and inefficient capital occurring in most members of the Commonwealth of Independent States (CIS), rather than to specific actions of individual countries.

Most of the EU-15 countries (the 15 members of the EU until May 2004) also show a similar pattern to each other: relatively slow improvement in energy intensity, but from a much higher level of efficiency. Again, this seems to reveal a widespread trend rather than individual activities (although the increasingly strong role of the EU in energy efficiency policies may mean that it is harder for individual countries to show different rates of progress).

One way to identify the individual differences among countries is to look at how they rank amongst their peers. For example, in 1990 Lithuania had the twentieth "best" energy intensity among the 27 countries for which ODYSSEE data were available[1]. By 2005, it had moved past 9 other countries to be eleventh. This is an impressive change, although it is still impossible to draw a clear conclusion about the cause. Over the period from 1995 to 2005, only six countries moved more than five places in the rankings. Lithuania and Greece improved by nine and eight places, respectively, while Austria, Luxembourg, Spain and Portugal fell eight, nine, nine and ten places, respectively. The other countries stayed in roughly the same ranking.

1 In this case, "best" means the lowest energy intensity, which is related to the highest energy efficiency.

It is well understood that aggregate measures such as national energy intensity can hide many detailed changes within economies. So these rankings should not be given too much importance. However, these results suggest that either most countries are successfully moving ahead with energy efficiency policies in a similar way and with similar effect, or that specific energy efficiency policies in most EU countries are having only a limited impact.

The first explanation would be comforting, but analysis of all the Energy Charter countries raises doubts. For example, using data from the IEA (2008a, 2008b), all 51 Energy Charter signatories can be ranked to see how their positions have moved over time. In this analysis, eight countries (Bosnia and Herzogovina, Lithuania, Ireland, Poland, Azerbaijan, Sweden, United Kingdom and Latvia) show a rank improvement of more than five places from 1995 to 2005, and five countries (Austria, Belgium, Portugal, Luxembourg and Albania) show a fall of more than five places. In all, 38 countries remain in roughly the same rank, despite being at different stages of implementation of energy efficiency policies. This suggests that many key drivers of energy efficiency remain structural and systematic rather than being the result of specific national policies, although these "fast mover" countries deserve further analysis. Considerable room remains for more ambitious policies to promote energy efficiency. Given the wide recognition of the many benefits that energy efficiency can offer, what is holding back more rapid action, and what is the role of international cooperation in moving forward?

An Energy Efficiency Industry?

Energy efficiency investments differ from other energy investments in a number of important ways. The literature is full of analyses of issues such as incomplete information, lack of externality, pricing and agency problems (e.g., where neither a tenant nor a landlord has the incentive to invest in energy efficiency in rented premises). But there are a number of aspects of energy efficiency investments fundamentally different from supply-side investments that make it more difficult to sustain economy-wide commitments to energy efficiency.

Income from such investments is essentially a notional stream of avoided costs. Unlike a wind farm, for example, where output can be measured and paid for in the same way as other energy supply contracts, the value of installing more energy efficient HVAC systems is to lower ongoing costs of operation. These "savings" must be measured against a notional baseline that never exists. This creates additional monitoring and evaluation costs, and may be a difficult concept for some finance providers.

Energy efficiency is also seen in many firms as a cost management exercise rather than a strategic investment. This can mean a lower profile than other investments, less attention at senior management levels and less funding.

Asked about the barriers to improved energy efficiency within BP, Kevin Ball, director of Low Carbon Business Policy at BP International, said: "In many parts of our business there was not a sufficient application of risk weighting in investments, so we tended to chase higher risk, higher return projects and overlook perhaps lower risk lower return projects — or projects that were perceived to be lower return" (Australia, Department of Industry, Tourism and Resources 2007).

Virtually every business every day makes decisions that affect energy efficiency performance — whether it be plant investments, policies on company cars, new building leases, distribution and logistic system design, or the setting of the thermostat in the factory or office. But very few companies would say they were in the energy efficiency business.

Unlike the coal, oil, gas, nuclear or renewable energy industries, there is no established "energy efficiency industry." Energy efficiency is not a product, but an attribute that can be developed in a variety of products or services. Few companies produce only the most efficient products — generally, they produce a diverse range, from highly efficient to fuel intensive.

Toyota, for example, has received global attention for its leadership in bringing to market the hybrid Prius, one of the most fuel-efficient passenger vehicles in the world at 4.4 litres per

100 kilometres in city driving (Canada, Natural Resources Canada 2009). However, Toyota also sells the Tundra 4x4, which consumes a massive 16.6 litres per 100 kilometres in city driving, or almost four times the consumption of the Prius. Of course, these vehicles have very different characteristics and different market niches. But it means that Toyota has no existential incentive to lobby or market for a general shift to more energy efficiency; it has products competing across the energy efficiency spectrum.

Similarly, a listing of clothes washers available in Australia shows only one five-star machine, manufactured by Kleenmaid (Australia, Department of the Environment, Water, Heritage and the Arts 2009). Kleenmaid also produces machines with the rating of one-star, as well as many ratings in between. In appliance manufacturing, companies do focus on mid- to upper-efficiency machines but many of the largest manufacturers produce across the range of efficiencies. And, of course, the companies that manufacture energy-efficient compact fluorescent light globes are the same companies that produce the existing inefficient incandescent globes.

In the area of energy efficiency services, there are some companies that are solely focused on energy efficiency, providing audit services or advice. But even here, there may not always be strong corporate level drivers for energy efficiency.

For example, the National Association of Energy Service Companies (2009) in the United States lists 29 full members on its website, among them Carrier Corporation, Chevron Energy Solutions, ConEdison Solutions, Honeywell International Inc, Johnson Controls Inc. and Siemens Building Technologies. Many of these names are familiar in a range of industries, not all with a strong focus on improving energy efficiency. No doubt, these companies and many others are genuinely committed to providing professional and effective energy efficiency services. But they are also linked to other companies with interests in less energy-efficient products and services. This is not to disparage the work of these companies, but to suggest that this may not be the basis for a focused and active industry committed to a strong program of energy efficiency across the economy.

Unlike traditional energy companies, there are also no globally dominant companies focused primarily on energy efficiency. Of the top ten largest companies in the world identified by Fortune (2009) in 2008, six are energy companies with a strong focus on fossil fuels (Exxon Mobil, Royal Dutch Shell, BP, Chevron, Total and Conoco-Phillips), albeit with an increasing interest in renewables and some specific energy efficiency activities. But there are no energy efficiency companies that can compare with the giants of traditional energy companies.

So, as well as facing a range of potential technical and market barriers, energy efficiency faces an inherently difficult operating environment: an uncertain and diluted investment framework, a disparate industry with a diffuse focus, but the potential to offer significant gains in a range of energy policy areas. In such an environment, what is the role for international cooperation?

Role for International Cooperation

There are already a wide range of international organizations with substantial work programs on energy efficiency, including the IEA, the World Energy Council, the Asia-Pacific Economic Cooperation forum (APEC), the United Nations economic commissions, the World Bank, the Asian Development Bank and the Energy Charter, as well as the newly created International Partnership for Energy Efficiency Cooperation. These organisations complete a range of work, from data collection and management to detailed policy analysis to completion of cooperative projects on the ground. They provide forums for countries to share experiences and assist each other in the implementation of new policies and measures.

And, of course, there are cooperative activities within the private sector as well. As well as government/industry partnerships such as the Renewable Energy and Energy Efficiency Partnership (REEEP), global companies are them-

selves examples of international cooperation, with technology and expertise from one part of the world applied across global operations.

Given all these activities, but also given that there is room for almost all countries to do more on energy efficiency, is there a role for enhanced international cooperation? And how does the disparate nature of the global energy efficiency "industry" affect the best course of action?

One important area is the overall investment framework. Energy efficiency investments often rely on stable investments that pay themselves through years of savings. A general investment framework that promotes stability and reduces risks is especially important. So extension of approaches such as the Energy Charter Treaty, which promotes a level playing field for energy sector investment, trade and transit, would be a supportive step.

At a more specific level, both industry and governments have an interest in the development of a robust, coherent energy efficiency industry at the national and global level. Improved energy efficiency will be absolutely necessary to meet global climate change objectives at an achievable cost. A strong industry would provide the economic strength and visibility needed, as well as ensuring that energy efficiency is one of the industries working with governments to develop and implement national and international abatement strategies.

Of course, governments cannot intervene directly to create such an industry. But they can create clear and consistent policy environments for such an industry to flourish. And an active dialogue between government and industry can identify the key priorities to make this happen and emphasize the importance of energy efficiency in meeting environmental and energy policy objectives. If more companies are confident that a strong energy efficiency industry will be an important and growing part of the global economy, they will be more able to undertake the necessary investments. Perhaps sometime in this century, the global energy industry will come to be dominated by those companies who know how to save rather than those who know how to produce and use energy.

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Energy Efficiency Potential: Reserve or Indicator of Diseconomy?

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For a long time, many experts and state officials have regularly spoken of the enormous energy saving potential within Russia. Needless to say, the existence of such enormous potential means that for a long time, valuable resources such as oil and natural gas have been wasted, without any benefit to the economy or to the people. But the reserves of such resources are limited. Soon we and, more importantly, our descendants will experience shortages. Even today, both the natural environment and human health are suffering from the negative impacts of processing fossil fuels at obsolete energy installations.

A comparison of energy and economic growth rates of various regions of the world shows that the energy intensity of Russia's gross domestic product (GDP) is twice that of the world economy as a whole, and three times more than in 15 countries of the European Union and Japan. Certainly, there are objective reasons for Russia's higher energy intensity, including, first, the fact that it is a northern country with a cold climate, where the heating season lasts five to eight months and most of its territory is in a permanent frost zone. The vast geography and distances result in an increasingly expanding transportation network and related energy costs. In addition, the economy is based on predominantly energy-intensive industries, such as raw material development and primary processing including oil refineries and metallurgical enterprises.

However, these reasons are not sufficiently important to justify the current difference in energy intensity in Russia's GDP compared to the world average and certainly compared to the rates of Canada and even the United States. This is primarily due to the low efficiency of energy-related technologies, as in the following examples.

- In Russia, the efficiency factor of industrial boilers is 30% lower than the best in the world.
- Only 15% of cement is produced using the efficient "dry" method.
- The output of the most valuable "light" fractions at oil processing is 15%–30% less than at the world's modern oil refineries.
- District heating systems are the least efficient featuring large losses during transportation of heat carrier and poor regulation of operation modes.

Due to high energy intensity, most Russian-produced goods consume far more energy and fuel for production and transportation and, as a result, are more expensive than comparable goods in other countries. The cost of every item includes transportation and production energy costs, which has a negative effect on the competitiveness of most Russian goods except raw materials.

For the past eight years energy demand in Russia has grown more slowly than GDP at a rate of 1%–1.5% a year. Consequently, the energy intensity of GDP has dropped rapidly. It decreased more than 25% for seven years, at an

annual average of 4.6% annually, even without any active state policy on energy efficiency improvement.

There were several reasons for that decrease, as follows:

- the structural change in the economy because of service sector growth;
- increased load in production facilities leading to more efficient use, even with obsolete equipment;
- increased world and domestic prices for raw materials and hydrocarbon fuels, which significantly contributed to the Russian GDP, so that the energy intensity of GDP dropped without any changes in specific fuel consumption or energy in more expensive manufacturing.

However, the impact of these factors has now been exhausted. The rise of world prices has been followed by a fall. In many industries, the load on production facilities has reached its limit, and any increase would require the installation and introduction of new facilities, including developing facilities in the fuel industry and generating ones in electric and heat and power engineering. Because of outdated equipment, the efficiency factor is diminished.

This situation requires active state policies on promoting and improving energy efficiency. Without a dramatic increase in energy efficiency, the Russian economy in the coming years will require more energy and fuel to maintain high rates of economic growth and welfare of population. But it will not be possible to meet large energy demands due to limitations on the energy resources that are available in the country and the economy cannot sustain increased costs in development and processing. As a result, the economic growth and the quality of welfare will slow down and may be suspended.

The World Bank in cooperation with the Centre for Efficient Energy Use published a report on the potential increase in energy efficiency overall in Russia as well as in separate sectors of economy. According to assessments, the immediate effect of the instant replacement of technologies and equipment in the sectors studied would have gained nearly 400 million tonnes of oil equivalent (toe) or 42% of energy consumption in 2005 (without reduction of flaring), which approximately equals the annual consumption of France. That may reduce Russia's greenhouse gas emissions by more than the annual volume of the Great Britain.

It should be mentioned that decrease of energy consumption in any sector has indirect effects on energy saving throughout the entire technological chain. So a decrease in electricity consumption results in reduced fuel demand for its processing as well as reductions in its development, processing and transportation, and so on. Eventually, reduction of each unit of energy consumption would result in multiple decreases in the total demand of primary energy carriers. In the case of heat conservation in the central heating systems, the reduction would be nearly threefold. At the same time, energy saving requires on average two to three times less investment than does the generation of the equivalent amount of energy and, in the most cost-efficient cases of energy saving, up to four to six times. Often, energy efficiency improvements require either no additional cost or minor costs that can be repaid quickly. That also pertains, in particular, to buildings and electric appliances such as refrigerators and lamps.

Environmental improvements and reduced health hazards are the positive effects of such changes at no extra cost, including the global benefits of slowed-down depletion of fossil fuels and prevention of further climate change.

This is not to suggest that the Russian government does nothing to improve energy efficiency. As long ago as 1995, the government adopted a law on energy saving, but unfortunately it turned out to be invalid and its revised version has gathered dust. There have been federal programs in the energy conservation and energy efficiency improvement that have been adopted and implemented, but without tangible results, and the most recent one in 2006 was put postponed indefinitely.

State support and the mechanisms and tools for improved energy efficiency develop at an extremely slow rate in various sectors of economy,

for example, energy service companies (ESCOs), which specialize in energy savings. However, there are still no regulation frameworks for ESCOs.

Policies on improving energy efficiency are more successfully developed at the regional and sectoral levels. One such example is a complex program for the rational use of energy resources in the educational establishments run by the Ministry of Education. This program involves more than 300 leading technical higher educational establishments in various regions. Participants have taken various energy saving actions and have established 24 centres of energy saving as well as training centres in 41 regions, thus ensuring regular and advanced training for regional specialists. The centres and energy-saving programs are functioning successfully, most effectively in the regions of Nizhniy Novgorod, Novosibirsk, Sverdlovsk and Chelyabinsk.

Many countries have applied a wide range of policy tools and mechanisms in the field of energy efficiency for a variety of economic sectors and groups of energy producers and consumers, ranging from administrative and technical policies to purely market and information mechanisms. Such practices have been described and examined in many widely available studies. In short, there is no need to invent anything new. It is simply a matter of choosing a policy and introducing it.

The potential for saving energy exceeds 40% of the current consumption level, but the fact that this level has not been reduced for about 20 years — neither by low or high energy prices, nor by a rapid drop in economic growth or by the opposite — indicates systematic faults in Russian economic system and regulation. Those faults distort market incentives and erect administrative barriers to improving energy efficiency in Russia. The first requirement is the political will to overcome these challenges.

In June 2008, Russian president Dmitry Medvedev claimed a goal of doubling the reduction of energy intensity in the Russian economy by 2020. To realize this goal, the Russian government has developed an action plan, but it is not yet available to the public. All that remains now is the hope that it will offer approaches and mechanisms that will be systematic and efficient.

Energy Security Code of Conduct

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All over the world, the energy consumption of buildings is increasing at a high rate due to improved living standards in developing countries. For instance, energy consumption in Northern African, Middle Eastern and Chinese commercial buildings has grown by 9% or more per year over the last 30 years, while private homes show similar trends. "Where there's quick growth in the number of buildings, it makes sense to have strict buildings codes and ensure that architects go beyond them," comments Sylvia Rezessy, an energy efficiency expert at the Renewable Energy and Energy Efficiency Partnership (REEEP). REEEP is an international public-private partnership that structures policy initiatives for clean energy markets and facilitates financing for sustainable energy projects.

New suburbs and other communities going up in developing countries offer the opportunity to act swiftly while buildings are new. In those countries where the proportion of new developments is higher, the potential power of building regulations and voluntary codes is all the greater. Yet even in some of the most mature economies in the world, policies are not fully developed. The United Kingdom, for instance, introduced its first requirement relating to energy efficiency in new buildings in 1985. The regulation has been revised twice in the last four years, so that, if fully enforced, it should cut carbon dioxide emissions from new buildings by another 40%. Even so, this will not affect the vast majority of houses, offices and other commercial buildings because so much of the UK's building stock is at least 50 years old.

In Russia, politicians have intervened to sweep away the crumbs from an outdated social system and reform the nation's entire economic system. This is particularly visible in Moscow, where many of the old Stalinist buildings have now been demolished and replaced with bright modern buildings of coloured glass. The city's mayor, Yury Luzhkov, is one of the major driving forces behind this change, inviting construction firms to bid for city developments. All of them are benefiting from new wealth; the country's economic growth averages 6.4%, and although its population is shrinking, development in areas such as oil and gas have led to economic improvements. Consequently, Russia is forecast to build around 250 million square metres of new residential buildings within the next five years.

Table 1. Volume of Residential Construction in Russia, 2002–2005

Type of building	2002	2003	2004	2005
Multi-family	19 566	21 092	24 854	26 038
Single family	14 210	15 174	16 145	17 571
Total	33 776	36 266	40 999	43 609

Note: In thousand square metres.

Perhaps surprisingly for Russia, a country that is so preoccupied with infrastructure development and growth of basic commodity export industries, innovative laws in this area had already been introduced when Moscow adopted a building code in 1994 to improve the energy efficiency of buildings. Of Russia's 89 regions, 49 followed suit, while more legislation in this vein was passed three years ago by the Russian Federation.

Compliance, though, can sometimes be a problem in a country changing so rapidly and where the rule of law is not as firm as in some of the older western economies. It is a problem in western Europe too, partly as a result of the enormous numbers of stakeholders involved in any building project and the diverse nature of planning and construction responsibilities. Hence, REEEP experts and three U.S. organisations – the Institute for Market Transformation (IMT), the Natural Resources Defense Council (NRDC) and the U.S. Environmental Protection Agency (EPA) — are working with local officials and planners to develop improved local enforcement skills, publish compliance manuals and use successful Muscovite financial incentives in other parts of the country. A new type of performance-based compliance method will be used to help ensure enforcement.

Using a model developed by the IMT team with support from the EPA, 53 Russian regional governments have adopted mandatory energy codes as of mid 2006, covering more than three quarters of new construction in the country. An "energy passport" will be required to list efficiency features, predicted energy consumption and, after two years, metered energy use. If a building complies with the codes, it will consume 35%–45% less energy and will have to verify this through the energy passport. This is a completely new direction for Russia, as the old Soviet building codes did not include energy or heat efficiency requirements.

In Asia, new towns showing off trendy new architecture are going up even faster to keep up with the population explosion. In Shanghai, the traditional pagoda style has been incorporated into new large office buildings. The whole country is undergoing a construction boom: China has the largest construction volume in the world, with almost 2 billion square metres of new buildings completed each year in urban and rural areas, of which more than 80% are categorized as high-energy buildings. At the moment, the energy consumption per floor space is at least two to three times higher in China than in developed countries, while building energy consumption accounts for 27.5% of overall energy consumption.

The motivations to cut energy usage are strong, however, as the country's overall demand for energy is so high. As in other parts of the world, energy security is on the Chinese government's agenda. But energy savings performance requirements are excluded from many industrial and other buildings. (Standards for public buildings cover most of what the Organisation for Economic Co-operation and Development calls commercial buildings and include lighting standards for industry.) In addition, according to Jiao Yan of the China National Engineering Research Centre for Human Settlements, "a general standards system for building energy savings, soil savings, water savings, material savings and environmental protection has not been established yet. Several cities are paying increasing attention to building energy savings, however. Beijing, for example, has compiled its first national public building energy savings standard, mainly for offices, hotel and restaurants."

Although China is developing various energy efficiency codes for new buildings, the implementation has been problematic to date. There is a need to design and roll out a new implementation strategy. "Energy efficiency should be made a key factor in the design, construction, inspection and marketing stages for new residential and commercial buildings," states Wanxing Wang, program officer at Beijing's Energy Foundation. "Necessary capacity should be developed for enhanced compliance monitoring."

Echoing many European complaints, Jiao Yan adds that "the task for strengthening building energy saving standards implementation and supervision is hard and immediate." This may be where clever financing and creative thinking are delivering results. In Russia, project workers

found they could create further compliance incentives through simple techniques. David Goldstein, an energy expert from the NRDC, asserts that the efforts to cut energy use always pay off.

"Policies to promote energy efficiency not only save money for households and businesses," says Goldstein. "They also encourage economic growth in several ways. The most direct is that efficiency investments have higher returns than almost anything else … [and] lead to innovation and technological progress not only for the efficiency features themselves, but also for non–energy-related features of buildings, transportation systems or industrial processes."

In an industry often with an eye only for rapid economic returns, financial arguments are persuasive and lead to a far greater likelihood of higher building code compliance. Project experts have found that upgrades in insulation came at no net cost. This is because as the Russian code was implemented, it became clear that the easy way for wall panel manufacturers to comply was to use more insulation and less concrete in the same forms. "No substantial capital costs were incurred because insulation is cheaper than concrete, so the materials costs are lower," states Goldstein.

Perhaps Chinese policy makers will adopt similar measures. At the moment, they estimate that only 20% of buildings completed since 1996 comply with energy standards already in place. As a result, they benefit from European expertise to improve low-energy building standards and building legislation, in another project jointly funded by REEEP and the United Nations Foundation.

"There are profound barriers to energy efficiency take-up related to the very basic routes of public budgeting," comments REEEP's Rezessy. Even if the enforcement of standards will take some time to put in place, at least the data generated by new standards all over the world will reveal the scale of the problem and thereby generate further action.

The House: The Preferred Place of Living

Interview with Christian Louis-Victor, president, Union des maisons françaises, with Lucien Maillard, professor, Sciences Po

For 21 years, Christian Louis-Victor has headed the most influential trade union of private homebuilders in France, l'Union des maisons françaises (UMF), formerly known as the Union nationale des constructeurs de maisons individuelles. One of the most influential Europeans in private homebuilding, Louis-Victor is an outstanding manager who is also now scanning the economic horizons, standing at the helm of the Compagnie Européenne de Garanties et Cautions. His experience and expertise make him a special example of technological and sociological evolution in homebuilding, particularly in terms of sustainable development. He was responsible for implementing financial guarantees to protect buyers in 1990 and later for the NF Maison Individuelle certification program. In 2003 he began developing the concept of bioclimatic homes, even before the debate on the Grenelle proposal and the European Council's spring 2007 effort to define a policy on the environment and sustainable development.

Anticipating the European Commitments

The efforts of Christian Louis-Victor focus on four major concepts: improving the quality of the offer; structuring the professional body of knowledge; developing accession to property and encouraging owners to commit to sustainable development challenges; and anticipating the European commitments of 2020. For him "Once you have a roof over your head, you can start living." The UMF president could also add that home ownership is a noble expression of citizenship and a broadly shared desire of eco-citizenship.

Between 1997 and 2004, private homes accounted for 55% of all new buildings. The UMF's share in the private real estate market reaches 56%, both urban and country housing. UMF covers 600 brands of housing. It drives progress. "In 2007 the UMF worked together with the Crédit Foncier on an interest-free financing project to make new homes comply with applicable requirements and to significantly improve the energy performance in existing buildings," explains Louis-Victor. "In less than a year, the idea of environmental interest-free financing was reflected in the Grenelle draft environmental law. This law provides for reinforcement of interest-free loans up to €20,000 to finance the thermal improvement of new homes in compliance with applicable requirements."

The UMF also initiated the annual Innovative Home Challenge, which involves research into new construction methods and materials to build cheaper, environmentally friendly and energy-saving homes with enhanced thermal performance. "Our members gathered in Stockholm in December 2008 to discuss the environmental issues raised by the last Innovative Home Challenge, which presented us with houses combining all kinds of innovations," says Christian Lou-

is-Victor. “These projects are often the product of intellectual efforts of 30-year-old constructors who belong to the ‘environment-minded’ generation. They have quite naturally joined the bioclimatic school and are eager to fill homes with positive energy by using photovoltaic panels, Earth Tubes, air/water heat pumps with a cogeneration system, water-heat exchanger wood-burning stoves that dispose of biomass by using rainwater, waste … The homes they design are already in line with ambitious goals of Grenelle environmental law in terms of carbon dioxide. Even construction site management becomes subject to rigorous environmental control.”

Collective Commitment

Every year the UMF implements innovations developed by the industry, regarding in the field of renewable energy (specifically photovoltaic elements) or the application of active materials. Louis-Victor, always mindful of his engineering background, says: “Thanks to insulation, there will no longer be cold walls, windows have become hermetically sealed, ventilation systems allow for the control of humidity levels and heated floors provide some warmth. Soon we will be able to enhance indoor comfort by regulating wall temperatures. For example, we already have the know-how to use the thermal energy that accumulates in walls. To this end, cross walls are added with phase change materials. Throughout Europe, the market for new and reconstructed energy-efficient homes offers an important challenge that will contribute to new economic growth. The Danish, the British and the Germans, as well as we French, started following this path around 2000, some as early as 1995. We realized that we need to engage private partners and professionals to develop energy management projects.”

“The French prefer living in private houses,” says Louis-Victor. “They invest in a home, and are ready to pay for their personal happiness and comfort, as well as the pleasure of living in the house of their own choice. In this respect, they avoid relying on a remote favourable political juncture. Their choice of home, which represents their choice of life, makes sustainable development a specific project of economic and cultural value with real technological challenges. For the UMF, the economic, cultural and anthropological aspects of sustainable development — that is, all the constituent elements of wellbeing — are the sides of a triangle that encompasses our way of living. The home has always been based on cyclically developing values. It is as a kaleidoscope whose colours change depending on the angle of its axis. The green colour appears most often today. Nonetheless, the home has always symbolized the search for balance and responsibility, both in France and worldwide. Society’s challenges are changing, and the UMF’s policy evolves in line with these changes. The union’s goal is to bring the house of our dreams into reality.”

Synthesis of Values

Christian Louis-Victor notes the union’s name was changed for a purpose. “This change means that we endeavour to synthesize the key values related to the quality of life,” he says. “Naturally, there is a feeling of integrity that we have when are ‘at home,’ but there is also the perception of that inner peace by other people. The home is the foundation of social harmony, the very basis of ideal existence. It expresses our common desire to have a peaceful society. For me, the words ‘French house’ acquire a very specific meaning: that of transmitting the past knowledge, harmonious vision of the historical continuity and the preservation of the quality of life that the French have always loved so much.”

Indeed, “transmission” is a key concept for Louis-Victor. “To build a house is to extend your knowledge further,” he declares. “Hence the responsibility of a builder as the major environmental actor. It was implicit in our trade ethics, but it has now become explicit. We wish — and I am speaking on behalf of all members of l’Union des maisons françaises — that the environmental challenge facing the building industry will spread to all private houses built across Europe and, in a broader sense, throughout the entire housing sector. We would like to revive the holistic vision of the pioneers such as Godin, Henri

Sellier, Loucheur — they were the housing visionaries. Why a holistic approach? It is the desire to create a product that exceeds the sum of its parts through the creative abilities of professionals, experts, researchers working on controlling energy. Quality of life, energy saving and environmental protection are the key principles in choosing a home. For a long time, the home symbolized social progress, but now it promotes environmental awareness. A century and a half ago, the American poet Henry David Thoreau prophesied this change: “What is the use of a house if you haven’t got a tolerable planet to put it on?” There is nothing more to add.

Cooperation on Energy Bulletin Pages

Ladies and Gentlemen,

The Editorial Council invites experts, representatives of public, commercial and non- profit organizations to cooperate on the pages of our publication.

The objective of the Energy Bulletin is to facilitate development of international scientific discussions on sustainable energy development, utilization and exchange of clean energy technologies, climate change mitigation as well as to attract attention of energy experts, politicians and representatives of various economy sectors.

It is extremely important today to hold a continuous international dialogue at the level of experts, politicians and society on the issues of strengthening interdependency in the fields of energy, demand and supply security, energy efficiency and energy conservation, environmental responsibility during development and use of energy resources, energy solutions for the poorest in the developing countries.

We would be glad to consider publishing of materials on the issues staying on the top of the international agenda in the coming issues of the Bulletin.

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For notes

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