Policy Developments and Challenges in

Delivering Energy Efficiency

Energy Charter Secretariat
with cooperation from
European Bank for Reconstruction and Development
Euroheat & Power

English hard copy
ISBN 978-905948-053-7
Depot D/2007/7850/6

English pdf
ISBN 978-905948-054-4

Policy Developments and Challenges in

Delivering Energy Efficiency

Energy Charter Secretariat

September 2007

With cooperation from
the European Bank for Reconstruction and Development
and Euroheat & Power

Energy Charter Secretariat

European Bank
for Reconstruction and Development

EUROHEAT & POWER

Energy Efficiency has never been more relevant than it is today. It is a tool which allows policymakers, simultaneously, to achieve the three main objectives of energy policy:

(i) improvement of energy security;
(ii) reduction of adverse environmental impacts arising from the use of energy; and
(iii) improvement of industrial competitiveness.

Many improvements in energy efficiency can be achieved in a short time with readily available technologies and with high cost-efficiency, especially on the demand side. Projects that improve energy efficiency, in particular on the supply side, are facilitated by and dependent upon technology transfer. Moreover, the potential for and value of implementing an energy efficiency strategy exist both in monopolistic and in liberalised market economies, even if the range and the effectiveness of energy efficiency policies can increase alongside the introduction of market mechanisms.

With climate change being the principal policy driver, a large number of initiatives and measures relating to energy efficiency have been adopted in recent years at regional, national and international levels. Since the Evian Summit in 2003, G8 leaders have acknowledged that Energy Efficiency is a key area for G8 action, with the subsequent adoption at Gleneagles in 2005 of a specific Plan of Action on Energy Efficiency. Both the St.-Petersburg G8 summit (2006) and the Heiligendamm Summit (2007) confirmed the commitments made at Gleneagles and underlined the need to enhance energy efficiency and energy savings.

At regional level, the European Union has taken a range of initiatives on energy efficiency, and has also made a proposal to create a new framework agreement on energy efficiency with key external trading partner countries and international organisations. Other relevant initiatives are ongoing in the International Energy Agency (IEA), the United Nations Economic Commission for Europe, and, at national level, from many countries of the world with national plans and policy measures for energy efficiency.

The main challenge today is not to generate additional political will; this, I believe, we have. The challenge is to find a way to channel a commitment towards energy efficiency into cost-effective policies and measures, and to ensure that political will is matched by adequate financial and human resources. In short, the challenge is to deliver real and tangible energy efficiency improvements. This has to be done by maximising the added value of all outcomes from different existing initiatives.

This report presents a perspective from the Energy Charter on policy developments and trends in energy efficiency. It was prepared in response to the Ministerial Declaration of the Kiev 'Environment for Europe' Conference, held in May 2003, and represents a follow-up to the Secretariat's report 'The Road towards an Energy Efficient Future' that was presented in 2003.

Four years on from the Kiev Conference, it is clear that much has been accomplished and that efforts to improve energy efficiency have been given additional momentum by high prices and heightened concerns over climate change and energy security. Yet, it is equally evident that more needs to be done, for example to put in place the necessary institutional

capacity to formulate and implement energy efficiency policies, and to ensure good coordination between institutions responsible for improving energy efficiency, those responsible for safeguarding the environment and addressing climate change, and those in charge of economic policy-making.

It is my conviction that international cooperation to improve energy efficiency will form an increasingly prominent part of efforts to tackle climate change and enhance energy security, by providing policy momentum, a comparative analytical foundation, capacity development, and access to technologies and financing. It is in this spirit that I am very pleased to make the Charter's experience available to the 2007 Belgrade Ministerial Conference and to a wider audience, based on our work with the implementation of the Energy Charter Protocol on Energy Efficiency and Related Environmental Aspects (PEEREA).

I take this opportunity to thank the European Bank for Reconstruction and Development and also Euroheat & Power for their contributions to the text, which also benefited greatly from discussions in the PEEREA Working Group under the chairmanship of Peter Helmer Steen. Rod Janssen, consultant to the Charter Secretariat, undertook drafting and research for this report, and Tudor Constantinescu from the Secretariat ensured overall coordination of the work under the direction of Eric Sorensen and, from 1 February 2007, Dario Chello. Tim Gould assisted in finalising the text and Olga Sorokina and Galina Romanova provided essential support in preparing the English and Russian versions for publication.

This report is made publicly available under my authority as Secretary General of the Energy Charter Secretariat.

André Mernier
Secretary General
14 August 2007

THE ENERGY CHARTER TREATY

The Energy Charter Treaty provides a multilateral framework for energy cooperation that is unique under international law. It is designed to promote energy security through the operation of more open and competitive energy markets, while respecting the principles of sustainable development and sovereignty over energy resources.

The Energy Charter Treaty was signed in December 1994 and entered into legal force in April 1998. To date the Treaty has been signed or acceded to by fifty-one states plus the European Communities (the total number of its Signatories is therefore fifty-two).

The Treaty's provisions focus on four broad areas:

- the protection of foreign investments, based on the extension of national treatment, or most-favoured nation treatment (whichever is more favourable) and protection against key non-commercial risks;
- non-discriminatory conditions for trade in energy materials, products and energy-related equipment based on WTO rules, and provisions to ensure reliable cross-border energy transit flows through pipelines, grids and other means of transportation;
- the resolution of disputes between participating states, and – in the case of investments – between investors and host states;
- the promotion of energy efficiency, and attempts to minimise the environmental impact of energy production and use.

The Treaty was developed on the basis of the Energy Charter Declaration of 1991, but while this Declaration signalled the political intent to strengthen international energy ties, the 1994 Treaty is a legally binding multilateral agreement. It is the only agreement of its kind dealing with inter-governmental cooperation in the energy sector, covering the whole energy value chain (from exploration to end-use) and all energy products and energy-related equipment.

Countries shaded dark are signatories of the Energy Charter Treaty, and members of the Energy Charter Conference. Countries shaded light are observers (vertical stripes denote the countries of ASEAN).

EXECUTIVE SUMMARY

I. INTRODUCTION

1. Energy efficiency policies started after the first oil crisis in 1973 (initially as energy-saving initiatives) and have delivered important results. But they can, and should, deliver more. It is now widely recognised that well-designed energy efficiency policies have the potential to make a real contribution to achieving a variety of policy goals at local, regional, national and global levels.

2. The main drivers for improving energy efficiency in the region covered by this report[1] are energy security, concerns about global climate change and improved competitiveness. Improved energy efficiency can also help alleviate poverty and other social concerns. Today, energy security is again at the top of the international policy agenda, with high and volatile prices, concerns in some countries about increased dependence on internationally traded energy, and fears that the speed of resource development and investments along the energy value chain may not be sufficient to meet future demand at affordable price.

3. The countries covered by this report include those that have taken the lead in promoting energy efficiency and in addressing global climate change. These two policy goals are intertwined. A relatively small group of countries, together with the European Commission, has been at the vanguard of advocating a more ambitious approach to energy efficiency. This small group has expanded in the past decade and many countries now are undertaking innovative work in this area.

4. This report focuses on ways to deliver improvements in energy efficiency. In 1998, the Aarhus Environment for Europe Conference discussed and approved convincing arguments for an accelerated energy efficiency approach. Even before then, participating countries – including transition countries – had started to adapt their policies and their delivery institutions.

   A necessary condition for successful implementation of improvements in energy efficiency is sound policy design. This is not, however, a sufficient condition for success, since even the best-designed policies do not in themselves guarantee results. Significant results from energy efficiency policies and measures require a long-term commitment from governments, including the development of strong partnerships with a wide range of actors that play a part in promoting energy efficiency actions.

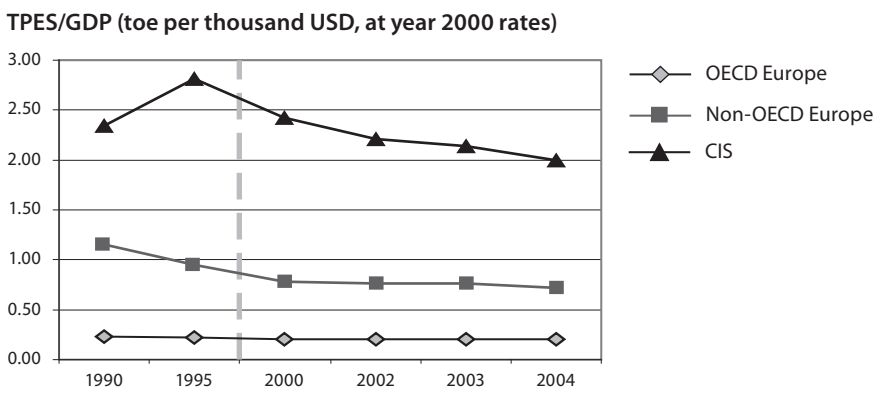
   Implementing energy efficiency measures is complex because of their effects across different sectors of the economy and because of the many stakeholders involved. Efficiency improvements also involve a wide array of technologies, depend on end-use energy prices that provide consumers with market signals and motivation to save energy, and require effective policies compatible with a market approach.

1 The report covers developments in Europe, the countries of the former Soviet Union, Australia, Canada, Japan and the United States.

II. SHOWING RESULTS – WHAT THE NUMBERS REVEAL

5. Showing quantitative results is a slow process because of the time lag between developing policies and noting the results, difficulties of attribution, and because data are reported and centralised with a certain delay. However, some trends have clear implications for both energy and environment policymakers.
6. Since 1990, primary energy production has increased 12.2% in OECD Europe, but has decreased in CIS countries[2] by 7.2% (although, after a sharp decline in the early 1990s, primary energy production in this region has been steadily increasing since 1995).
7. Energy intensity – which includes energy efficiency, fuel switching and structural changes, and is often used as a proxy to determine the level of energy efficiency improvements – has improved in all regions. Between 1990 and 2004, it decreased 13% in OECD Europe, it decreased 14.5% in CIS countries and decreased 37.4% in non-OECD Europe (see Figure 1.1).

Figure 1.1: Energy Intensity (TPES/GDP), 1990-2004

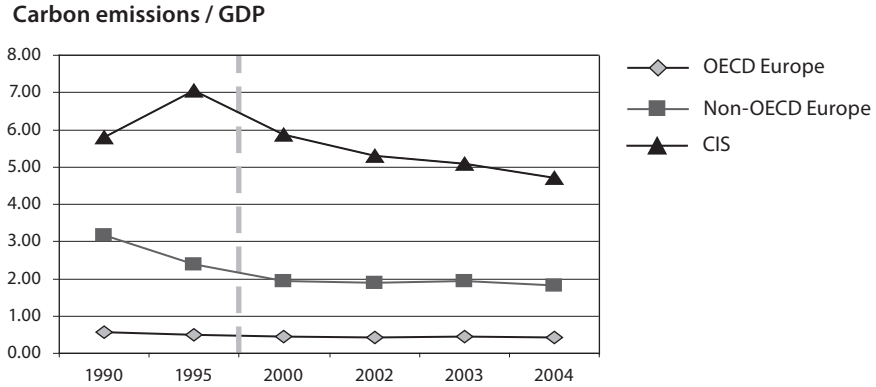


Source: IEA database

8. Over this period, carbon emissions have increased in OECD countries but not in non-OECD Europe or in the CIS countries. In OECD Europe, total CO_2 emissions increased 4.4% between 1990 and 2004. They decreased 30.9% in the CIS and 31.4% in non-OECD Europe, due initially to economic decline and later on to the economic restructuring and technological improvements. In the CIS, however, emissions have increased since 2000.
9. Carbon intensity, the carbon used per unit of economic activity, however, has decreased in all regions as shown in Figure 1.2, although this trend is less pronounced in the OECD region.

2 Commonwealth of Independent States: Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan, Turkmenistan, Uzbekistan, Ukraine.

Figure 1.2: Carbon Intensity (CO_2 emissions/GDP), 1990-2004



Source: IEA database

III. THE GROWING PRIORITY FOR ENERGY EFFICIENCY

10. At the international level, support for energy efficiency has never been stronger. The G8, European Union, the International Energy Agency, various bodies of the United Nations and the major international financial institutions (IFIs) all strongly endorse greater energy efficiency. The Kyoto Protocol and its flexible mechanisms also put a high priority on energy efficiency, even if there has been less uptake than anticipated.

> ***UN Commission for Sustainable Development, 2006***
>
> "Energy efficiency provides a win-win opportunity with many benefits including greater industrial competitiveness, better energy security and substantial reductions in carbon dioxide and other greenhouse gas emissions in a cost-effective way. There is considerable scope for improving energy efficiency in households, the transport sector and industry, including the energy industry, by changing consumption and production patterns, behaviours and lifestyles."

11. EU member states and other IEA countries covered by this report have generally accepted that energy efficiency is a major component of overall energy policy. This priority has been sharpened by the recently renewed emphasis on energy security, and also by heightened public awareness of global climate change. Nonetheless, evidence from the IEA and elsewhere indicates that many countries are still not putting a high enough priority on energy efficiency or on the development of renewable energy sources.

12. Some of the countries covered by this report do not have energy security concerns derived from increasing import dependence, largely because of abundant domestic supplies of oil and gas. Policy in some transition economies has not been driven by the obligation of meeting Kyoto GHG emissions targets, since emissions have fallen in any event as a product of economic decline in the 1990s. A concern of these countries in applying the Kyoto Protocol has been to make the flexible mechanisms of the Protocol work in their favour, for example by financing much-needed energy efficiency schemes.

IV. POLICY DEVELOPMENTS

13. The higher priority given to energy efficiency has been reflected in policy developments in many countries. The US 2005 Energy Policy Act gave a high priority to renewables and energy efficiency, allocating significant tax reductions for their promotion and introducing more stringent labelling requirements. In Europe, many changes are driven largely by the European Union and its ambitious policy agenda. A series of policy statements (Green Paper on Energy Efficiency, Action Plan on Energy Efficiency, on energy policy, on climate change) have been accompanied by legislative initiatives that have required EU member states to prepare energy efficiency action plans. This policy drive affects more than half of the countries covered by this report.
14. Even if not all EU member states are giving energy efficiency the same policy priority, the EU requires a core policy that is significantly more rigorous than many of them have had in the past. Thus, the EU is an important driver in developing national energy efficiency strategies.

Assessment by the European Bank for Reconstruction and Development (2006)

In the more advanced countries [in the Bank's region] there have at least been significant improvements over the last five years. In these countries energy prices, while often still subsidised to some customers, have increased significantly in recent years and already provide a strong signal to improve energy efficiency.

The challenge in these countries will be to tackle the wide-ranging and complex structural reforms required to change patterns of energy use and investment priorities. What will help in this respect is competent and well-resourced institutions to lead on energy-efficiency measures in each country.

Several have already been established (e.g., in Bulgaria, Czech Republic, Croatia, Poland and Romania), some of which are already world-class institutions, however many remain understaffed and underfunded.

These institutions can address in particular the cross-sectoral aspects of energy efficiency and help coordinate policy and regulatory initiatives across different sectors and ministries.

In other countries in the Bank's region there has been little improvement in energy efficiency. Energy prices remain very low, institutional or regulatory support for energy efficiency is limited or non-existent and awareness of energy-efficiency opportunities is restricted to a few industrial consumers with high levels of energy consumption and is driven by their process needs. In these countries the challenge is to put in place the basic building blocks of tariff reform, policy and regulatory support and improving awareness and knowledge dissemination.

Source: EBRD Energy Operations Policy, July 2006

15. Overall, in CIS countries, policy developments have generally been less ambitious. While importance is attached to energy efficiency and efficiency issues are often integrated it into energy laws, there is a less comprehensive approach taken than in most EU countries. The priority is lower and the approaches are less elaborated and often poorly resourced. According to the EBRD, progress in CIS countries has been impeded by a combination of low tariffs, scarce financing and an ageing industrial structure.
16. All EU member states have quantitative targets as a result of the recently approved Energy End-use Efficiency and Energy Services Directive. Several of those countries had specific targets prior to this Directive. Under the Directive, member states will plan to achieve a minimum annual energy savings target of 9% by the ninth year in the period from 2008 to 2016. The energy savings targets are indicative rather than mandatory and therefore not legally binding. However, it is felt by many analysts that if the 2006 Action Plan on Energy Efficiency is fully implemented, energy demand will decrease 13% by 2030 from today's demand.[3]
17. Of non-EU transition countries, Belarus, Moldova, the Russian Federation and Ukraine have quantified targets. For example, in Belarus, the target in the current period (2006-2010) is to reduce energy intensity by 15-20% compared to 2005.
18. It has long been argued that energy efficiency, to be truly effective, needs to be integrated into other economic and social policy areas, from industrial development to transport to environmental policy and, to a greater or lesser degree, into all areas of government responsibility. A major issue is integration with environmental policy, particularly in relation to global climate change. Improved energy efficiency is seen as a major instrument in climate change strategies and all Annex 1 countries to the UNFCCC confirm its importance. Almost all national or regional energy efficiency strategies make the direct link with climate change policy.
19. Developments in energy pricing are encouraging greater energy efficiency. Energy prices overall have become a major issue in the past years, primarily because of strong price increases for petroleum products. The world price of crude oil has

3 Ibid., p. 11.

increased sharply since 2000, and the same has been true for natural gas prices. The EBRD, in its 2006 transition report,[4] stated that there has been significant progress in the reform of energy pricing, and gave quite good marks to all transition economies in price liberalisation.

V. DELIVERING ENERGY EFFICIENCY: THE INSTITUTIONAL SITUATION

20. Good delivery of energy efficiency measures at any level of government requires an effective delivery mechanism and the resources to undertake implementation. Most countries covered by this report have an implementing organisation, often closely affiliated with the ministry responsible for energy or for environment, either integrated within the ministry or as a body directly answerable to the ministry.
21. There have been improvements in the institutional capability to implement programmes, but, particularly in many transition countries, this remains a slow process.
22. For many countries, the question about adequate resources is vital and there is often a shortage of funding for the measures themselves, as well as for the organisations to deliver them. There Is a need for both stronger capacity and resources for enforcement. This is true in both transition and non-transition countries.
23. There are many non-governmental bodies that play a vital role in promoting energy efficiency, sometimes also in delivering programmes. Whether they are representing the various energy efficiency industries (insulation, control systems, lighting, district heating, cogeneration, etc.) or advocating certain positions to promote energy efficiency at the EU level or in IFIs, their voice has grown and they have been instrumental in improving the awareness of the importance of energy efficiency and the decisions made at the national, regional or the international levels.

VI. POLICY INSTRUMENTS

24. A full range of policy measures is being used to improve energy efficiency. These measures include information/advice, financial instruments and regulatory measures (both mandatory and voluntary). What has proven most effective over the years is a judicious combination of mandatory measures combined with information and/or with financial incentives. There is a growing use of international approaches, such as the US-led "Energy Star" labelling scheme. And, more and more frequently, governments are working together with the private sector to finance, promote or implement energy efficiency measures. In federal states (like the US), partnerships built between the federal level and the state level can help to address energy efficiency in key areas, like buildings, by promoting codes, training and technical assistance.

    The choice of instruments or mix of instruments depends on the particular

4 EBRD, Transition Report 2006, London, 2006, pp. 4-5.

circumstances of the country concerned. Information and awareness are always important. When designing more specific measures, attention is in general paid to the sectors with the highest energy-saving potential and to the type of instruments with greatest potential impact. Energy audits can help many industries, notably in their phase of restructuring. Market-based energy prices give the right signals to all consumers, and can be accompanied by targeted subsidies for low-income households in order to tackle energy poverty. Voluntary agreements with manufacturers have proved to be an effective instrument in several countries in the past, and now, with the new market conditions developing throughout the region, they may be given another opportunity to show their effectiveness.

25. Financing energy efficiency measures remains a major concern. While there is assistance available from various international mechanisms and funds, many transition countries are finding it difficult to provide adequate financial resources for energy efficiency improvements. The flexible mechanisms developed in relation to climate change open some opportunity, but they have so far failed to finance many energy efficiency projects and thus have not lived up to expectations. Public-private partnerships organised with the support of various international organisations are also an important tool to catalyse financing for energy efficiency projects; such schemes have been initiated by the EBRD, World Bank and others are planned also in the framework of the UNECE.

A joint EBRD and EIB climate change initiative

The EBRD and the European Investment Bank (EIB) have established the Multilateral Carbon Credit Fund (MCCF) as a key instrument in their strategy for combating climate change. Fully subscribed, with €165 million in commitments, the MCCF is one of the few carbon funds dedicated specifically to countries from Central Europe to Central Asia.

Shareholder countries can purchase carbon credits from emission reduction projects financed by EIB or EBRD to meet their mandatory or voluntary GHG emission reduction targets. Countries can also participate via the MCCF in green investment schemes. This is an innovative way to facilitate government-to-government trade in carbon credits, whereby the selling country uses the revenue from the sale of carbon credits to support investments in climate-friendly projects.

Carbon credits can be generated from a large variety of project types, all of which reduce or avoid GHG emissions and are of interest to the MCCF including, inter alia, energy efficiency in industry (co-generation) and larger projects in the residential sector (double glazing, insulation).

Source: www.ebrd.com

26. Many transition countries, however, depend on only a few instruments and do not maximise the potential of, for example, mandatory minimum energy performance standards, appliance labelling and voluntary programmes.

VII. SECTORAL ISSUES

27. Apart from transportation, the sector that has received the single greatest policy attention has been buildings. This has been a priority for almost all participating countries. The potential for energy savings is high; according to the IEA, buildings and appliances can contribute around a quarter of possible reductions in CO_2 emissions to 2050.[5]

28. Recent analysis shows that there is significant potential to reduce the energy consumption in lighting. Australia has announced its intention to ban incandescent light bulbs and the EU is considering the same. An IEA study states that global emissions caused by lighting amount to 1,900 Mt of CO_2, which is 70% of the emissions of global passenger cars and three times more than the emissions from aviation.[6]

29. The industrial sector is important for energy savings and emissions reductions. Large industry in the EU is participating in the EU Emissions Trading Scheme (ETS) and there are plans to expand the trading system to more sub-sectors within the industrial sector.

30. Transport is a high priority for many reasons, including the increasing effect it is having on GHG emissions and its high dependence on fossil fuels. This has been a challenge for government for decades, due to the lack of many cost-effective alternatives. Both the CO_2 limitations per km in the EU and the revised fuel efficiency standards in the US are expected to help in curbing energy demand in the transport sector. Other measures like labelling of cars, eco-driving, the introduction of biofuels, use of taxation and modal shifts are contributing to improving the overall efficiency of the transport sector, but have been slow to make any significant headway.

VIII. OVERALL CONCLUSIONS

31. There have been many accomplishments over the last few years. There is a better policy and legislative foundation that will produce good results in the future. There is momentum and the policy drivers of climate change and energy security are putting energy efficiency higher up the political agenda. Both energy and environment policymakers should feel confident that there will be strong improvements in energy efficiency in the region covered by this report. Nevertheless, while there are encouraging signs, governments need to devote adequate resources and political commitment in order to ensure that those results are forthcoming. For more results to be delivered in a timely and cost-effective manner, however, there are still many areas of policy, regulation and implementation that need to be improved.

5 IEA, Energy Technology Perspectives, OECD, Paris, 2006, p. 144.

6 IEA, Light's Labour's Lost, Policies for Energy-efficient Lighting, OECD, Paris, 2006, p. 31.

32. The main conclusions in this report are:

(a) While there has been good progress in many parts of Europe, the results are uneven and the gap is growing in terms of developing and implementing policies and measures to promote energy efficiency between EU member countries and CIS countries.

(b) Energy efficiency policies are improving and the regular update of policies to reflect changing circumstances and priorities is welcome. The priority for energy efficiency at the international level has never been higher. This is also true at the national level, although the level of commitment depends on national circumstances, such as the energy security situation and/or concerns about global climate change. There is some evidence of an imbalance in the priorities for energy efficiency and renewable energy, with many cost-effective energy efficiency opportunities being overlooked.

(c) There are several countries which have made significant efforts and progress in the area of energy efficiency. The European Union is a major driver in promoting energy efficiency and global climate change strategies and its regulatory influence extends well beyond its border of 27 countries.

(d) Implementing energy efficiency policies is complex and requires a good delivery mechanism (implementation agencies or set of agencies) together with the necessary human and financial resources. Too often, national efforts are under-resourced, particularly in many transition countries. There are signs of improvements but they are slow to materialise, given the benefits that can be expected. Good implementation also means the best use of available stakeholders from local authorities, industry groups, energy supply companies, energy service companies and non-government organisations.

(e) The full range of policy instruments is being used throughout the region: from information to financial incentives, fiscal policies and regulatory measures. However, these instruments are not used equally or uniformly throughout the region. Many transition countries, especially some in the CIS, have not fully developed their use of the range of instruments, either for lack of policy commitment or for lack of resources.

(f) There is a need to better exploit the benefits that improving energy efficiency brings to the environment, both at global level by mitigating climate change and at local level by reducing local pollutants. The potential is significant and improved energy efficiency can play a major role.

(g) It is necessary to better integrate energy efficiency into the full range of national and regional policies and programmes of global climate change measures, and in particular, for the countries concerned in the implementation of the flexible mechanisms of Emissions Trading, Joint Implementation and the Clean Development Mechanism.

(h) The continuing reform of energy prices and the removal of environmentally harmful subsidies should be encouraged in order to support energy efficiency and environmental policies. Appropriate energy price signals play a major role in encouraging consumers to undertake energy efficiency actions.

(i) There is good work being undertaken in the buildings sector, for district heating and cogeneration, and for appliances. The EU is giving a high priority to all three areas and a comprehensive set of measures is in place and is now being implemented.

(j) The transport sector remains a major concern in all countries covered by this review. It is a complex and growing sector, mostly dependent on fossil fuels and, thus, a sector where GHG emissions are increasing significantly.

(k) All countries need to ensure they have good monitoring and evaluation systems set up in order to regularly assess the progress being made in their energy efficiency policies and programmes.

(l) No country in the region can afford to be complacent. There is considerable scope for more action, even in the countries that have relatively strong policies and programmes. These countries are generally the first to admit they can and should do more.

(m) Energy efficiency cannot be improved in isolation and it requires governments to work together with a wide range of actors in all end-use sectors, with the energy supply industries and the financial sector.

(n) International cooperation is very important in promoting energy efficiency. The international community provides valuable policy momentum, the comparative analytical foundation, capacity development, technology development and financing. It also allows countries to learn from each other, as is the case in peer reviews for the Energy Charter. International cooperation can be regional (or even global) or sub-regional, and is still needed to support capacity-building in some of the countries that have been lagging behind.

PART 1

PART 1 – THE FOUNDATION FOR DELIVERY

Countries participating in the Environment for Europe process have, for the most part, embraced the importance of energy efficiency and have taken steps to implement energy efficiency policies. The importance of improving energy efficiency has never been stronger. This report focuses on how participating countries are implementing energy efficiency policies and programmes to achieve real impact.

PART 1 looks at the context in which energy efficiency policies are being delivered. It explores the international policy developments to review how the priority for energy efficiency has been evolving in recent years and how energy efficiency is so integrally linked to global environmental concerns and energy security. This section also analyses energy demand trends and what factors are affecting these trends.

CHAPTER 1

INTERNATIONAL POLICY DEVELOPMENTS AFFECTING ENERGY EFFICIENCY

INTRODUCTION

Over the years, energy efficiency policies have delivered important results in terms of reducing energy intensity, reducing energy demand below the business-as-usual scenario and in reducing associated GHG emissions. Energy efficiency policies and programmes can deliver more, should deliver more and are expected to deliver more. This sentiment is widely held globally and definitely true throughout most of Europe today. More than ever, energy efficiency is seen as a major tool in addressing many of the local, regional, national and global issues that our societies face. Whether it is to reduce consumer energy costs, improve competitiveness, reduce harmful environmental effects, help make societies more secure in terms of energy, improved energy efficiency has a fundamental role.

The policy environment at the present time is very fluid. There are trends and issues – often in conflict with one another – that are giving decision -makers difficulty. Globalisation, global climate change, energy security, fuel poverty, access to energy, restructuring, transition, and sustainable development – these are phrases that all are confronted with daily. In terms of global impacts, there is growing concern how fast-growing countries such as China and India will affect the global energy system, not to mention the global environment. There are also European and Asian countries that are still in some phase of transition to a market economy, requiring comprehensive and sustained strategies in order to tackle economic, structural and environmental legacies.

These issues require a long-term perspective and a steady, consistent policy foundation that gives coherent and effective signals to all actors. Societies too often want 'instant' solutions and results. But, as seen by the transition process itself, patience is required. There are no instant results, certainly few that would be sustainable.

The main drivers for energy efficiency today remain energy security and global climate change, together with other environment-related issues, and followed closely with the need to improve industrial competitiveness.

Energy efficiency policies started in the 1970s because of energy security concerns after the major energy crises; the link between energy efficiency and energy security subsequently faded, but has now been firmly re-established since 2000 as prices have become higher and more volatile and many countries have become increasingly reliant upon internationally traded energy.

On the environment, there are two major milestones in recent years that are having a major effect on energy efficiency. First, the World Summit on Sustainable Development in Johannesburg in 2002 continued to build on the importance of energy efficiency in promoting sustainable development and re-enforced its support for the United Nations Framework Convention on Climate Change (UNFCCC). The breakthrough for the UNFCCC was the negotiation, ratification and entry into force of the Kyoto Protocol (see box).

The Kyoto Protocol

The Kyoto Protocol is an agreement made under the UNFCCC. Countries that ratify this protocol commit to reduce their emissions of carbon dioxide and five other greenhouse gases, or engage in emissions trading if they maintain or increase emissions of these gases.

Governments are separated into two general categories: developed countries, referred to as Annex 1 countries (who have accepted GHG emission reduction obligations); and developing countries, referred to as Non-Annex 1 countries (who have no GHG emission reduction obligations).

Any Annex 1 country that fails to meet its emissions target must make up the difference in the second commitment period, plus a penalty of 30%.

In the period 2008-2012, Annex 1 countries have to reduce their GHG emissions by around 5% below their 1990 levels (for example, for EU member states, this corresponds to about 15% below their expected GHG emissions in 2008). Reduction targets expire in 2013.

The treaty was negotiated in Kyoto, Japan in December 1997, and came into force on February 16, 2005 following ratification by Russia on November 18, 2004. As of August 2006, a total of 165 countries and other governmental entities have ratified the agreement (representing over 61.6% of emissions from Annex 1 countries).

It is with respect to the environment that attention has once more turned to energy efficiency. The warnings about global climate change are getting starker, as described in the recent assessment reports of the Intergovernmental Panel on Climate Change (IPCC). The question remains how to slow that change down or reverse it, and to lessen its impact. Undoubtedly, global problems need global responses and it can take considerable time to build a sustainable consensus. In Europe, this consensus is taking shape and there is a strong region-wide commitment to reducing GHG emissions.

Energy Efficiency – the fastest and cheapest

Improving energy efficiency is often the cheapest, fastest and most environmentally friendly way to meet the world's energy needs. Improved energy efficiency also reduces the need for investing in energy supply. Many energy efficiency measures are already economic and they will pay for themselves over their lifetime through reduced energy costs.

IEA, Energy Technology Perspectives, 2006, OECD, p. 31

The serious risks associated with the current path are made clear in the IEA's *World Energy Outlook 2006* which projected that, without major changes to current policies, CO_2 emissions will grow more than 50% by 2030 and total energy use will increase by 53%.[7] Most of the energy growth is in developing countries. But, what is most unsettling

7 Reference scenario (business-as-usual case) in the IEA, World Energy Outlook 2006, OECD, Paris, 2006, p. 65.

for policymakers is that this analysis shows that the energy system is becoming more carbon-intensive, and not less. Coal is expected to play a greater role in the overall energy balance and, given current technologies, this is not a good sign for global emissions.

> Is this sustainable? Is there more that can be done starting now? And where do energy efficiency policies and programmes fit in?

Being so prominent on the political agenda raises a new set of concerns about having to be more systematic, comprehensive and steadfast in implementing long-term energy efficiency policies and programmes – and delivering results.

Improving energy efficiency is generally seen as a positive, relatively low-cost policy option. There may be some negative impacts but improved energy efficiency is almost entirely positive. But this does not mean that these 'positive' outcomes are easily acheived. Most OECD countries have had comprehensive energy efficiency strategies since the 1970s, but a truly 'energy-efficient' economy remains elusive. Governments at all levels that have developed and implemented policies will admit that it is not simple and straightforward. Part 1 of this report is a testament to that.

One of the major arguments for improved energy efficiency is that there is so much potential for cost-effective energy savings. European economies still waste too much energy. The European Commission stated in its 2006 Action Plan on Energy Efficiency that the EU could save 20% in a cost-effective manner. Many other studies have given similar figures.[8] Some argue that these percentages are conservative, but the underlying argument is not in dispute: there is much that can be done.

The numbers look even better when getting down to specific technologies or groups of technologies. In its 2006 technology scenario study, the IEA stated that, in many countries, new buildings could be made 70% more efficient than existing buildings. The study concludes that with an accelerated technology scenario, "improved energy efficiency in the buildings, industry and transport sectors leads to between 17 and 33% lower energy use than in the Baseline [reference] scenario by 2050".[9] Impressively, energy efficiency accounts for between 45 and 53% of the total CO_2 emissions reduction relative to the Baseline scenario. And the other options include the use of renewables, changing the fuel mix, carbon capture, nuclear, coal to gas, and so on. No other option has the impact that increased energy efficiency has. Thus, harnessing energy demand through efficiency gains is essential.

So, if global climate change is a major policy driver, then improved energy efficiency should be the foundation of any GHG emissions reduction strategy.

---

8 The issue is what is meant by cost-effectiveness: whether it is at the individual consumer's level or at the national or global level. Also, what externalities have been built into the pricing system to account for them. Those have a significant impact on what is considered "cost effective".

9 Ibid., p. 28.

A POSITIVE INTERNATIONAL POLICY CLIMATE

Energy policy is always made in a dynamic environment, and this is true today. International oil and natural gas prices have increased significantly in recent years, in part due to the situation in the Middle East; fast-rising demand in countries such as China and India; and because of concerns about tightening oil and natural gas supplies. There is no indication that prices will drop significantly; there is a need to be prepared for a high-cost energy future.

Over recent years there have been price shocks that, fortunately, did not lead to the economic collapse of the 1970s. Nonetheless, as energy systems become more complex, as pipelines cross more borders, as demand becomes harder to predict, as political insecurity plays a major role, then energy security is going to be a major concern. Modern economies need energy services. Energy security for a modern society, however, does not mean necessarily having more energy. It can mean better use of energy, more flexible energy systems that rely on a wider range of fuels, with as much reliance on local resources (especially renewables) as possible.

On the environmental side, the Kyoto Protocol is now being implemented with the first commitment period of 2008-2012 quickly coming. There are some complex questions to solve. The flexible mechanisms of Joint Implementation (JI), the Clean Development Mechanism (CDM) and emissions trading have not yet reached their potential and are having difficulty encouraging projects in energy efficiency. Major countries such as Australia and the United States have decided to stay out of the Kyoto Protocol, making the global tool less global. Canada has ratified but the current government has decided that it will not meet its commitments. Discussion on the new phase after the first commitment period (2008-2012) is controversial because there is growing momentum for the major energy-consuming developing countries – at least Brazil, China, India and South Africa – to accept GHG emissions targets. Moreover, many of the participating Annex 1 countries are going to fall short of reaching their Kyoto target for 2008-2012 and will have to resort to getting more emission reduction credits externally than previously expected.

THE STRENGTHENING INTERNATIONAL VOICE

Many international organisations have firmly linked energy efficiency improvements with energy security and/or the environment, especially global climate change.[10]

- At the G8 Summit in St.-Petersburg in 2006, the leaders of the eight industrialised nations adopted an Action Plan on Global Energy Security, which included a commitment to increase efforts to boost energy efficiency, to move forward with timely implementation of the Gleneagles G8 Plan of Action for Climate Change, Clean Energy and Sustainable Development, and underlined that outcomes from this Action Plan can also be relevant to the dialogue on long-term cooperation to address climate change under the UNFCCC.

10 See Chapter 7 below for more on international cooperation.

- The European Union has given a strong endorsement to energy efficiency in recent years. Recent actions include the October 2006 Action Plan on Energy Efficiency and the proposal by the European Commission in January 2007 of a comprehensive package of measures, including on energy efficiency, to establish a new Energy Policy for Europe to combat climate change and boost the EU's energy security and competitiveness. At the same time, the Commission set out proposals and options for keeping climate change to manageable levels in its Communication "Limiting Global Climate Change to 2° Celsius: The way ahead for 2020 and beyond." The European Council on March 8-9, 2007 confirmed the importance of energy efficiency.

> ***The European Council:***
>
> - stresses the need to increase energy efficiency in the EU so as to achieve the objective of saving 20% of the EU's energy consumption compared to projections for 2020 . . .
>
> *Presidency Conclusions, Brussels, March 8-9, 2007*

- The Report on the fourteenth session (22 April 2005 and 1-12 May 2006) of the UN Commission on Sustainable Development,[11] stated:

> 22. Energy efficiency provides a win-win opportunity with many benefits including greater industrial competitiveness, better energy security and substantial reductions in carbon dioxide and other greenhouse gas emissions in a cost-effective way. There is considerable scope for improving energy efficiency in households, the transport sector and industry, including the energy industry, by changing consumption and production patterns, behaviours and lifestyles.

- Energy efficiency is an integral policy area for the UN-Economic Commission for Europe, the UN Development Programme and the UN Environment Programme.

11 See http://www.un.org/esa/sustdev/csd.

THE POLICY CONTEXT FOR ENERGY EFFICIENCY POLICY

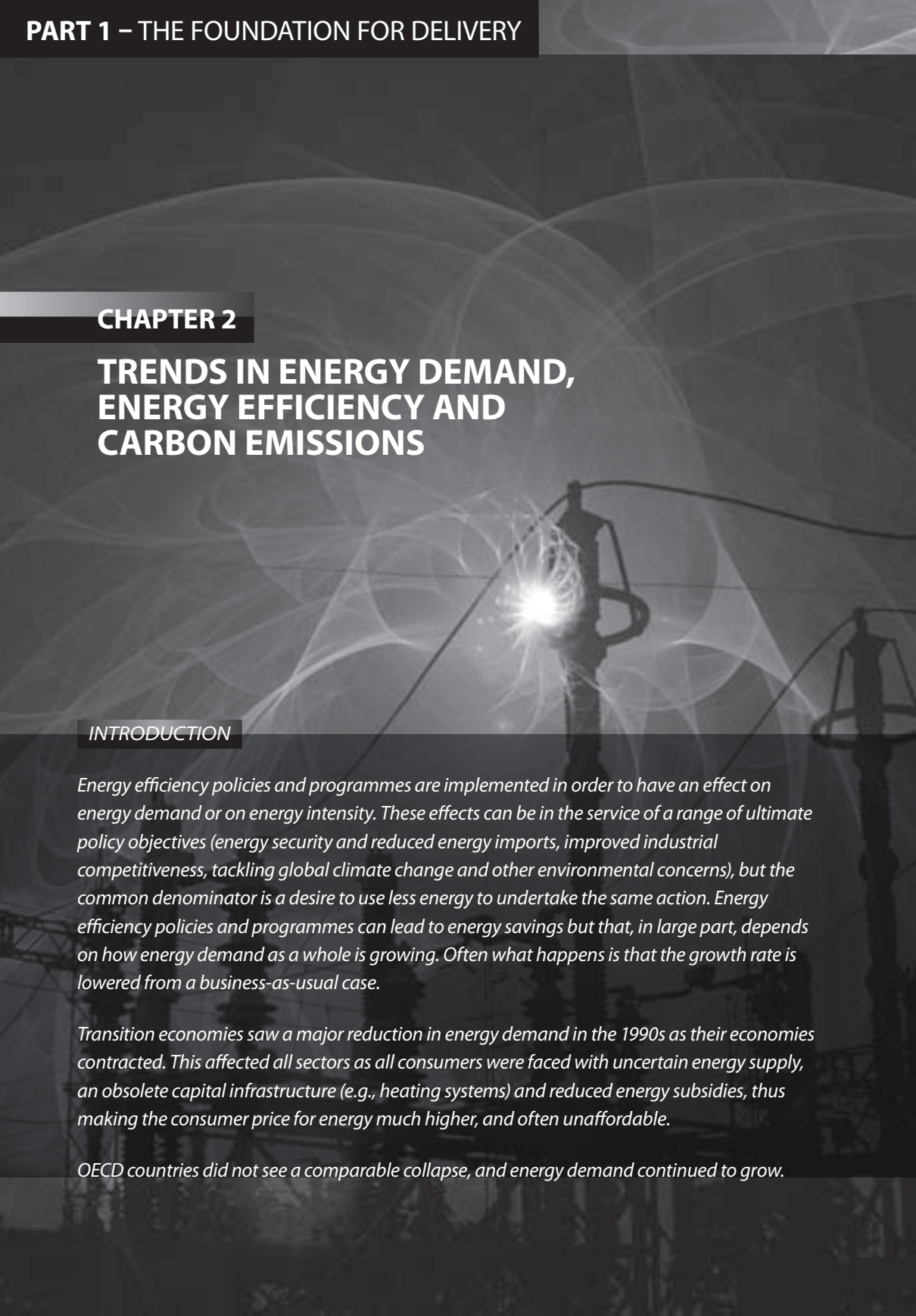
Whether addressing energy security issues, environmental concerns or even improved competitiveness, there is a complex – often confusing – context in which to develop and implement energy efficiency policy. Energy efficiency is a means to reach policy objectives in each of these areas, but this depends on 'delivery' – on a policy framework that is robust and comprehensive, with adequate resources to ensure success.

It is relatively easy to implement one energy efficiency measure in an individual home or business. It is much more difficult to translate those lessons learned from that project into a nation-wide strategy – and to make it work.

There are still sceptical audiences, not convinced that energy efficiency can achieve its cost-effective potential and not convinced that demand-side efficiency measures can really make a difference for energy security or such environmental issues as global climate change. There are also questions as to the role of governments, with some believing that the price mechanism alone is sufficient to promote energy efficiency.

Yet scepticism can also be attached to supply-side solutions, often the first solutions for which governments reach, but where major new developments can be significantly behind schedule or have huge cost overruns, often needing large subsidies and / or creating environmental damage.

A main aim of this report is to provide a basis for assessing the benefits of developing and implementing an energy efficiency strategy. The countries covered by the report have, for the most part, a strong policy framework, and much has been achieved already. The process of delivering energy efficiency, however, is far from complete.



CHAPTER 2

TRENDS IN ENERGY DEMAND, ENERGY EFFICIENCY AND CARBON EMISSIONS

INTRODUCTION

Energy efficiency policies and programmes are implemented in order to have an effect on energy demand or on energy intensity. These effects can be in the service of a range of ultimate policy objectives (energy security and reduced energy imports, improved industrial competitiveness, tackling global climate change and other environmental concerns), but the common denominator is a desire to use less energy to undertake the same action. Energy efficiency policies and programmes can lead to energy savings but that, in large part, depends on how energy demand as a whole is growing. Often what happens is that the growth rate is lowered from a business-as-usual case.

Transition economies saw a major reduction in energy demand in the 1990s as their economies contracted. This affected all sectors as all consumers were faced with uncertain energy supply, an obsolete capital infrastructure (e.g., heating systems) and reduced energy subsidies, thus making the consumer price for energy much higher, and often unaffordable.

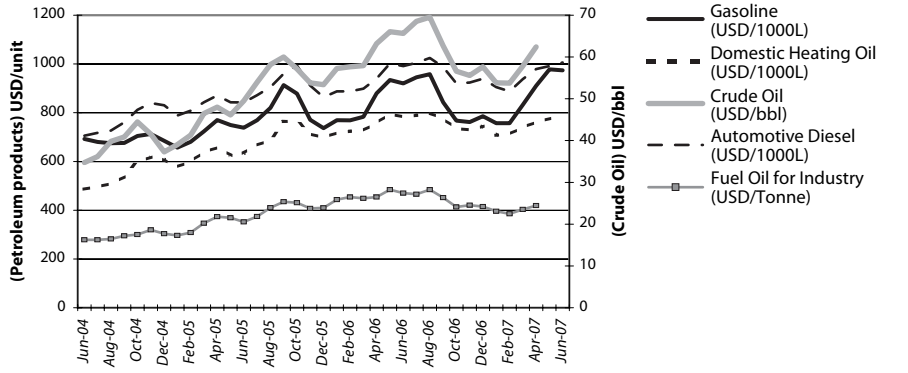
OECD countries did not see a comparable collapse, and energy demand continued to grow.

TRENDS IN ENERGY PRICES

In the past two years, energy prices have shown great volatility, as shown in Figure 2.1 below. For oil importing countries, this caused concerns about costs but also had implications about energy security. The IEA's *World Energy Outlook 2006* estimated that the high crude oil prices in the last few years have reduced global economic growth by about 0.3% per year on average since 2002.[12]

The EBRD, in its 2006 transition report,[13] stated that the reform of energy pricing had made significant progress, giving quite good marks to all transition economies in price liberalisation.

Figure 2.1: End-user Petroleum Product Prices and Average Crude Oil Import Costs, January 2007



Source: www.iea.org

The IEA has recently reviewed the energy pricing policies in Ukraine and it is illustrative of what is going on in transition economies. Electricity, natural gas and district heating prices for the residential sector, until recently, were lower than even Russia, one of Ukraine's main suppliers of energy.[14] While there were pricing reforms underway, real prices actually declined from 2000 to 2005. This changed in 2006, with the steep increase of imported natural gas. The National Electricity Regulatory Commission (NERC) raised gas prices by 25% in May 2006 and then a further 80-85% from July 2006. Prices are still not at full cost recovery and NERC expects that to be achieved by 2008.

12 IEA, World Energy Outlook 2006, OECD, Paris, 2006, p. 269.

13 EBRD, Transition Report 2006, London, 2006, pp. 4-5.

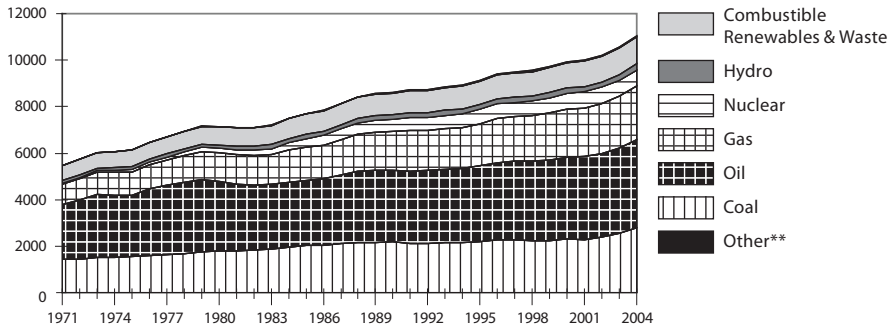
14 M. Evans, "Energy Prices, Tariffs, Taxes and Subsidies in Ukraine," in IEA, Energy Prices & Taxes, 4th Quarter 2006, OECD, Paris, 2007, pp. xi-xii.

KEY ENERGY INDICATORS

It is useful to put energy demand in perspective.

Globally, energy demand continues to grow (see Figure 2.2), and the trend since 1971 has been fairly consistent.

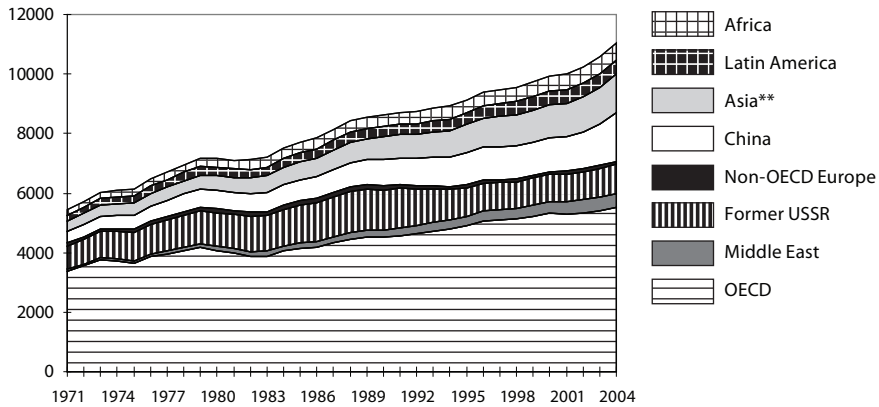
Figure 2.2: Evolution from 1971 to 2004 of World Primary Energy Supply by Fuel (Mtoe)



Source: IEA, Key World Energy Statistics 2006, OECD, Paris, p.6

On a regional basis, the change in energy demand is shown in Figure 2.3.

Figure 2.3: Evolution from 1971 to 2004 of World Total Primary Energy Supply by Region (Mtoe)



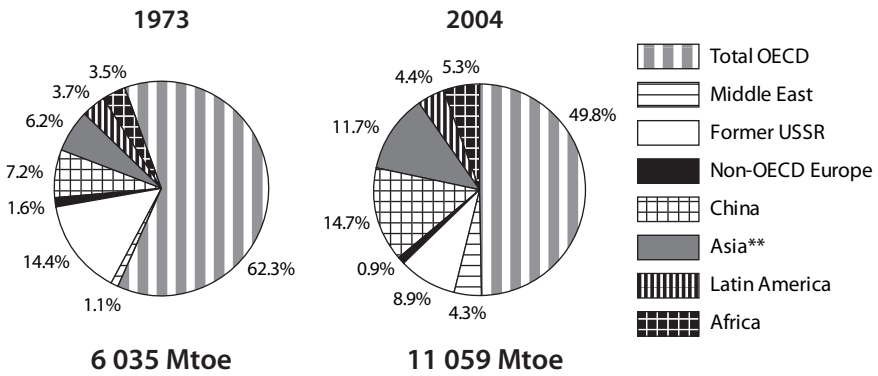
Source: IEA, Key World Energy Statistics 2006, OECD, Paris, p.8

This shows that OECD countries have had a slower growth rate than most regions but it is by far the largest consumer.

Figure 2.4 shows the change in the regional shares in TPES between 1973 and 2004. What is important to note is the decreasing share of the regions covered by this report: for

the OECD from 62.3% to 49.8%, for the FSU, from 14.4% to 8.9% and for non-OECD Europe, from 1.6% to 0.9%. Nevertheless, the combined regions represent 59.6% of global TPES.

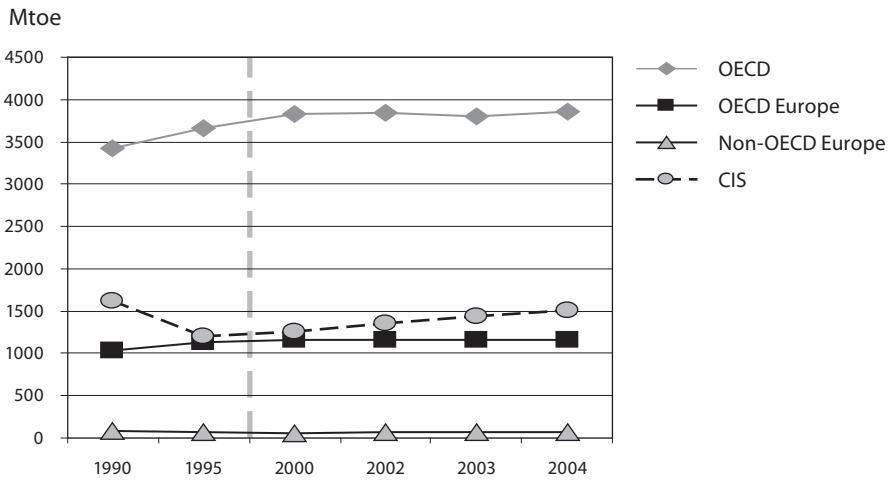
*Figure 2.4: 1973 and 2004 Regional Shares of TPES**



** Excludes international marine bunkers and electricity trade*
*** Asia excludes China*
Source: IEA, Key World Ene rgy Statistics 2006, OECD, Paris, p.8

Figure 2.5 shows energy production in the region covered by this report. For the OECD region and for OECD Europe, it has hardly changed in recent years. For CIS countries, there has been a steady increase since 1995.

Figure 2.5: Energy Production, 1990-2004

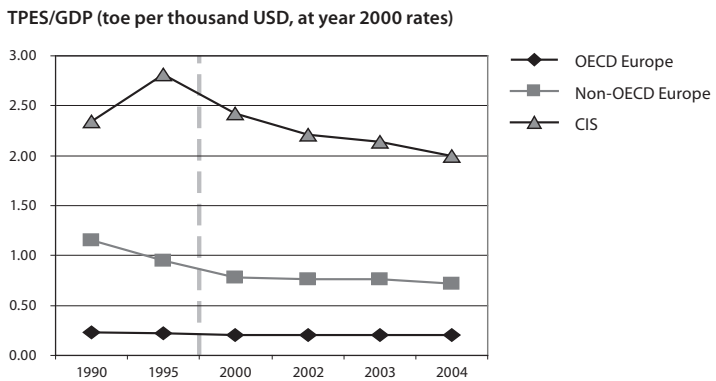


Source: IEA statistics

KEY INDICATORS IN ENERGY INTENSITY

Figure 2.6 shows the change in energy intensity for participating countries. Energy intensity in CIS countries has steadily declined since 1995, in part due to major restructuring of the economies, but it remains much higher than in OECD and OECD-Europe (virtually the same line).

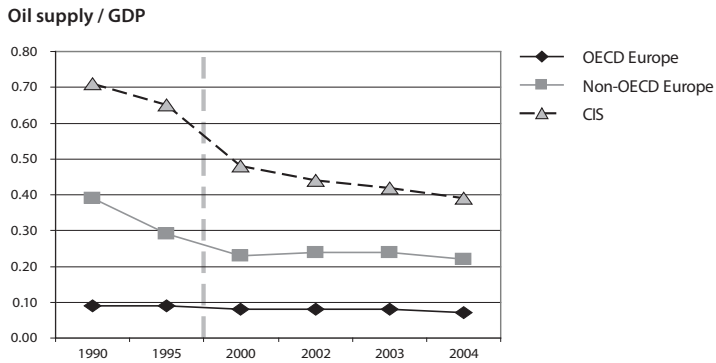
Figure 2.6: Changes in Energy Intensity (TPES/GDP), 1990-2004 (toe per thousand US$)



Source: IEA statistics

Oil intensity (see Figure 2.7) has fallen in all regions, although it is most pronounced in CIS countries, even though they remain the most intensive.

Figure 2.7. Oil Intensity, 1990-2004

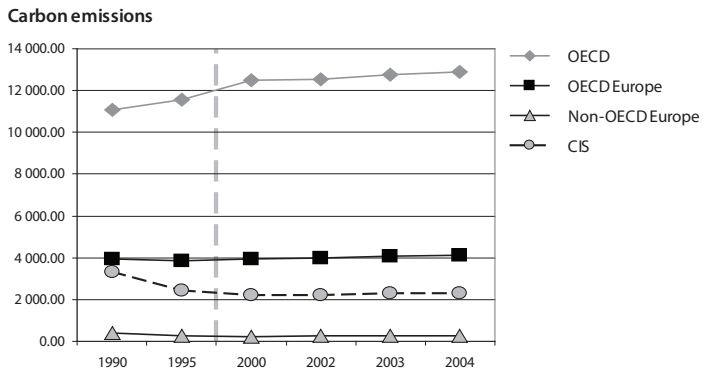


Source: IEA statistics

CARBON EMISSIONS

Figure 2.8 shows the evolution of CO_2 emissions in the region covered by this report. For the OECD as a whole, emissions have increased from 11,078 million tonnes of CO_2 in 1990 to 12911 tonnes in 2004. Even OECD Europe has seen a slight increase from 3949 million tonnes in 1990 to 4122 million tonnes in 2004. CIS countries and non-OECD Europe have seen declines, mainly due to the economic contraction in the early 1990s. For the CIS countries, carbon emissions have increased since 2000.

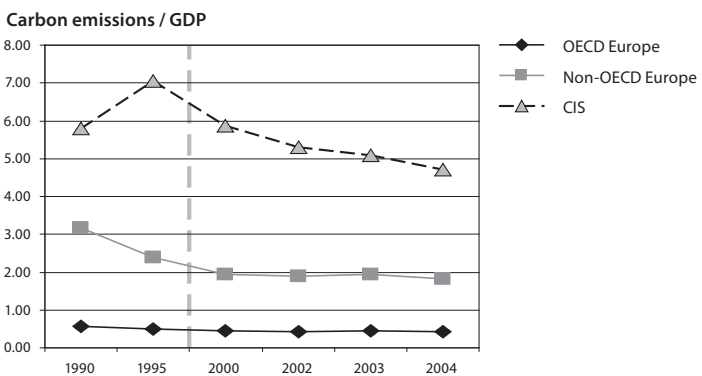
Figure 2.8: Carbon Emissions, 1990-2004 (million tonnes of CO_2)



Source: IEA database

While carbon emissions have increased in OECD countries, they have dropped in terms of emissions per unit of economic activity since the mid-1990s. Since 2000, there has been little noticeable change in OECD Europe. The CIS countries have shown a gradual decrease since 1995 (see Figure 2.9).

Figure 2.9: Carbon Intensity (CO_2 emissions/GDP), 1990-2004



Source: IEA database

CHAPTER 3

ENERGY EFFICIENCY'S CONTRIBUTION TO THE ENVIRONMENT, SUSTAINABLE DEVELOPMENT AND ENERGY SECURITY

INTRODUCTION

It has been well documented how the energy cycle, from extraction through to energy end-use, is responsible for many of the current environmental concerns at the local, national and global levels. Essentially, the energy sector is linked with many of the major environmental problems countries are confronted with – from deforestation to water pollution, from air quality to health problems. There are environmental impacts at all points of the energy cycle from extraction through to usage. This report deals primarily with issues relating to energy end-use.

Particularly since the early 1990s, energy efficiency has been closely linked to climate change policies, and climate change is one of the most important environmental areas facing the globe today. The 1992 Conference on Sustainable Development in Rio de Janeiro raised the awareness of global climate change issues, even though Agenda 21, the work programme approved at the 1992 Conference, did not include a specific chapter on energy.

Countries covered by this report have been supportive of the efforts to address global climate change through the UN Framework Convention on Climate Change in 1992, which came into effect in March 1994. The Convention was the first global attempt at internalising some environmental costs into energy planning and decision-making. The Kyoto Protocol followed in 1997 and came into force on February 16, 2005, the ninetieth day after the ratification by Russia. Of the countries covered by this report, Australia and the United States did not ratify the Kyoto Protocol and thus are not participating. Thirteen participating countries are non-Annex 1 countries, meaning they have no specific targets for GHG emissions. All the other participating countries are within Annex 1 and do have specific GHG emissions targets to meet.[15]

The Protocol on Energy Efficiency and Related Environmental Aspects (PEEREA) under the Energy Charter Treaty came into force in 1998. In its preamble, the Protocol states that it was developed.

15 More on the Kyoto Protocol and its flexible mechanisms is available later in the report.

> "Recognising that improvements in energy efficiency reduce negative environmental consequences of the energy cycle including global warming and acidification."

Article 1 (1) further states that the Protocol "defines principles for the promotion of energy efficiency as a considerable source of energy and for consequently reducing adverse environmental impacts of energy systems".

Article 1 of *PEEREA* states that one of the main objectives of the Protocol is "the promotion of energy efficiency policies consistent with sustainable development." All Contracting Parties of the Protocol have embraced the importance of sustainable development and most are developing strategies towards that end. Energy efficiency is a major component of such a strategy.

In recent years, there has been a growing body of support for improved energy efficiency and the role it can play in addressing many of the pressing environmental and energy security issues. One of the most important in recent years has been the G8 process. At the G8 summit in St.-Petersburg in 2006, the leaders of eight industrialised nations adopted an Action Plan on Global Energy Security, which included an agreement to increase efforts to boost energy efficiency. These efforts were reinforced by the G8 at their summit in Heiligendamm in 2007.

In their St.-Petersburg Action Plan, G8 leaders agreed to move forward with timely implementation of the Gleneagles G8 Plan of Action for Climate Change, Clean Energy and Sustainable Development, and underlined that outcomes from this Action Plan can also be relevant to the dialogue on long-term cooperation to address climate change under the UNFCCC.

The leaders agreed to encourage improved energy efficiency labelling programmes and standards, including examining in more detail the issues of standby power and standards for set top boxes, digital TVs and lighting. In addition they committed to raising public awareness of climate change and the importance of energy efficiency and energy saving.

From the G8 St.-Petersburg Action Plan on Global Energy Security, July 2006

1. We reaffirm our commitment to implement and build upon the agreements related to energy reached at previous G8 summits. We will enhance global energy security through actions in the following key areas:

   - *increasing transparency, predictability and stability of global energy markets;*
   - *improving the investment climate in the energy sector;*
   - *enhancing energy efficiency and energy saving;*
   - *diversifying energy mix;*
   - *ensuring physical security of critical energy infrastructure;*
   - *reducing energy poverty;*
   - *addressing climate change and sustainable development*

   …

Enhancing Energy Efficiency and Energy Saving

15. Energy saved is energy produced and is often a more affordable and environmentally responsible option to meet the growing energy demand. Efforts to improve energy efficiency and energy saving contribute greatly to lowering the energy intensity of economic development thus strengthening global energy security. Increased energy efficiency and conservation reduce stress on infrastructure and contribute to a healthier environment through decreased emission of greenhouse gases and pollutants.

16. We will move forward with timely implementation of the Gleneagles Plan of Action. We have instructed our relevant ministers to continue the Dialogue on Climate Change, Clean Energy and Sustainable Development and report its outcomes to the G8 Summit in 2008. We call upon other states, especially fast-growing developing economies, to join the corresponding G8 initiatives.
    These outcomes can also be relevant to the dialogue on long-term cooperation to address climate change under the UNFCCC. Those of us who have ratified the Kyoto Protocol recognise the role of its flexibility mechanisms in promoting energy efficiency. It is important to engage the private sector and other stakeholders in achieving these ends.

From the G8 Heiligendamm Summit Declaration, June 2007
Energy Efficiency

62. The global potential for saving energy is huge. According to the International Energy Agency, successfully implemented energy efficiency policies could contribute to 80% of avoided greenhouse gases while substantially increasing security of supply.

63. We recognise that enhanced international cooperation offers enormous opportunities. Against this background we are committed to further strengthening and increasing our efforts of cooperation, both at inter-state level as well as within the framework of the respective international fora and organisations.

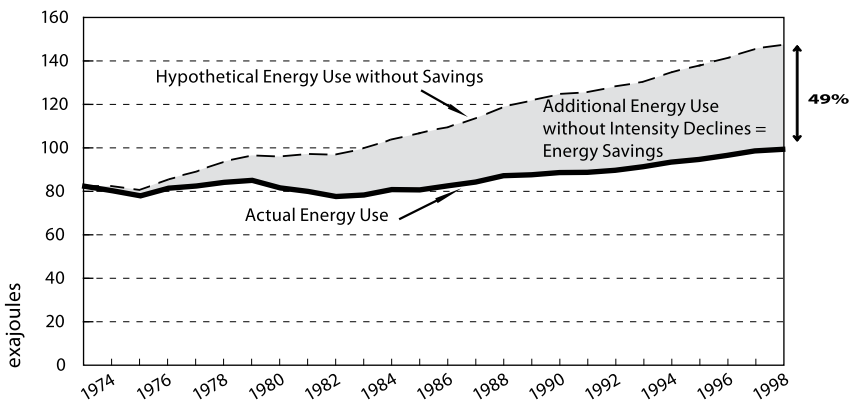
    To this end, we will
    - *continue and further substantiate our energy-efficiency dialogue begun at Evian;*
    - *move forward with implementing the Gleneagles and St.-Petersburg Action Plans, thereby retaining and supporting the IEA's close involvement;*
    - *take forward the concrete recommendations on energy efficiency presented by the IEA and consider drawing on these when preparing national energy efficiency plans;*
    - *encourage the World Bank and other IFIs to further broaden and improve their financial framework for energy efficiency and clean energy;*
    - *note the EU's proposal for an international agreement on energy efficiency and ask the Gleneagles Dialogue on Climate Change, Clean Energy and Sustainable Development and the IEA to explore the most effective means to promote energy efficiency internationally, including through the exchange of best practices, sharing methodologies and further cooperation and by inviting other countries with significant energy needs to join;*
    - *promote international research, encourage investment and development cooperation aimed at energy efficient technologies and other greenhouse gas mitigation options;*
    - *report on progress in the policies and measures on energy efficiency outlined below at the G 8 summit in 2008.*

64. We note that, in view of their high energy needs, industrialised and emerging economies have a fundamental joint interest in taking measures to encourage the most effective use of their energy.

65. Against this background we commit ourselves to a model of efficient energy systems and call on other countries with high energy demand, including the major emerging economies, to join us in this endeavour. Our goal of building less energy intensive economies will also advance economic growth and competitiveness. To this end, we will promote the appropriate policy approaches and instruments, including inter alia economic incentives and sound fiscal policies, minimum standards for energy efficiency, sound and ambitious energy performance labelling, information campaigns aimed at consumers and industry that enhance national awareness, sector-based voluntary commitments agreed with industry, investment in research and development and guidelines for public procurement. We will develop and implement national energy efficiency programmes and advance international cooperation on energy efficiency, notably on efficiency standards. …

It is important to consider energy efficiency's role with respect to global climate change and energy security separately. But for both climate change and for energy security, Figure 3.1 provides a strong argument about the benefits of improved energy efficiency. A recent report by the IEA[16] shows that for a sample of 11 of its member countries,[17] the actual energy use compared to projected energy use without improvements in energy intensity from the early 1970s to the late 1990s shows the importance of improved energy efficiency. If actual use corresponded to the higher value, then there would be a need for greater energy resources, also meaning there would be more CO_2 emissions and more imported fuels. For the 11 countries analysed, energy use would have been 49% higher in 1998 if energy intensities had remained at 1973 levels.

Figure 3.1: Actual Energy Use and Hypothetical Energy Use Without Intensity Reductions, IEA-11



Source: IEA, Oil Crises and Climate Challenges, 30 Years of Energy Use in IEA Countries, OECD, Paris, 2004, p. 54

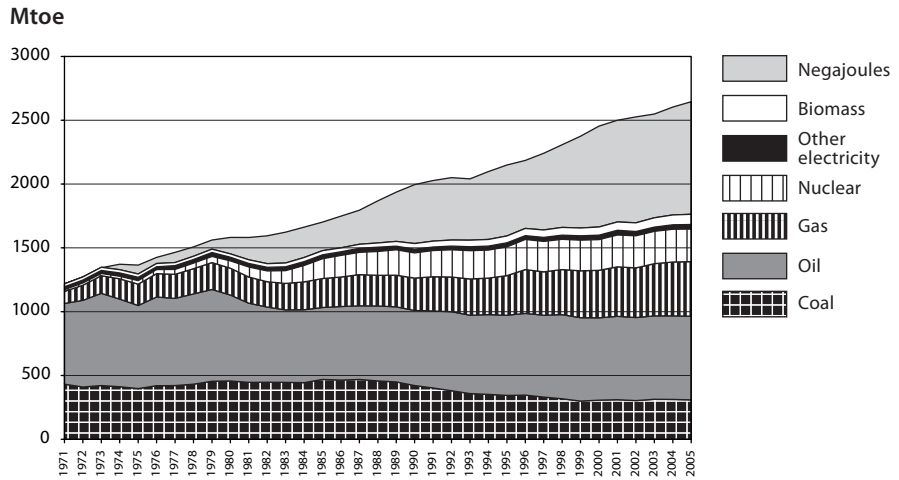
The EU's Action Plan on Energy Efficiency includes a similar analysis. The Plan demonstrates that by 2005, "negajoules" (or avoided energy consumption through savings) became the single most important energy resource.[18]

16 IEA, Oil Crises and Climate Challenges, 30 Years of Energy Use in IEA Countries, OECD, Paris, 2004, p. 54.

17 The 11 countries are Australia, Denmark, Finland, France, Germany, Italy, Japan, Norway, Sweden, the United Kingdom and the United States.

18 Communication from the Commission, Action Plan for Energy Efficiency: Realising the Potential, COM(2006)545, Brussels, October 19, 2006, p. 5.

Figure 3.2: Development of the Primary Energy Demand and of "Negajoules" ("Negajoules": Energy Savings Calculated on the Basis of 1971 Energy Intensity)



Source: Communication from the Commission, Action Plan for Energy Efficiency: Realising the Potential, p. 5

ENERGY EFFICIENCY AND ITS CONTRIBUTION TO CLIMATE CHANGE

Energy efficiency policies and programmes were developed since the 1970s to, in part, deal with environmental concerns.[19] At the time most of those concerns were local or regional in nature. In the 1980s, improved energy efficiency was used to address the environmental problems of acid rain that were affecting many countries. In the late 1980s, there was growing awareness of the problems of global climate change and the link between reducing CO_2 emissions through improved energy efficiency became firmly established in new energy policies, such as in the Netherlands in 1990. Its 1990 *Memorandum on Energy Conservation* stated that energy policy could contribute a 3-5% CO_2 emissions reduction by the year 2000, relative to 1989/90.[20] The *Second Memorandum on Energy Conservation*, published in December 1993, accepted that target and said that an annual energy efficiency rate of 1.7% per year between 1989 and 2000 was needed and was feasible.

The European Community's Council meeting in Luxembourg in 1990 set an overall Community CO_2 target of stabilising emissions at the 1990 level by the year 2000. After the UN Conference on Environment and Development (UNCED) in 1992 (the "Rio Conference"), which led to the creation of the United Nations Framework Convention on Climate Change (UNFCCC), the IEA published a study that reviewed the policy

19 This is not to underplay the role of these policies and programmes to address energy security issues after the oil crises in the 1970s.

20 Government of the Netherlands, Second Memorandum on Energy Conservation, The Hague, December 1993, p. 3. Renewables is included in the strategy but the largest share of mitigation was through improved energy efficiency.

positions and approaches taken by its member countries and selected non-IEA countries.[21] A review of the country profiles shows that improved energy efficiency ranked highly amongst the policy options that were available and realistic.

Throughout the 1990s, energy efficiency policies were designed to address climate change concerns. This was true at the national level and, for much of western Europe, at the EU level. Essentially, for more than 15 years, energy efficiency policies and programmes have been integrally linked with climate change policy. If this is so, it is important to understand what contribution energy efficiency is now expected to play in meeting climate change targets. Understandably, there are no hard and fast rules, but there are expectations.

The EU's European Climate Change Programme (ECCP) was established in 2000 to identify the most environmentally and cost-effective measures to help the EU meet its Kyoto Protocol obligations, gave considerable emphasis to energy efficiency. The programme recommended measures in all end-use sectors: increased use of combined heat and power generation; improvement of energy efficiency standards for electrical equipment; improvement of efficiency standards for industrial process; improved energy efficiency limiting carbon dioxide emissions (for boilers, construction products, etc.); increased energy services for small and medium enterprises (SMEs); development of a framework for voluntary agreements; public procurement of energy-efficient end-use technologies; energy audits and heating performance certificates; improvement of building/lighting performances; building design and infrastructure planning; transport pricing; and a European campaign for more fuel-efficient driver behaviour. These measures have all been introduced before, but clearly now they are broadly accepted in the climate change strategy.

The Second ECCP Progress Report in April 2003 estimated that the potential in the first commitment period in the field of energy demand is 214-259 Mt of CO_2 equivalent. The Programme's Working Group 3 on energy demand indicated a technical potential of 430 Mt of CO_2 equivalent. This compares to the Kyoto Protocol target for the EU as a whole of -8% (336 Mt of CO_2 equivalent).

Going further back, the Council Resolution of 7 December 1998 on energy efficiency (98/C 394/01) stated that meeting the indicative target of a 1% improvement in energy intensity above the current trend would result in avoiding energy consumption of 55 Mtoe in buildings. This represents about 20% of the Kyoto Protocol target. Most recent analysis is provided in the original proposal prepared by the European Commission on the Directive on the Energy Performance of Buildings. As regards energy in buildings that is used for heating, hot water, air-conditioning or lighting purposes, the Commission estimated that a savings potential of around 22% of 2001 consumption could be realised by the year 2010.[22]

In 2005, a new Commission Communication again came out strongly in favour of energy efficiency.[23]

---

21 IEA, Climate Change Policy Initiatives, OECD, Paris, 1992.

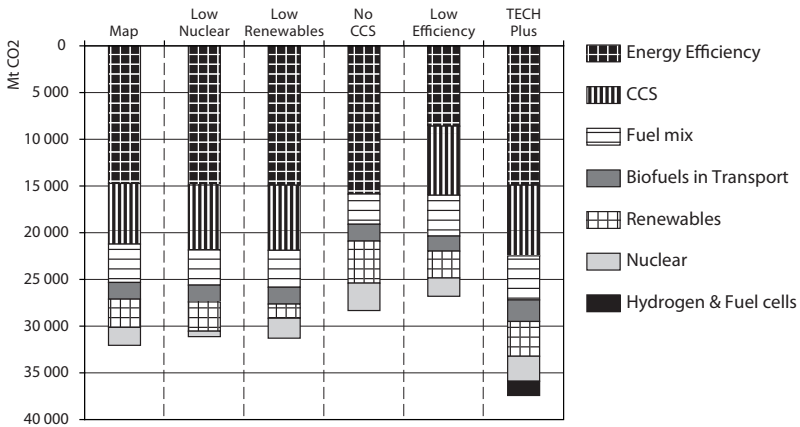
22 The proposal states that this is for investments in energy-efficient technology with a pay-back of eight years or less. It should be noted that this is only for EU-15 and not for the EU-25.

23 EC Communication, Winning the Battle Against Global Climate Change, COM (2005)35 final, Brussels 9.2.2005, p.6.

Many technologies to reduce greenhouse gas emissions either exist already or are at an advanced pilot stage. A recent study identified the 15 most promising of such technologies . . . Taking all 15 options together this would amount to a reduction potential of more than 54 Gt CO_2 eq. per year in 2050. If used to its fullest extent, the major part of the projected baseline emissions in 2050 could be avoided. Five of those options concern energy efficiency. Thus, one central pillar of any future energy strategy for the EU must be cost effective energy efficiency improvements and energy savings.

Projecting to the year 2050, a recent IEA study on energy technology scenarios stated that in the various scenarios developed, energy efficiency accounts for between 31% and 53% of the CO_2 emissions reductions. That study looked at all options and, for example, it stated that CO_2 capture and storage, while important, comes a distant second with between 20% and 28% of the reductions in CO_2 emissions.

Figure 3.3: Co_2 Emission Reductions by Contributing Factor in the Act and Tech Plus Scenarios (Reduction Below Baseline Scenario In 2050)



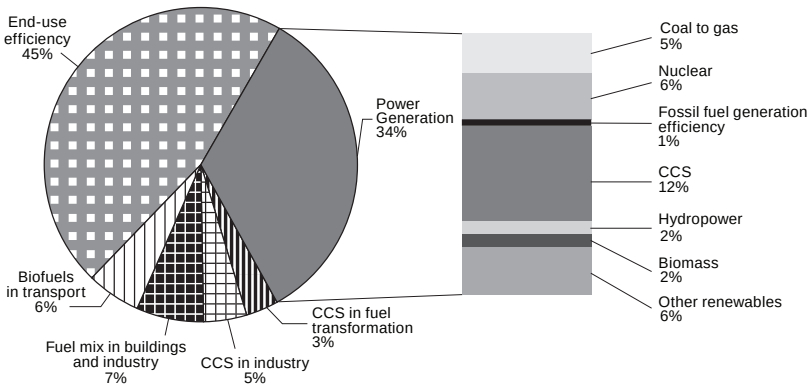
Source: IEA, Energy Technology Perspectives, 2006, OECD, Paris, p. 47

All of this evidence confirms the expectations placed on improving energy efficiency in the strategy to tackle climate change.

Figure 3.4 shows where reductions in CO_2 emissions take place in the ACT Map Scenario (an 'Accelerated Technology' scenario, with relatively optimistic assumptions about overcoming technological barriers to renewables, carbon capture and storage etc.) of the IEA technology scenario study. Concerning energy efficiency, the report assumes that "progress in energy efficiency is accelerated due to successful implementation of best practices and policies that lead to the adoption of more-efficient technologies in the transport, buildings and industrial sectors".[24]

24 IEA, Energy Technology Perspectives, 2006, OECD, Paris, p. 42.

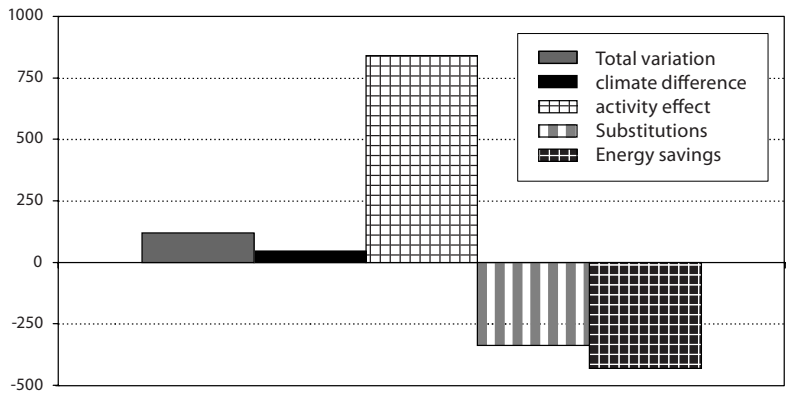
Figure 3.4: Reduction in Co_2 Emissions in the Map Scenario by Technology Area (Share of Reduction Below Baseline Scenario In 2050)



Source: IEA, Energy Technology Perspectives, 2006, OECD, Paris, p. 48

Recent analysis using the ODYSSEE database shows that improved energy efficiency was the major reason for lowering carbon emissions in the EU-15 between 1990 and 2003.[25] The impact of economic growth (+840 Mt CO_2) is largely balanced by 770 Mt of savings. This still means that emissions grew 120 Mt. There is a gap of 70 Mt when taking into consideration climate differences. The analysis shows that around 45% of the savings is due to fuel substitution and 55% is due to energy efficiency improvements. This means that energy efficiency reduced carbon emissions by 423.5 Mt during this period.

Figure 3.5: Factors of Variation of Total CO_2 Emissions in the EU-15 (Mt CO_2) (1990-2003)



Source: Presentation by Bosseboeuf and Lapillonne at IEA workshop on energy efficiency indicators, May 2006, www.iea.org

25 Presentation by Didier Bossebeuf, ADEME, and B. Lapillonne, Enerdata, to IEA workshop on energy efficiency indicators, May 2006.

However, while the potential for energy efficiency in relation to climate change is promising, it has not always been able to achieve the expected results. The in-depth country reviews conducted by the Energy Charter point to some possible explanations. For example, the 2006 in-depth review of Georgia's energy efficiency policies and programmes noted that the necessary administrative system had been created for Georgian participation in the Kyoto flexible mechanisms, but that foreign interest had been limited to projects with renewables. "Energy efficiency projects have not attracted so far the interest of potential investors in CDM projects".[26] Even in Denmark, the original indicative list of possible domestic measures included very few on energy efficiency, although the new action plan from 2005 gave a renewed priority to energy efficiency.

Quantitative results will not really be fully appreciated until the first commitment period of 2008-2012. Annex 1 countries can achieve their Kyoto Protocol targets through a combination of domestic measures and the use of the flexible mechanisms which essentially means that they buy credits from projects undertaken outside their country. So, it will not always be obvious about the role of energy efficiency. However, there are encouraging signs that energy efficiency will play a major role.

ENERGY EFFICIENCY AND ITS CONTRIBUTION TO ENERGY SECURITY

Being an integral element of energy policy, improved energy efficiency is also seen as an important contributor to improving energy security. And for many of the countries covered by this report, this means a focus on the IEA.

The IEA gives four reasons for energy insecurity.[27]

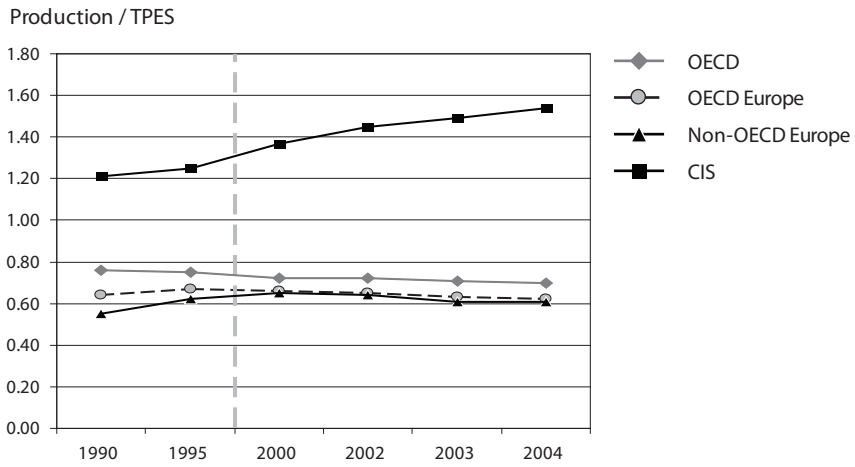
- Energy system disruptions linked to extreme weather conditions or accidents;
- Short-term balancing of demand and supply in electricity markets;
- Regulatory failures: and
- Concentration of fossil fuel resources.

It is beyond the scope of this report to go into a full discussion of energy security. Figure 3.6 nonetheless suggests that these concerns are likely to grow as key countries become more dependent on imported energy.

26 Energy Charter, In-depth Review of Energy Efficiency Policies and Programmes of Georgia, Brussels, 2006, p. 7.

27 IEA, Energy Security and Climate Policy, Assessing Interactions, OECD, Paris, 2007, pp.12-13.

Figure 3.6: Self Sufficiency (Energy Production/TPES)



Source: IEA database

In addressing energy security, policies have to be put in place that deal with two aspects: addressing long-term vulnerability and reaction to short term crises. From the creation of the IEA in the 1970s as a reaction to the first oil crisis, energy conservation, as it was called then, was an integral element in making member countries less vulnerable. It was part of the Long Term Cooperation Programme (LTCP), approved in January 1976. The focus then was to reduce the rate of growth of energy and particularly oil consumption, to eliminate waste and to have more efficient energy utilisation. In 1977, the IEA adopted the "Principles for Energy Policy", and energy conservation figured prominently. The fourth principle stated.[28]

> "Strong reinforcement of energy conservation, on a high priority basis with increased resources, for the purpose of limiting growth in energy demand relative to economic growth, eliminating inefficient energy use, especially of rapidly depleting fuels, and encouraging substitution for fuels in shortest supply, by implementing vigorous conservation measures in various sectors…"

The 1993 Shared Goals, approved by IEA Ministers, stated:

28 For more on the history, see Richard Scott, IEA, The First 20 Years, Volume Two, Major Policies and Actions, IEA/OECD, 1995, pp. 160-161.

Improved energy efficiency can promote both environmental protection and energy security in a cost-effective manner. There are significant opportunities for greater energy efficiency at all stages of the energy cycle from production to consumption. Strong efforts by Governments and all energy users are needed to realise these opportunities.

European countries and other OECD countries are increasingly worried about growing energy demand and what this means in terms of energy imports and the resulting increased dependence. The IEA projects that global energy demand could grow over 50% by 2030 with no changes to policies. The majority of that demand will be in non-OECD developing countries but it will still grow in all regions. Energy systems are more robust than in the 1970s after the first oil crisis but they remain vulnerable. The January 2007 EU Communication on energy policy stated.[29]

Europe is becoming increasingly dependent on imported hydrocarbons. With "business as usual" the EU's energy import dependence will jump from 50% of total EU energy consumption today to 65% in 2030. Reliance on imports of gas is expected to increase from 57% to 84% by 2030, of oil from 82% to 93%.

The following two Tables show the EC's projections of increased import dependence on two end-use sectors. These are important because they show what it means to be increasingly vulnerable – that it can have a tangible effect on energy consumers. There are still many unknowns but the Tables give policymakers some indication on improving energy efficiency in those sectors, as well as switching away from more vulnerable fuels.

Table 3.1: The energy security implications from different energy sources for heating

Energy sources		EU-25 market share by energy source	EU-27 import dependence	
			2005	2030
Fossil fuels	Heating gas oil	20%	82%	93%
	Natural gas	33%	57%	84%
	Coal	1.8%	39%	59%
Biomass	Wood chips	5.7%	0	?
	Pellets		0	?
Electricity		31%	<1%	?
Solar		0.2%	0	0
Geothermal		0.4%	0	0

Source: Adapted from Communication from the Commission, Action Plan for Energy Efficiency: Realising the Potential, COM(2006)545, Brussels, October 19, 2006, p. 27

29 EC, An Energy Policy for Europe, January 2007, p. 3.

Table 3.2: The Dependence on Different energy Sources for Road Transport

	Import dependence	
	2005	2030
Petrol and diesel	82%	93%
Natural gas	57%	84%
Domestic biofuel	0%	0%
Tropical bio-ethanol	100%	100%
Second-generation biofuel	/	15%

Source: Adapted from Communication from the Commission, Action Plan for Energy Efficiency: Realising the Potential, COM(2006)545, Brussels, October 19, 2006, p. 28

Modern economies contend with increased globalisation and trade. However, the European Commission and the IEA are increasingly worried that investment in new energy supply will not keep pace with the growing demand. The Communication correctly states that no single policy area will solve the problem and energy efficiency can only be seen as one instrument in a package of options. The Communication further states.[30]

For Europe's citizens, energy efficiency is the most immediate element in a European Energy Policy. Improved energy efficiency has the potential to make the most decisive contribution to achieving sustainability, competitiveness and security of supply.

And it estimates that if the new Action Plan on Energy Efficiency is fully implemented, energy demand will decrease 13% by 2030 from today's demand.[31] That has a significant impact on improving energy security. While imports will increase, as shown above, the speed of this increase will be lessened.

Improved energy efficiency is important for energy importers, but as a recent IEA report states, even energy exporting countries such as Russia, will benefit because by being more energy efficient, as this will free up resources for export.[32]

A new report by the IEA on climate change and energy security has some important comments on energy efficiency.[33] This is the first study to develop energy security indicators and looks at energy security in terms of the physical unavailability (called ESIvolume) and in terms of price (ESIprice). There is a separate indicator for market concentration (ESMC). The report uses five case studies. Policy measures were considered against a 5% reduction in carbon emissions from a baseline by the year 2030. End-use efficiency improvements as well as an enhanced move to non-fossil fuel technologies (renewable energy or nuclear) in the electricity sector both had positive impacts of similar magnitude on energy security. In the transport sector, fuel efficiency improvements led to important benefits in ESIprice, with reductions ranging from 4.6% to 8.2%. This analysis

30 Ibid., p. 11.

31 Ibid., p. 11.

32 IEA, Optimising Russian Natural Gas, Reform and Climate Policy, OECD, Paris.

33 IEA, Energy Security and Climate Policy, Assessing Interactions, OECD, Paris, 2007, pp. 17-18.

is the first time the IEA has used such indicators, and they underline the role improved energy efficiency can make to improving energy security.

Undoubtedly, improved energy efficiency is most important for the development of long-term strategies. However, even for short-term crises, demand restraint – often from behaviour changes or energy efficiency measures – is a fundamental component of national and international strategies.

HAS THE PRIORITY FOR ENERGY EFFICIENCY CHANGED?

Energy efficiency is getting attention at all levels internationally. This Chapter showed the growing interest in energy efficiency at many levels. The energy efficiency 'community' and its 'supporters' have definitely grown and matured. The argument that energy efficiency has to play a growing – maybe even a lead – role in the climate change strategy has been well established. For some countries and regions, with energy security being a major energy policy concern, energy efficiency again is well placed to provide a strong role.

There is, however, a concern that has been highlighted by the IEA.[34]

Nevertheless, in the recent in-depth reviews, it was often pointed out that energy efficiency policy is not receiving sufficient emphasis compared with renewable energy policy, even though they have similar benefits in terms of energy security and climate change mitigation, and energy efficiency is often the more cost-effective of the two.

This was also confirmed by recent in-depth reviews undertaken by PEEREA.

With this in mind, there is a need to examine how this growing emphasis on energy efficiency translates into direct action, and the following Chapters assess how the growing priority has been expressed at the national level.

34 IEA, Energy Policies of IEA Countries, 2006 Review, OECD, Paris, 2006, p. 23.

PART 2

PART 2 – PROGRESS AND CHALLENGES

PART 2 of this report reviews the progress in 'delivering' energy efficiency. A strong institutional and policy framework that sets a comprehensive approach to energy efficiency (whether country-specific or regional) is fundamental. This framework should also fit well with the overall energy strategy of the country and be integrated with other major policy areas.

It is important to assess the progress in using the different policy instruments that are part of an overall energy efficiency strategy. For this report, primary focus is given to three important areas: (i) buildings; (ii) cogeneration and district heating, and (iii) appliances. These are three areas with great potential for energy savings throughout the entire region. While results are not 'guaranteed' in these three areas, much has happened, the framework is strengthening and the results look promising.

There are also challenges to delivering energy efficiency. Chapter 6 focuses on four areas where there has been progress but also where much work remains to be done. One of the challenges is an end-use sector, transport, while the others are cross-cutting issues: integrating energy efficiency and renewable energy policies and programmes; promoting energy efficiency through the Kyoto Protocol flexible mechanisms, primarily through emissions trading, and; financing energy efficiency measures in all end-use sectors.

Promoting energy efficiency in the transport sector and financing energy-efficient investments have troubled energy efficiency policy makers since the 1970s. Integrating energy efficiency and renewables is a relatively new concept, built on the concept of a sustainable energy approach. The Kyoto Protocol is a powerful international instrument to reduce GHG emissions. It has been hailed as a major way to implement energy efficiency projects but it has had many problems in doing so.

CHAPTER 4

THE INSTITUTIONAL AND POLICY FRAMEWORK

INTRODUCTION

The key to any successful national strategy for energy efficiency is to have a strong institutional and policy framework. This means that there is both a strong policy-led government commitment to energy efficiency plus the framework to make it happen. This Chapter reviews the existing policy frameworks, and what progress has been made in recent years in developing such frameworks.

Annex 1 shows the overall energy efficiency policy objectives of the countries covered by this report. Countries that have made significant changes since the 2003 Kiev 'Environment for Europe' Ministerial Conference include: Armenia, Bosnia and Herzegovina, Denmark, Estonia, Germany, Latvia, Lithuania, the Netherlands, Portugal, Romania, the Slovak Republic, Slovenia, Spain, Sweden, Macedonia and the United Kingdom. Importantly, some of those countries mentioned had poorly developed policies in 2003 and those have been greatly improved.

Throughout the region, the European Union is the biggest driver in encouraging a strong policy framework and commitment to energy efficiency. Understandably, the European Union directly affects 27 participating countries, and indirectly many more (e.g., Norway, Switzerland and non-members in the Balkans). Norway and Switzerland, under agreements with the European Union, transform specific EU directives into national legislation and implement them as do EU member states.

Chapter 3 described the EU's commitment to energy efficiency. The Action Plan for Energy Efficiency, the European Climate Change Strategy and the approach to energy security, all show the importance of energy efficiency. In addition, the recently approved Energy End-use Efficiency and Energy Services Directive (2006/32/EC) now requires national energy plans and specific targets for efficiency gains, quite a different approach than was taken in the past.

Energy saving in Belarus

Belarus uses 4-5 times more energy resources than western European countries to produce one unit of GDP. The country consumes annually more than 30 thousand tonnes of coal equivalent. This comes to approximately 3 tonnes of conditional fuel per citizen compared to 7 tonnes in the Soviet times, while for the rest of the world this averages 1 tonne per person. For example, in 2005 per capita consumption of gas and electricity was 1,850 cubic metres and 3,400 kWh, respectively. This is nearly twice an average European level.

The Government has long been encouraging the population and enterprises to save energy. With the price of imported energy from Russia increasing sharply, a campaign of strict economy of resources was announced. Energy-saving norms were made compulsory. A target of reducing GDP energy intensity by 6% versus 2003 has been put forward.

Wishing to reduce its dependence on imported energy, the Government is looking to increase the share of local resources. Consumption of local fuel should be increased by 300 thousand tonnes. Wherever possible, boiler houses will be converted to the use of peat (in 2004 its extraction will increase by 1.5 times). About 50-60 boilers in each region will be converted to fire wood.

This applies not only to traditional furnaces and boilers, but also to larger equipment. A thermal power plant that will work on waste wood is being designed and should be put in operation in 2006.

The CIS countries and non-EU Balkan countries have a mixed record in developing energy efficiency strategies. This, in part, reflects the lower priority for energy efficiency which manifests itself in a less comprehensive institutional foundation (see Annex 1 for details).

THE LEGAL FRAMEWORK

Annex 2 describes the main legal instruments used for energy efficiency in countries covered by this report, other than the framework legislation for EU directives. The legal framework is evolving: most recently, Turkey approved an energy conservation law that has been in draft form since the early 1990s. Georgia, on the other hand, has had draft legislation ready for many years, yet it still has not been approved.

Some countries covered by this report need legislation to legitimise any activity in the field of energy efficiency. This provides them with their mandate to, for example, set up an energy centre, establish policies and objectives, as well as implement projects. For other countries, it is possible to undertake some activities but laws provide a framework for specific actions such as mandates and standards.

THE EUROPEAN UNION

The EU has taken a very comprehensive approach to developing a legal framework for energy efficiency. The main categories of legal instruments used in the European Union are:

- regulations: these are binding in their entirety and directly applicable in all Member States;
- directives: these bind the Member States as to the results to be achieved and have to be transposed into the national legal framework;
- decisions: these are fully binding on those to whom they are addressed;
- recommendations and opinions: these are non-binding, declaratory instruments.

For energy efficiency, the approach taken has been to use directives. Most of the early directives on efficiency, until 2002, referred to labelling requirements. The Buildings directive and most recently the so-called 'Energy Services' Directive gave more political weight to the energy efficiency legislation. The EU's legislative framework is presented in the following box.

The full range of legislative measures related to energy efficiency that have been adopted by the European Union since 1992 include:

- Council Directive 92/42/EEC on "efficiency requirements for new hot-water boilers fired with liquid or gaseous fuels."
- Council Directive 92/75/EEC on "the indication by labelling and standard product information of the consumption of energy and other resources by household appliances."
- Council Directive 93/76/EEC on "to limit carbon dioxide emissions by improving energy efficiency (SAVE)."
- Commission Directive 94/2/EEC implementing Council Directive 92/75/EEC "with regard to energy labelling of domestic electric refrigerators, freezers and their combinations."
- Commission Directive 95/12/EC implementing Council Directive 92/75/EEC concerning energy labelling of clothes washers.
- Commission Directive 95/13/EC implementing Council Directive 92/75/EEC concerning energy labelling of clothes dryers.
- Council Directive 96/57/EC on energy efficiency requirements for household electric refrigerators, freezers and combinations thereof.
- Commission Directive 96/6/EC implementing Council Directive 92/75/EEC concerning energy labelling of household dishwashers.
- Commission Directive 97/17/EC of 16 April 1997 implementing Council Directive 92/75/EEC with regard to energy labelling of household dishwashers.
- Commission Directive 98/11/EC implementing Council Directive 92/75/EEC concerning energy labelling of household lamps.
- Directive 2000/55/EC of the European Parliament and of the Council of 18 September 2000 on energy efficiency requirements for ballasts for fluorescent lighting.

- Commission Directive 2002/31/EC of 22 March 2002 implementing Council Directive 92/75/EEC with regard to energy labelling of household air-conditioners.
- Commission Directive 2002/40/EC of 8 May 2002 implementing Council Directive 92/75/EEC with regard to energy labelling of household electric ovens.
- Directive 2002/91/EC of the European Parliament and of the Council of 16 December 2002 on the energy performance of buildings.
- Directive 2006/32/EC of the European Parliament and of the Council of 5 April 2006 on energy end-use efficiency and energy services and repealing Council Directive 93/76/EEC, the so-called 'Energy Services' directive.

The End-use Efficiency and Energy Services Directive, adopted by the European Council on 14 March 2006 and which formally entered into force on 17 May 2006,[35] is a wide-ranging directive for all end-use sectors. The Directive defines and sets savings targets on a national level, and will require action by each member state of the EU. The Directive requires specific targets and action plans. Member states must achieve a minimum annual energy savings target of 9% by the ninth year in the period from 2008 to 2016. Also, each national government will have to produce energy efficiency action plans in 2007, 2011 and 2014.

In their first action plan, each member state will have to report on how they will reach their targets and in the two subsequent plans they will also have to report on what has been achieved. Although the targets are indicative rather than mandatory, member states have a clear legal obligation to adopt and aim to achieve the target, using appropriate cost-effective energy services and other energy efficiency improvement measures. Member states are required to place energy efficiency obligations on energy distributors or retailers. These obligations can range from involving the energy distributors and/or the retail sales companies in energy efficiency activities, through to letting the energy distributors and/or suppliers contribute to funds for energy efficiency. These obligations may be carried out by other market actors.

OTHER COUNTRIES

Some other countries have adopted new legislation related to energy efficiency (other than laws that adopt EU directives) in recent years. These developments include:

Armenia

The intent of the Energy Saving and Renewables Law adopted in 2004 is to formulate and ratify the government policy framework for energy saving activities and advancement of renewables with a view to:

- strengthen the economic and energy independence of Armenia;
- enhance the reliability of the Armenian energy system;
- create new manufactures and services to facilitate energy saving and promote renewables; and
- reduce man-made impacts on the environment and human health.

35 Member states are given two years to transpose the Directive into national law.

Denmark

Denmark has a system of tax exemptions for industry. In 2006 agreement on energy savings was obtained between the government and the companies which deliver energy to the consumers. These companies will have to initiate energy saving measures among the final consumers within 3 years. Negotiations on a new energy strategy between the government and the opposition are now taking place, with a stronger emphasis being given to energy efficiency and renewables.

Latvia

The Law on Energy, originally approved in 1998, was amended in 2005. It includes a chapter (10) on energy efficiency.

Sweden

On 1 January 2005, the Programme for Improving Energy Efficiency Act (2004:1196) came into force. The programme is designed to increase energy efficiency and create opportunities for tax exemption. The act gives energy-intensive companies in manufacturing industry, which are subject to the tax, the opportunity of being granted tax exemption on their electricity consumption if they take action to improve their energy efficiency.

The Former Yugoslav Republic of Macedonia (FYROM)

Energy efficiency is included with a special chapter in the new Energy Law adopted in May 2006, which elaborates national policy and activities for improvement of energy efficiency. The Energy Law contains provisions about the development of a strategy for improvement of energy efficiency for a period of ten years and a programme for the implementation of the strategy.

Turkey

In March 2007 a new energy conservation law was adopted by the Parliament after more than a decade. The law still needs to be approved by the Presidency. When enacted, this Energy Efficiency Law will introduce, in the building sector, the obligation of energy management for all large buildings (over 20,000 m^2) and for public buildings.

French law to drive down energy consumption

In May 2006 French government has adopted a decree targeting 54 TWh of energy savings over three years, equivalent to 3.6% of national consumption. From July, all suppliers of electricity, gas or heating oil will be required to meet a specific target based on the amount of energy they produce.

Suppliers could achieve savings either through reducing their own energy consumption or by helping their customers acquire more efficient heating and lighting equipment.

In return, they will receive tradable energy saving certificates, also known as white certificates, that will have to be handed over at the end of the period to check their targets have been met.

They will be allowed to fulfil these targets through their own or their customers' energy savings or by purchasing certificates from other suppliers or individuals who achieved energy savings.

Suppliers failing to comply with their obligations will have to pay fines of €0.02 per kWh.

Energy savings will be calculated according to the life expectancy of various type of equipment. Italy and the UK have already set up similar tradable white certificate schemes.

The target of 1.2% annual savings in national energy consumption is more ambitious than the indicative target of 9% energy savings over 'business as usual' between 2008-2017 set in the EU's new end-use energy efficiency and energy services directive.

Source: www.eceee.org

NATIONAL INSTITUTIONS FOR ENERGY EFFICIENCY

Studies undertaken by the Energy Charter Secretariat show that effective institutional arrangements are fundamental to an effective energy efficiency strategy. Without adequate institutions, legislative and regulatory measures are not properly implemented and programmes are neither effectively run nor efficiently monitored. The role of the institutions in the area of energy efficiency is challenging because energy efficiency is an area of cross-cutting interests among economic sectors and efficiency policies interact with other horizontal policies such as environmental and social ones. In order for energy efficiency institutions to operate efficiently, there is a need to have clear legislation, policies and strategies in place, market-based energy prices and commitment from policymakers.

As a starting point, an effective organisation is required to undertake policy analysis. Often this is a function of the ministry responsible for energy efficiency[36] although it can be done for them by external institutes that have expertise in the area.

In Western Europe, such institutions have been trying since the beginning to combine regulations with incentives and information. They have operated in all end-use sectors, setting priorities according to national concerns.

In formerly central planned economies, energy efficiency institutions started to be developed mainly in those countries dependent on energy imports. The role of such institutions was mainly to implement regulatory measures aimed at reducing demand and saving energy. Such institutions have been perceived in some cases as command and control bodies, having as main instruments inspections and penalties. Some more positive measures such as training of energy managers for industrial companies, audits and dissemination of information on good practices have been undertaken, but not on a large scale.

For both market economies and those in transition, energy efficiency institutions have to pay special attention to the sectors with the largest market potential for energy efficiency and for emissions reduction. The CO_2 emissions reduction potential shown in many cases by the transport sector may lead to the need to develop activities in an area in which only few energy efficiency institutions have great experience, and where cooperation with planning and regional/local authorities is essential. In addition, if a country has managed so far to create a competitive advantage through the development of certain energy efficient technologies, it would also appear natural that energy efficiency institutions support the deployment of such technologies on both domestic and foreign markets.

Institutions also need to work in close partnership with a range of governmental and non-governmental actors that play important roles from developing technologies to helping create awareness.

Because this report is concerned with 'delivering energy efficiency', what is of interest is how the implementation of energy efficiency policy can motivate energy consumers to undertake energy efficiency actions. In many countries covered by this report, a separate implementing energy agency has been created. Models for these agencies differ across countries. On occasion, this agency can deal solely with energy efficiency or it can cover the full range of energy issues, including renewables. There are other cases when it is integrated with the body responsible for the environment, as, for example, in France, and cases where it is separate from the government's administrative structure. Many countries have separate regional or local agencies that can deliver programmes or provide advice, some of which have been created with support from the European Union.

For federal states, individual state agencies often play a major role, depending on the legal division of responsibilities between the federal and state levels. Those with strong state agencies or delivery responsibilities include Australia, Belgium, Canada, Germany, the Russian Federation, Spain, Switzerland, the United Kingdom and the United States.

36 Institutional arrangements differ amongst countries. In some countries, energy efficiency is integrated within the ministry responsible for energy policy. In other countries, it is part of the ministry responsible for environment.

A review of the efforts made by participating countries shows that many do not have adequate financial or human resources; this can have a serious impact on the overall results. Annex 4 provides a summary of the institutional arrangements in countries covered by this report.

The Netherlands: Senter and Novem merged

SenterNovem is an agency of the Dutch Ministry of Economic Affairs, created in May 2004 by combining two existing organisations, Senter and Novem. It promotes sustainable development and innovation, both within the Netherlands and abroad. It aims to achieve tangible results that have a positive effect on the economy and on society as a whole.

On behalf of the Dutch government SenterNovem implements policy regarding: Innovation; Energy and Climate Change; and Environment and Spatial Planning. SenterNovem employs about 1,250 people in offices in four locations in the Netherlands.

Source: www.senternovem.nl

Ukraine: National Agency for Efficient Use of Energy Resources

The new Agency was approved in December 2005 and began operation in 2006. The Agency reports directly to the Cabinet of Ministers. It is a government body with special status. Its responsibilities are:

- Carrying out state policy in the area of energy consumption and energy conservation;
- Securing an increase in the share of non-traditional and renewable energy production;
- Establishing a state system to monitor energy production, consumption, exports and imports; improving the system of registering and controlling energy consumption; and
- Ensuring the functionality of the system of industrial energy consumption norms.

Many of the European agencies have formed a group to help support each other. EnR is a voluntary association of 23 European organisations (essentially the national energy agencies but some countries have two participating agencies) having a responsibility for the planning, management or review of national research, development, demonstration or dissemination programmes in the fields of energy efficiency and renewable energy.[37] It is flexible in character, able to accommodate a range of working

37 See www.enr-network.org. Members include ADEME, France; AEL, Luxembourg; PTJ, Germany; ADENE, Portugal; CRES, Greece; DENA, Germany; EEA, Bulgaria; SEA, Slovakia; DEA, Denmark; ENEA, Italy; EST, United Kingdom; AEA, Austria; IDAE, Spain; ARCE, Romania; EIHP, Croatia; AURE, Slovenia; SEI, Ireland; Enova, Norway; SenterNovem, Netherlands; STEM, Sweden; MOTIVA, Finland; CEA, the Czech Republic; KAPE, Poland.

relationships from unanimous concerted effort through optional participation by any number of members to bilateral collaboration. The main function of EnR is to encourage and facilitate exchange of information and expertise amongst its member organisation. The cumulative experience and know-how of these organisations constitutes a unique and valuable European resource. Seven of the agencies come from transition countries and two of the agencies are from outside the EU (Croatia and Norway).

The European Union has played a major role in promoting regional and local agencies, often providing initial funding for a limited period of time. *ManagEnergy*[38] is an initiative of the European Commission's Directorate-General for Energy and Transport, which aims to support the work of actors working on energy efficiency and renewable energies at the local and regional level. The main tools are training workshops and online events. The website includes a partner search system with some 3000 organisations, including 380 energy agencies, which can provide valuable expertise and partnerships on energy activities at local and regional levels

Figure 4.1: Energy Agencies set up Under SAVE II (1998-2004)

Source: http://ec.europa.eu/energy/intelligent/agencies/index_en.htm

38 See http://www.managenergy.net.

Figure 4.2: Energy Agencies set up Under IEE (2004-present)

Source: http://ec.europa.eu/energy/intelligent/agencies/index_en.htm

In 2003, the decision was made to create the Intelligent Energy Executive Agency (IEEA) to implement the *Intelligent Energy – Europe (IEE)* programme. The IEEA manages the different projects and events that are funded under the *IEE* programme, and disseminates the resulting know-how and best practices. This is intended to give the programme a sharper focus and greater visibility. Most projects are initially only partly funded by the IEE programme.

The IEEA is the first of a number of new executive agencies created by the European Commission to put policies into action more efficiently and with improved results, helping the Commission concentrate on its policy-making and institutional tasks.

CHAPTER 5

PROGRESS IN IMPROVING ENERGY EFFICIENCY IN BUILDINGS, APPLIANCES AND THROUGH DISTRICT HEATING AND COGENERATION

INTRODUCTION

This Chapter examines progress in three areas, all related to buildings and of key importance to energy efficiency strategies: energy efficiency in the building structure; cogeneration and district heating; and energy efficiency in appliances. These areas were chosen for examination because of the impact they can have on overall energy demand throughout the region. These are also areas that have received considerable attention at the international and national levels. For each of these areas, progress will be assessed in terms of awareness, norms, standards, labels, and financing.

Buildings account for about 35% of total global final energy consumption. District heating and cogeneration are important across the region covered by this report; district heating, in particular, has been a major issue in the economies in transition. Appliances are important because they represent a growing share of consumer energy demand and there is a significant growth in appliance penetration throughout the region. Also, there is significant regional trade in appliances, implying benefits for an international approach.

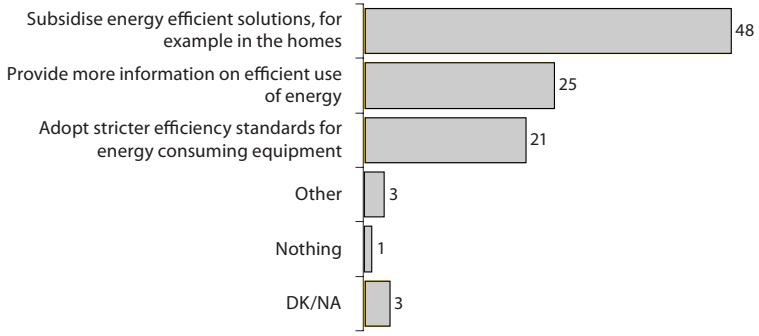
In the most recent Eurobarometer of attitudes towards climate change, those surveyed were asked what the government should do to encourage a reduction in energy consumption. The results are shown in Figure 5.1, and these are among the full range of policy measures used.

ENERGY EFFICIENCY IN BUILDINGS

Energy efficiency policy has sought to improve the energy performance of buildings since the 1970s. Unlike automobiles or energy-consuming equipment such as household appliances, buildings last for decades, sometimes for centuries. According to recent IEA statistics, energy use in residential and commercial/public building accounts for 35% of total global final energy consumption.[39] In OECD countries, energy use in buildings increased 39% between 1973 and 2003.[40] These trends are significant and need to be addressed in a comprehensive manner.

Policy has generally followed three main approaches since the 1970s. First, there was a need to upgrade existing buildings to reduce energy consumption, because, for the most part, older buildings tend to be less energy-efficient than newly built ones. Second, there was a need to ensure new buildings would be built according to higher standards of thermal quality because building energy efficiency into the design and construction is cheaper than through retrofit. Third, there was a need to ensure that occupants modified their behaviour to promote the rational use of energy through being aware of how energy is used and through encouraging the elimination of wasteful practice. Understandably, total energy consumption in buildings is highly affected by the behaviour of occupants.

Figure 5.1: What Governments Should Do to Encourage People to Reduce Energy Consumption (%)



Source: 2007 Eurobarometer. http://europa.eu/rapid/pressReleasesAction.do?reference=IP/07/280

One of the main reasons for giving high priority to buildings is because the potential for cost-effective energy savings is also significant. Analysis from the original proposal prepared by the European Commission on the Directive on the Energy Performance of Buildings showed that there was potential for a 22% reduction of 2001 consumption that can be realised by 2010. This consumption is for heating, hot water, air conditioning

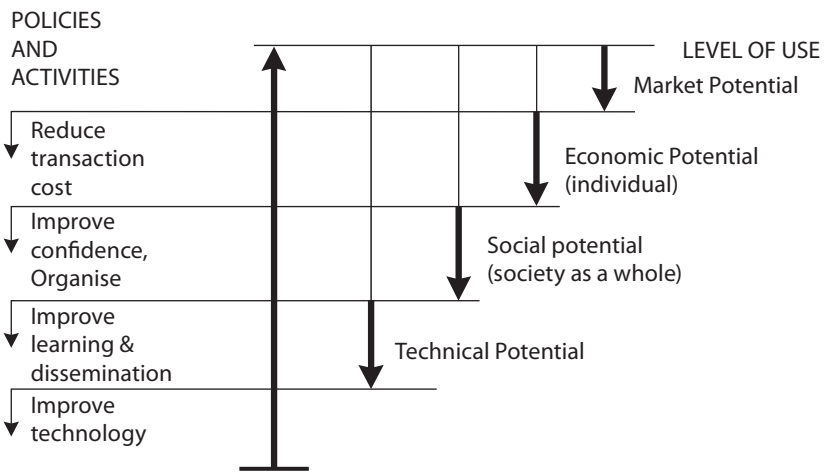
39 IEA, Energy Technology Perspectives, 2006, OECD, Paris, p. 331.

40 Ibid., p. 331.

and lighting.[41] Other estimates of potential are generally about the same, even though much greater savings could be achieved with more accelerated approaches.

Analysis shows that much of that cost-effective potential (at the individual or society level, see Figure 5.2 below) will not be achieved, in part, because of various market barriers. This justifies a government role to create a more favourable environment to promote energy efficiency measures. Achieving the economic potential for energy efficiency is complex. Market players have different approaches and different priorities. Energy efficiency *per se* is usually not a major consideration in investment decisions, except during periods of crisis when it is often too late. In a crisis, demand can quickly be reduced by restricting services. But, improved energy efficiency at a regional or national level has to occur through a thoughtful, planned approach over a fairly long period. Due consideration to the factors that are hindering the market from functioning properly need to be examined. And governments have to continually assess whether their measures are properly targeting those barriers.

Figure 5.2: Energy Efficiency: Different Types of Potentials and Policies for Improvements



Source: Lena Neij, adapted from Dynamics of Energy Systems, Lund University, (Lund, Sweden 1999) in IEA, Energy Efficiency in the Baltic Sea Region, an IEA report to the Baltic Energy Efficiency Group, 1999/09-23

THE EUROPEAN UNION'S APPROACH

The European Union is the major catalyst driving energy efficiency policies and programmes in the buildings sector throughout most of the region as discussed in earlier Chapters. While there are some individual countries that are playing an exemplary

41 The proposal stated that this is for investments in energy-efficient technology with a pay-back of eight years or less. It should be noted that this is only for EU-15 and not for the EU-25.

and leading role, most are following the lead of the Commission, the European Parliament and the Council of Ministers. This is highlighted by the Directive on the Energy Performance of Buildings which is the most powerful instrument developed to date for the buildings sector. It primarily deals with the building structure and much of the effort towards the equipment used in residential buildings will be discussed under appliances below.

There is a growing body of legal obligations on member states from the European Union that directly relate to buildings energy efficiency.[42] Directives cover:

- Appliance labelling for a wide range of products;
- Appliance efficiency standards;
- Boiler efficiency;
- Energy performance of buildings; and
- Energy end-use efficiency and energy services.

Some of these will be discussed below under appliances.

THE ENERGY PERFORMANCE IN BUILDINGS DIRECTIVE

The main legislative instrument affecting the buildings sector is the Directive on the Energy Performance in Buildings. The directive is designed to promote the energy performance of buildings in member states by introducing a framework for an integrated methodology for measuring energy performance; application of minimum standards in new buildings and certain renovated buildings, and regular updating of these; energy certification and advice for new and existing buildings; and inspection and assessment of boilers and heating/cooling systems. The directive entered into force on January 4, 2003 and implementation was to be by January 4, 2006. This directive replaces three of the obligations under Council Directive 93/76.

The savings potential for the Directive is estimated at 28%, and which in turn can reduce total EU final energy consumption by around 11%. Replacing old boilers could reduce energy consumption by over 10 Mtoe or 5% of the energy used in heating in the residential sector, according to analysis undertaken for the Communication. New boilers have an efficiency of approximately 35% more than existing ones. To better understand the importance of boilers, In the EU, space heating represents about 57% of total consumption in residential buildings and 52% in service sector buildings. Unfortunately, there has not been any official examination of the boiler efficiency directive from 1992 to have a better appreciation whether the estimated savings are achievable.

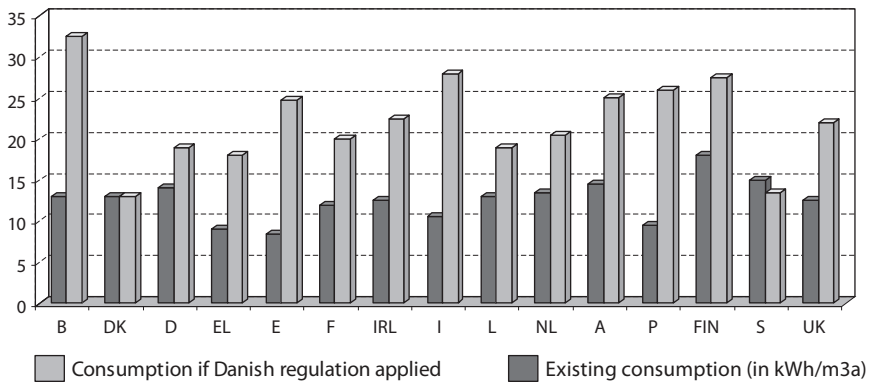
The Communication further estimated that there could be savings in lighting of between 6 Mtoe and 9 Mtoe, with savings in the range of 30-60%. In the services sector, most of the lighting is permanently installed and thus considered part of buildings policy. Lighting represents about 14% of total energy consumption in the services sector.

The Communication that accompanied the proposal for a directive on the energy

42 Norway and Switzerland also implement the directives.

performance of buildings emphasised the significant potential for energy savings through improvements in building regulations. The following diagramme was used by the Commission to illustrate the broad potential that is possible, if member states were to achieve the level attained by Denmark.[43]

Figure 5.3: Comparison of Energy Consumption, Applying the Model Building Regulation in Denmark to each EU-15 Member State (2001)



Source: DG TREN, European Commission, [COM (2001) 226 final, 11.5.2001]

The benefit of this directive is that it provides an integrated approach to different aspects of buildings energy use, which until this directive, only a few member states were doing. The Communication on the proposal stated that the largest potential for impact of the directive was on the renovation of existing buildings. For that, the proposal stated that "the most appropriate measure seems to be to introduce certification of buildings".[44]

Standards bodies and others are involved in the implementation process. While member states are free to implement on their own, there has been greater emphasis on Community-wide collaboration.

It is useful to refer to the specific requirements as outlined in the Directive.

ADOPTION OF A METHODOLOGY

Article 3 states that member states shall apply a methodology at either the national or regional level to calculate the energy performance of buildings on the basis of a general framework outlined in the Annex of the Directive.

43 This potential has to be re-calculated to include the new member states but it does reflect a high potential for savings.

44 COM (2001)226 final, 11.5.2001, p. 14.

From Annex to Directive

General framework for the calculation of energy performance of buildings (Article 3)

1. The methodology of calculation of energy performances of buildings shall include at least the following aspects:
   (a) thermal characteristics of the building (shell and internal partitions, etc.). These characteristics may also include air-tightness;
   (b) heating installation and hot water supply, including their insulation characteristics;
   (c) air-conditioning installation;
   (d) ventilation;
   (e) built-in lighting installation (mainly the non-residential sector);
   (f) position and orientation of buildings, including outdoor climate;
   (g) passive solar systems and solar protection;
   (h) natural ventilation; and
   (i) indoor climatic conditions, including the designed indoor climate.

2. The positive influence of the following aspects shall, where relevant in this calculation, be taken into account:
   (a) active solar systems and other heating and electricity systems based on renewable energy sources;
   (b) electricity produced by CHP;
   (c) district or block heating and cooling systems;
   (d) natural lighting.

3. For the purpose of this calculation buildings should be adequately classified into categories such as:
   (a) single-family houses of different types;
   (b) apartment blocks;
   (c) offices;
   (d) education buildings;
   (e) hospitals;
   (f) hotels and restaurants;
   (g) sports facilities;
   (h) wholesale and retail trade services buildings;
   (i) other types of energy-consuming buildings.

SETTING ENERGY PERFORMANCE REQUIREMENTS

Using the methodology established in Article 3, Article 4 requires member states to ensure that minimum energy performance requirements for buildings are set. It is allowed to differentiate between new and existing buildings and different building types. The Article also requires member states to review these requirements at regular interviews (not longer than five years) "to reflect technical progress . . ."

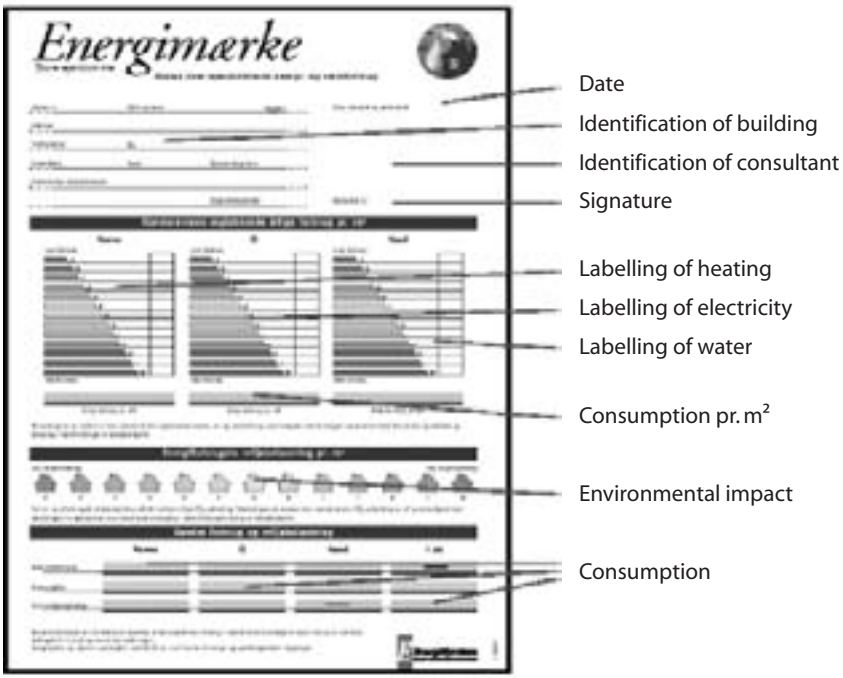
Articles 5 and 6 discuss new and existing buildings respectively in terms of the necessary measures that shall be taken to meet the minimum energy performance requirements. For new buildings, it is applicable to buildings over 1000 square metres and the technical, environmental and economic feasibility of decentralised energy supply systems based on renewables, CHP, district or block heating or cooling and heat pumps shall be taken into account before construction. For existing buildings, the requirements also apply to buildings over 1000 square metres and can be set for either the entire renovated building or for renovated systems or components.

ENERGY PERFORMANCE CERTIFICATE

Energy performance certificates, according to Article 7, are required when buildings are constructed, sold or rented out and must be made available to the owner or by the owner to the prospective buyer or tenant. The validity of a certificate cannot exceed 10 years.

Article 7 further states: "Member States shall take measures to ensure that for buildings with a total useful floor area over 1000 square metres occupied by public authorities and by institutions providing public services to a large number of persons and therefore frequently visited by these persons an energy certificate, not older than 10 years, is placed in a prominent place clearly visible to the public." There has been some debate, which is not totally resolved, on the definition of institutions providing public services to a large number of persons, and whether this includes private buildings.

Figure 5.4: Energy Certificate for Buildings from Denmark



Source: http://www.eva.ac.at/publ/pdf/forum_experience_dk.pdf

Inspection of boilers

A choice is given to member states in Article 8 to either "lay down the necessary measures to establish a regular inspection of boilers fired by non-renewable liquid or solid fuel of an effective rated output of 20 kW to 100 kW" or to "take steps to ensure the provision of advice to the users on the replacement of boilers, other modifications to the heating system and on alternative solutions which may include inspections to assess the efficiency and appropriate size of the boiler." The impact of the second option has to be "broadly equivalent" to the first one.

Inspection of air-conditioning systems

Article 9 states that member states "shall lay down the necessary measures to establish a regular inspection of air-conditioning systems of an effective rated output of more than 12 kW.

Independent experts

According to Article 10, drafting of recommendations on the inspection of boilers and air-conditioning systems for the certification of buildings, member states are required to ensure that the work is undertaken by independent qualified and/or accredited experts.

Status of Implementation of EPBD

The directive was to be implemented by January 2006 but there have been delays in its full implementation. The deadline for transposing the directive was initially missed by nine member states and the overall implementation has been slow.

To assist in the implementation, the Buildings Platform was created by the European Commission within the framework of the Intelligent Energy – Europe (IEE) programme. Its objective is to support the full and continued implementation of the Buildings Directive by setting up mechanisms for transferring information among stakeholders, notably via its website www.buildingsplatform.org. The website provides updates of the status of implementation of individual member states.

Concerted Actions[45] is another initiative of the European Commission to help in the implementation of the EPBD by sharing information and experience amongst member states. The Concerted Actions working plan was organised around a series of eight meetings (from January 2005 to June 2007), bringing together the participants of 25 countries (24 Member States together with Norway; missing were the Czech Republic, Luxemburg and Malta). The Concerted Actions works formally and informally with the standards body, CEN, the IEE programme and the Buildings Platform.

Support Projects Funded by the EC

The Enper Exist project (www.enper-exist.org) analyses the possible use of CEN standards for certification of existing buildings and gives suggestion on the development of national additions to these standards. It then provides a description of the non technical issues to be addressed and described some examples of ways chosen by member states to address them.

The EPA NR project (www.epa-nr.org) is developing a set of tools to enable to obtain calculated rating in Non Residential buildings. Three main types of tools are developed. First, a checklist which aimed at facilitating the first contacts with the client of the certification. Second, an inspection protocol which enables to collect the data which will be necessary to run the calculation software. Third, a calculation software which will is based on CEN standards and will be freely available. This software can be supplemented by national modules for inputs and outputs.

The EP Label project (www.eplabel.org) is developing a methodology and a software to obtain a measured rating in Non Residential buildings. The approach is highly based on the use of benchmarks representing good practice and standard buildings. The procedure enables three different levels of details depending on the time and amount of data available to get the rating. A beta test version of the software is available.

45 See http://www.epbd-ca.org.

The Impact project (www.e-impact.org) enables to test certification method for residential buildings in 6 different countries. The tests were performed in each country with one or two different tools. The tests in each country concentrated on a specific hot issue, e.g., reduction of certification cost, certification of apartment in a collective residential building, auditors with limited skills in energy issues… Practical solutions as well as appreciation of certification costs are assessed in the project.

Information on building energy consumption is today quite low in most countries. Enper Exist has analysed this data and showed how the certification procedure can be a great tool to improve it. The Datamine project http://env.meteo.noa.gr/datamine, which started in 2006, focuses on developing coherent approaches in this direction.

Source: A. Husaunndee and J. C. Visier, Energy Performance Certification, Status in December 2006, P 27, February 22, 2007, www.buildingsplatform.eu

Future of the EPBD

The Action Plan states that the Commission will propose expanding the scope of the Energy Performance of Buildings Directive substantially in 2009, after its complete implementation. It will also propose EU minimum performance requirements for new and renovated buildings (kWh/m^2). For new buildings, the Commission will also by the end of 2008 develop a strategy for very low energy or passive houses in dialogue with member states and key stakeholders towards more widespread deployment of these houses by 2015.

OTHER COUNTRIES

Many countries, including those in the EU, offer a Range of grants and advice, often targeted to vulnerable segments of society. They are not listed here. Below are some of the initiatives of non-EU countries.

Canada

The Model National Energy Code of Canada for Buildings 1997 (MNECB) contains cost-effective minimum requirements for energy efficiency in new buildings. The MNECB applies to all buildings, other than houses of three storeys or less, and to additions of more than 10 square metres to such buildings. The provinces of Canada are responsible for developing and implementing building codes. They use the model code in the preparation of the provincial standards.

There is also a voluntary standard, R 2000. The R-2000 Standard is based on an energy consumption target for each house and a series of technical requirements for ventilation, air-tightness, insulation, choice of materials, water use and other factors. The requirements are rigorous – about 40% above building codes. The result is new houses

that use at least 30% less energy than conventional new houses. Since being introduced over 20 years ago, the R-2000 Standard has set the benchmark for home building in Canada. The Standard is continually upgraded to include new technologies as they become established in the marketplace. Canada also has programmes for energy audits and other types of awareness.

Georgia
There are buildings regulations but they have not been updated since independence. New building standards are being developed.

Japan
There is a new standard for buildings as of February 24, 2003 and the standard for houses is from March 1999.[46] The current standard for Japan is described below.

Moldova
Moldova has a programme to rehabilitate the thermal conditions of residential buildings, developed by the Ministry of Construction and Territorial Development. There is an energy certificate (an energy passport) for new and existing buildings that are under reconstruction. The main part of the certificate shows the classification of the building in energy efficiency scale from A (the most efficient) to J (the least efficient), different for heating and hot water. The Energy Certificate became mandatory in 2002.

Russian Federation[47]
In Russia and the former Soviet Union, codes on the thermal properties of buildings (thermal-engineering codes) have existed since 1921. Russia has an extensive network of regulatory documents, which include a series of national building codes (SNiP), standards (GOST R), territorial building codes (TSN), and guiding regulations (RDS). The State Committee on Construction, Architecture and Housing Policy (Gosstroy) has overall responsibility.

Only in the 1979 code did requirements first appear for energy conservation.

Progress in improving the energy efficiency in buildings was achieved in 1994-1995 with a new regional code for the city of Moscow, entitled "Energy Efficiency in Buildings". This code introduced requirements for the thermal performance of the building, as well as for heating, domestic hot water, heat supply, electricity, and water supply systems.

The federal Russian code was revised after these innovations in Moscow. Following the Moscow model, the amended federal code established two stages for introducing new requirements, the first starting in 1995 and the second starting in 2000. The first stage doubled thermal resistance requirements for walls and the second stage, tripled the original requirements. This brought the standards up to those in Sweden and Canada. These levels of thermal performance were established by means of calculations of the energy consumption of buildings during the heating season, but the methodology for the calculation for building energy consumption did not become a part of the federal code itself. Both codes (federal and regional) provided for a reduction of energy consumption in

46 The Energy Conservation Centre, Japan Energy Conservation Handbook 2005/2006, Japan.

47 Most of the information here is from http://www.cenef.ru/home-pg/hp-43e.htm.

the first stage of 20% in comparison with the level that existed before the codes entered into force, with a further reduction of 20% with the onset of the second stage in 2000.

There are two types of building codes – federal SNiPs, which are applied across all of the Russian Federation as well as in a few CIS countries; and there are regional codes, which apply to regions of the Russian Federation and whose purview is limited to the territories of those subject entities. However, regional codes requirements must not be less stringent than nation-wide requirements.

Ukraine

Ukraine adopted a new building code in 2006 which will go into force in 2007. The code has been re-designed by focusing on total building heat loss (or performance), as is the case in most IEA countries. The technical assistance for designing the building code came from the United States.

United States

On 1 February 2006, the federal Department of Energy (DOE) joined 15 other federal agencies and the White House Council on Environmental Quality in a joint commitment to designing and constructing sustainable buildings that achieve high-energy performance. The agencies signed a Memorandum of Understanding to adopt a standard set of guiding principles for sustainable buildings:

- employing integrated design principles;
- optimising energy performance;
- protecting and conserving water;
- enhancing indoor environmental quality; and
- reducing the environmental impact of the building materials.

The agencies will aim to achieve the Energy Star targets for new construction and renovation and will also employ daylighting and incorporate bio-based materials into their buildings. The Federal government is committed to designing, locating, constructing, maintaining, and operating its facilities in an energy efficient and sustainable manner.

In September 2006 the DOE awarded $6 million to 22 federal-state partnerships that will work to save energy in residential and commercial buildings. The partnerships are to focus on building energy codes and training and technical assistance programmes that will result in more energy-efficient buildings.

Individual states have thermal efficiency standards for buildings. For example, the standard in California dates back to 1978. The standard is generally revised every 3-5 years. However, the level of thermal integrity did not change a great deal in the 1990s.[48]

ENERGY EFFICIENCY OF APPLIANCES

Residential appliances use approximately 30% of all electricity generated in OECD countries and the IEA estimate that such appliances produce 12% of all energy-related carbon dioxide

48 See http://www.worldenergy.org/wec-geis/publications/reports/eepi/a1_newbuildings/californiadata.asp.

emissions.[49] While the share may be slightly less in the non-OECD countries covered by this report, it does give a sense of the magnitude of the importance of appliances.

The use of appliances is increasing and they are now seen as an essential part of modern life. Stoves, ovens, refrigerators and freezers, washing machines, dryers, dishwashers and domestic hot-water heaters make up the major share of appliances. In addition, the use of home entertainment systems, computers in homes, kitchen gadgets, mobile phones and their chargers form an increasing share of use.

The commercial and public sector is highly dependent on the use of energy-consuming equipment such as computers, printers, air conditioners, and lighting.

There have been many studies in recent years to address how to improve the efficiency of appliances. The IEA alone has prepared several studies on appliances, stand-by losses, appliance labels and standards, and lighting. One study shows that 24% of projected energy consumption could be avoided by 2010 (the book was written in 2003) and 33% by 2030.[50] Standby power consumes 10% of residential electricity consumption and that could be reduced by 75%.[51]

In 2006 the IEA study on energy efficient lighting[52] concluded that information labels, minimum energy performance standards and voluntary programmes are the most popular measures applying to lighting components. It also concluded that building codes are increasingly being applied to new-build and retrofit lighting systems. Financial incentives, market transformation and promotion campaigns are mostly implemented at the sub-national level, often with utilities playing a major role.

IEA study on energy-efficient lighting

The IEA published the first detailed global analysis of energy-use by lighting, with a review of the technologies and policies that could reduce it. The report, Light's Labour's Lost, Policies for Energy-efficient Lighting, identifies a "simply enormous" potential to increase lighting efficiency.

By applying technologies already readily available and competitive, worldwide energy demand for lighting in 2030 could be stabilised at 2005 levels, the IEA says. This would save 16,000 million tonnes of CO_2, equivalent to about six years of current global car emissions, it says. Without action, demand is predicted to have risen by 80% by 2030.

Many appliances are also traded globally and thus international cooperation is valuable. CLASP[53] out of the United States is one organisation that is helping countries around the world to develop standards for appliances.

49 IEA, Cool Appliances, Policy Strategies for Energy-Efficient Homes OECD, Paris, 2003, p. 11.

50 IEA, Cool Appliances, Policy Strategies for Energy-Efficient Homes, OECD, Paris, 2003, p. 3.

51 IEA, Things That Go Blip in the Night, OECD, Paris, 2001, p. 3.

52 IEA, Light's Labour's Lost, Policies for Energy-efficient Lighting, OECD, Paris, 2006, pp 297-387.

53 See www.clasponline.org.

Australia to ban incandescent bulbs

CANBERRA, Australia – Australia will be the world's first country to ban incandescent lightbulbs in a bid to curb Greenhouse gas emissions, with the government saying on Tuesday they would be phased out within three years. Environment Minister Malcolm Turnbull said yellow incandescent bulbs, which have been in use virtually unchanged for 125 years, would be replaced by more efficient compact fluorescent bulbs by 2009.

"By that stage you simply won't be able to buy incandescent lightbulbs, because they won't meet the energy standard," Turnbull told local radio.

Reuters, Feb. 20, 2007

The following provides a review of many of the major programmes for appliances.

EU DIRECTIVES ON LABELLING AND EFFICIENCY

There are directives for labelling and for minimum energy performance requirements for a range of energy-consuming appliances.

There has been labelling for a wide range of products. These include freezers and refrigerators; clothes washers; dishwashers; household lamps; household air conditioners; and household electric ovens. The first of these labels came out in the early 1990s, based on a framework directive. The labelling specifications are spelled out in individual implementing directives for each product type. These directives were approved by the Commission, following the mandate from the framework directive.

The EU labels are category-type comparison labels, with the primary focus on ranking the product models against a predetermined, open-ended efficiency scale based on energy consumption per year. The labels also indicate energy use and performance, such as noise and cooling characteristics for refrigerators.

There are standards for refrigerators, freezers, hot-water heaters and fluorescent ballasts. There is no framework directive to introduce or revise efficiency standards. Three minimum energy efficiency performance directives were introduced between 1992 and 2000. These directives defined minimum energy efficiency standards for hot-water boilers (92/42/EEC), fridges and freezers (96/57/EEC) and fluorescent ballasts (2000/55/EEC), and are to be absorbed into the Eco-design Directive, which was adopted in 2005. This Directive establishes a framework under which manufacturers of energy-using products will, at the design stage, be obliged to reduce energy consumption and other negative environmental impacts occurring throughout the product life cycle. It does not prescribe specific measures or standards and sets no overall energy saving targets.

Earlier Directives with minimum energy performance standards are to be integrated into the Eco-design Directive framework and considered as the basis for implementing measures. Existing requirements for product energy labelling (as well as for the voluntary EU eco-label) will continue to exist alongside the provisions set out in the Eco-design Directive. All energy-using products sold in the domestic, commercial and industrial sectors are potentially covered by the new Directive with the exception of means of transport, which are covered by other legislation.

While the Directive's primary aim is to reduce energy use, it also enforces other environmental considerations. The Eco-design Directive should ensure that energy using product design standards are "at least as ambitious" as those already in existence in other world regions. The Eco-design Directive makes it possible for member states to go beyond the minimum requirements only on the basis of scientific evidence proving a specific national problem. In general, the protection of a free and unhindered internal market is the dominant priority.

The Eco-design Directive's implementing measures should begin to take effect soon after July 2007, when the Commission will publish a working plan.

The Action Plan on Energy Efficiency outlined what is expected in the near to middle term in the European Union on this issue, and the Commission has announced its intention to develop eco-design requirements and labels for a range of key products 2007-2012 as a priority of its energy efficiency policy.

The product groups being studied for early implementation are:
- boilers and combi-boilers (gas/oil/electric)
- water heaters (gas/oil/electric)
- personal computers (desktops & laptops) and computer monitors
- imaging equipment: copiers, faxes, printers, scanners, multifunctional
- devices
- consumer electronics; televisions
- standby and off-mode losses of energy-using products
- battery chargers and external power supplies
- office lighting
- (public) street lighting
- residential room conditioning appliances (airco and ventilation)
- electric motors (1-150 kW)
- commercial refrigerators and freezers, including chillers, display cabinets
- and vending machines
- domestic refrigerators and freezers
- domestic dishwashers and washing machines.

Eco-design requirements for more product groups will be adopted. Possible areas include the following:
- Solid fuel boilers
- Laundry driers
- Industrial air compressors
- Electric heating appliances (incl. heat pumps)

- Domestic or industrial lighting
- Set-top boxes
- Vacuum cleaners.

It was also announced in the Action Plan that the "Labelling" Framework Directive (92/75/EC) would be amended:

- Two draft Commission Directives are being prepared for the energy labelling of gas water heaters and electric water heaters.
- Additional labelling implementing directives and revision of existing labels will be adopted by the Commission for some of the products under examination in the preparatory studies for eco-design, with a view to re-scale them every 5 years or when technically justified. Life-cycle costs and expected energy savings will also be verified.
- The Commission will, in considering amending Framework Directive 92/75/EC, seek to enlarge its scope to include other equipment, pending an impact assessment. This assessment, to be carried out in 2007-2008, will determine the benefits and costs of a revision.
- The Commission will launch a comprehensive survey on the practical implementation of Directive 92/75/EC and application of energy labelling in shops and other sales channels in the EU Member States. This is to be carried out during 2007. The level of compliance directly influences the effectiveness of the Directive and the energy savings achieved

It was also announced in the Action Plan that there would be changes to the ENERGY STAR® Agreement. This agreement with the USA coordinates the labelling schemes for office equipment and will be concluded by 2007 for another 5 years. ENERGY STAR will introduce new, demanding efficiency criteria for imaging equipment (copiers, printers, fax, scanners, etc.), for computers and for other equipment with external power supplies. In parallel with the conclusion of the new ENERGY STAR Agreement by the Council, the Commission will propose in 2007 amending Regulation (EC) No 2422/2001 with a view to improve implementation of the programme in the EU.

Also, the Commission will continue developing more demanding energy efficiency criteria for office equipment 2007-2011. To determine the appropriate level of efficiency and the timing, the Commission will launch a survey on market penetration of ENERGY STAR equipment and on new energy efficiency criteria.

OTHER COUNTRIES

Canada

The EnerGuide label is a tool to help you make an energy-wise choice when buying a new appliance. It shows how much energy appliances consume in a year of normal service and makes it easy to compare the energy efficiency of each model to others of the same size and class.

Major electrical household appliances and room air conditioners sold in Canada must meet minimum energy efficiency standards and are required to display an EnerGuide label. Information on the EnerGuide label is the result of extensive testing, based on Canadian Standards Association test procedures. The EnerGuide energy consumption rating is an average measure of how much energy individual appliances typically consume when used at different temperature and/or speed settings.

In 2001, EnerGuide teamed up with ENERGY STAR® (see above) to help consumers find the most energy efficient refrigerators, dishwashers, clothes washers and room air conditioners on the market. An appliance receives the ENERGY STAR rating if it is significantly more energy efficient than the minimum government standards, as determined by standard testing procedures.

Canada also uses ENERGY STAR for many types of office equipment; lighting and signage; windows, doors and skylights; televisions, VCRs, TV/VCR combinations and DVD or audio products; and for many commercial and industrial products.

France

Under the White Certificates Trading programme, suppliers of energy (electricity, gas, heating oil, LPG, heat, refrigeration) must meet government-mandated targets for energy savings achieved through the suppliers' residential and tertiary customers. Appliances are targeted. Those exceeding and undercutting their objectives can trade energy savings certificates as required for common compliance.

Energy suppliers who do not meet their obligation over the period (2006-2008) must pay a penalty of €0.02 per kWh. Government's stated goal is an energy saving equivalent to 54 TWh between 2006 and 2008.

A **white certificate** is an instrument issued by an authority or an authorised body providing a guarantee that a certain amount of energy savings has been achieved. Each certificate is a unique and traceable commodity that carries a property right over a certain amount of additional savings and guarantees that the benefit of these savings has not been accounted for elsewhere.

Source: Joint Research Centre, Tradable Certificates for Energy Savings (White Certificates) – Theory and Practice, Institute for Environment and Sustainable, EUR 22196 EN, 2006, p. 31

Japan

Japan's Top-Runner programme, introduced in 1999, is a standards scheme to promote more energy-efficient appliances and vehicles on to the market. The programme was designed to help Japan meet its Kyoto Protocol obligations. It is not a minimum energy performance standards programme but a mandatory manufacturer sales-average energy efficiency target. It was decided that only the most efficient appliances in the late 1990s would still be allowed to be sold from 2003-2007.[54]

54 IEA, Cool Appliances, op.cit., p. 71.

The target produces are machinery and equipment which are commercially used in large quantities in Japan and which consume a significant amount of energy. The obligations to meet specific targets are placed on both domestic manufacturers and importers. Target standard values are set on the basis of the value of the most energy-efficient products available on the market. Targets are normally set for 4 to 8 years.

The original products in the programme include vehicles, air conditioners, fluorescent lights, TVs, video cassette recorders, copying machines, computers, magnetic disk units, freight vehicles, electric refrigerators and electric freezers. In 2002 space heaters, gas cooking appliances, gas water heaters, oil water heaters, electric toilet seats, vending machines and moulded transformers were added. In 2006 microwave ovens, electric rice cookers and DVD recorders were added.

Success in Japan's Top-Runner Programme, where actual improvements significantly surpassed initial expected savings, can be seen from the Table below for selected equipment.

Table 5.1: Japan's Top-Runner Programme: Actual Improvement of Energy Saving in Target Fiscal Year

Equipment	Base year	Target year	Initial expected energy saving (%) compared to the base year at the target fiscal year	Actual improvement of energy saving (%) compared to the base year at the target fiscal year
Air conditioners (below 4kW)	FY1997	FY2004	63	67.8
TV sets <cathode ray TV>	FY1997	FY2003	16.4	25.7
VCRs	FY1997	FY2003	58.7	73.6
Electric refrigerators	FY1998	FY2004	30.5	55.2
Electric freezers	FY1998	FY2004	22.9	29.6

Italy

Italy has a White Certificate programme,[55] with the Authority for Electricity and Gas is in charge of its implementation. The target reduction of primary energy consumption set by the Authority for 2005 was 156,000 toe for large distributors that had at least 100,000 consumers. The results showed that 63% had been saved in electricity and 38% in natural gas. The target for 2006 was 311,000 toe, 62% from electricity. In the programme, one *toe* (tonne of oil equivalent) was equal to one White Certificate. The average price

55 Material provided to IEA's Roundtable Energy Efficiency Working Party (EEWP) meeting, October 2006.

of White Certificate exchanged was €60 for each *toe* saved in electricity and €90 for each *toe* saved in the gas sector. About 700 ESCOs operate within the white certificate scheme, but only 70 actually presented project proposals. So, there is potential for further growth.

Russian Federation

Russia, since the 1980s developed minimum energy performance standards. There is no official labelling programme, although CENEf (the Centre for Energy Efficiency) did develop a comparative label for refrigerators, called "ENERGOCOMPASS."

The minimum energy performance standards are as follows:

Product Description	Year Implemented
Air Conditioners (window, split-type, ducted)	1999
Air Conditioners – room	1986
Audio – domestic sound frequency signal amplifiers	1990
Computers	1989
Dishwashers	1987
Freezers	1987
Graphical input devices	1989
Monitors	1989
Printers	1989
Ranges/Ovens	1983
Refrigerators and/or refrigerator-freezers	1987
Televisions	1989
Water heaters – electric	1984

Source: Lloyd Harrington and Melissa Damnics, Energy Labelling and Standards Programs Throughout the World, The National Appliance and Equipment Energy Efficiency Committee, Australia, December 2001, p. 33

United Kingdom

There are many innovative ways that energy-efficient appliances and equipment are being promoted. For example, in the UK, the Energy Saving Trust has a separate "Energy Saving recommended" label, as shown in the box below. This complements the energy label from the EU.

Energy Saving Recommended – in the United Kingdom

Developed by the Energy Saving Trust, in conjunction with industry and Government, the Energy saving recommended logo appears on a wide range of products including fridges, freezers, dishwashers, washing machines, tumble dryers, light bulbs, light fittings, gas boilers and heating controls.

The EST on-line database tells the consumer exactly what is available with full product and manufacturer's details. Consumers can search using product type, brand and even model number.

Source: www.est.org.uk

The Market Transformation Programme (MTP) supports sustainable consumption and production, in particular policies and delivery programmes that encourage competition and innovation in the environmental performance of traded goods and services. The MTP publishes product strategy guides and policy briefs, which set out the measures required to reduce the energy consumption of appliances. These policy briefs are public consultation documents that inform UK Government decisions on product policy.

MTP also generates briefing notes. These explanatory documents provide background information to the policy briefs:

- Rationales and definitions used to construct the policy briefs;
- Assumptions made to model the impact of potential policy measures;
- Details of new and emerging technology; and
- Results of energy efficiency product testing.

The Market Transformation Programme covers products that consume large amounts of energy and water at the point of use and are responsible for a significant waste and hazardous materials arising at end of their useful life:

- All major domestic energy-consuming appliances (lighting, heating, cold, wet, cooking and consumer electronics).
- Traded goods in the commercial sector (office equipment, motors and drives, lighting, commercial refrigeration and air conditioning).
- Domestic and non-domestic water products (showers, toilets and other bathroom products).

Ukraine

Ukraine has appliance standards based on the 2001 Law on Standardisation. Before that, the Ukraine used Soviet-era standards. Appliance standards and labelling were introduced in 2003 through an order on technical regulations of appliances. That document anticipated that Ukraine will set standards based on those of the EU. There

are now standards for refrigerators and freezers, washing machines, dryers, dishwashers, ovens, water heaters, lighting equipment and air conditioners. They are also required to have a label. Energy labelling is included in the revised Law on Energy Conservation adopted in 2005.

United States

Some of the Federal measures include:[56]

- Included within the 2005 Energy Policy Act, the energy efficiency tax credits, which entered into force on 1 January 2006, enable private and business consumers to reduce their 2006 tax bills on a dollar-for-dollar basis up to the amount allowed under the law. These tax credits are due to expire after two years, but may be extended in Congress.
- Specific tax benefits for the home include:
  - *$50 for purchasing an advanced main air circulating fan;*
  - *$150 for installing a highly efficient furnace or boiler;*
  - *$200 for installing energy efficient windows;*
  - *$300 for purchasing a highly efficient central air conditioner, heat pump or water heater;*
  - *30 percent, or up to $2000, for the purchase of solar water-heating equipment (excluding equipment used to heat swimming pools or hot tubs).*
- Businesses may be eligible for credits such as:
  - *30% tax credit for the installation of qualifying solar equipment on buildings;*
  - *Business tax credits for companies that build highly energy efficient homes;*
  - *Credits for companies that manufacture energy-efficient appliances such as dishwashers, clothes washers and refrigerators.*

In March 2006, the U.S. Department of Energy (DOE) announced more stringent energy efficient criteria for dishwashers carrying the ENERGY STAR® label. Dishwashers that meet the new ENERGY STAR criteria must be a minimum of 41% more efficient than federal energy efficiency standards, and will save over 160 million kWh of energy per year.

The new qualifying levels will go into effect on January 1, 2007, and dishwashers that meet the criteria will be eligible for tax credits for the production of energy efficient appliances to manufacturers under the Energy Policy Act of 2005.

In January 2006, the DOE released a schedule for setting new appliance efficiency standards, committing the US government to issue standards by 2011 for all products requiring regulatory revision. The five-year plan outlines how DOE will address the appliance standards rulemaking backlog and meet the statutory requirements established in the Energy Policy and Conservation Act and the Energy Policy Act of 2005.

In addition to products required under Energy Policy Act of 2005, the schedule provides for the issuance of one standard for each of the 18 products currently in the backlog, including:

56 From IEA energy efficiency policy database. See www.iea.org.

- residential furnaces and boilers;
- mobile home furnaces;
- small furnaces;
- residential water heaters;
- direct heating equipment;
- pool heaters;
- electric motors;
- incandescent reflector lamps;
- fluorescent lamps;
- incandescent general service lamps;
- fluorescent lamp ballasts;
- residential dishwashers;
- ranges and ovens;
- microwave ovens;
- residential clothes dryers;
- room air conditioners;
- packaged terminal air conditioners and heat pumps; and
- residential central air conditioners.

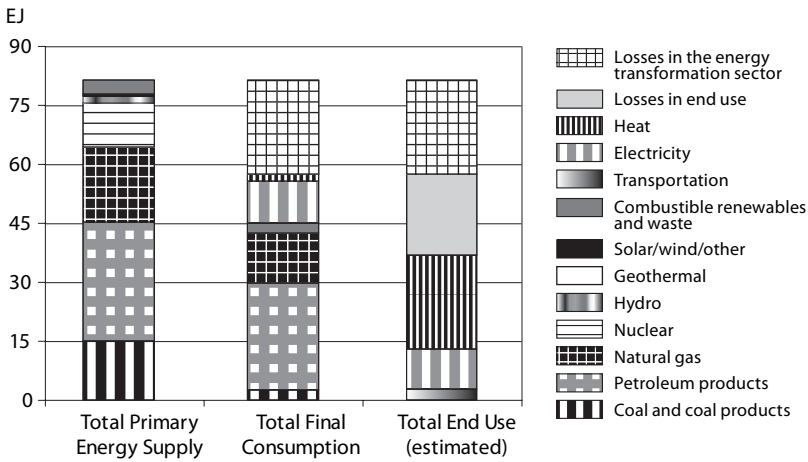
COGENERATION AND DISTRICT HEATING[57]

Cogeneration and district heating are two technology systems that are often linked and that have important potential for energy savings in both heat/cooling production as well as electricity generation.

District heating and cooling (DHC) grids make it possible to optimally use and combine a large spectrum of "free" energy inputs: surplus heat from electricity production based on conventional or renewable fuels, from waste incineration and/or from industrial processes as well as different forms of renewable heat (i.e., geothermal, heat/cold from deep-sea or lake water). Thus significant parts of the heat which otherwise is lost in energy conversion processes can be used and distributed by district heating and cooling systems to heat urban buildings.

57 Much of the material in this section was prepared for this report by the industry association, Euroheat & Power.

*Figure 5.5: Share of Heat in Europe's Total Energy End Use in 2003**



** Heat in the Total Final Consumption bar considers commercial heat deliveries, mostly through district heating systems, while heat in the Total End Use bar considers all heat used by end users, except heat generated from electricity, still allocated to the electricity area.*
Source: www.ecoheatcool.org: energy balances for EU25+ACC4+EFTA3 during 2003

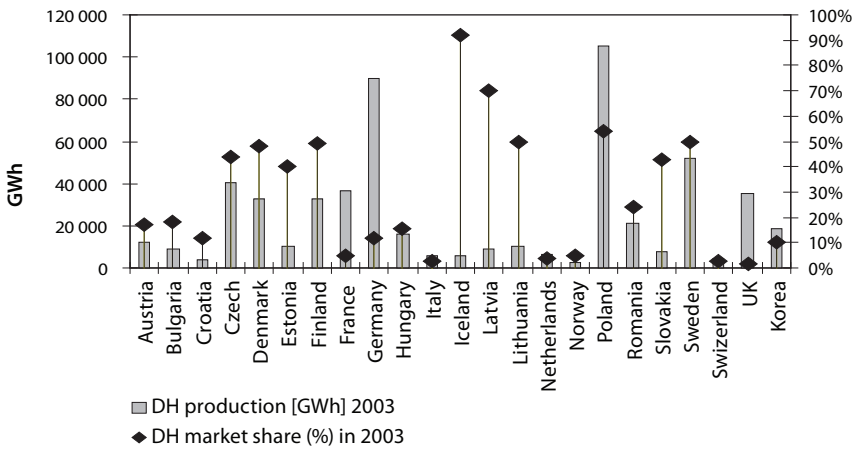
Looking at the energy balance of the EU together with the European Free Trade Association (EFTA) and Accession countries, it is striking that Europe actually wastes more heat than it consumes (see Figure 5.5). The total primary energy supply of 81.1 EJ (1936.7 Mtoe) contains the calorific value of all fuels and other energy amounts supplied to satisfy the total energy demand. The second bar contains all energy commodities used by all community sectors.

The difference between the first two bars reflects what occurs in the energy transformation sector, including power generation, oil refining, central heat generation for district heating systems, and distribution losses in electricity and heat distribution systems. In particular, losses from the energy transformation sector are huge: 23.8 EJ (568.3 Mtoe), corresponding to 29% of all primary energy supply. Most of this heat was lost in thermal power stations due to low conversion efficiencies. Adding losses from final to end-use (difference between second and third bars), total heat losses in the balance correspond to more than half of the total primary energy supply.

District heating (DH) and cogeneration (CHP) have been widely available and used in many parts of the region. District heating has a long tradition in the economies in transition and in many of the northern OECD countries. Large District heating systems exist in the transition economies and in the northern non-transition economies. Out of the total residential and public heating market DH covers 70% in Russia and Lithuania, 68% in Latvia, 53% in Poland, 52% in Estonia, and 50% in Denmark and Finland. In EU and CEE countries DH supplies heat to more than 100 million people, thus covering a substantial

share of the heating demand. Moreover, DH represents in some countries, particularly in Western Europe, important outlets for CHP plants. CHP represents 79% of DH supplies in Germany, and 75% both in Finland and Denmark. In the economies in transition the CHP share of DH supplies is generally much lower.

Figure 5.6: District Heating Production and Market Share



Source: Euroheat and Power

Unfortunately, DH systems in transition economies were allowed to deteriorate because of a lack of maintenance and investment. Usually, the DH systems in transition economies require substantial rehabilitation in order to become satisfactory for the customers and the environment. Pipelines and consumer substations need to be modernised on a large scale, and heat metering to be introduced at the customer level, for instance. The local district heating enterprise (DHE), often owned by municipalities, is usually not in a position to provide sufficient guarantees in order to obtain outside finance for investments in these areas.

So far, the heating and cooling markets, local by nature, got little attention from analysts and policymakers. For many, it seems to come as a surprise that the largest chunk of the primary energy cake is used for heating purposes. And cooling catches up quickly: in the past electricity peak loads occurred in winter, nowadays, and not only during the latest heat wave, demand for powering air conditioning is frequently peaking in summer.

Today, thousands of local CHP/DHC operators make their contribution to a more efficient energy system by "redistributing" heat which otherwise would be lost to satisfy local demands for secure, affordable and environmentally friendly energy. This contribution could be even more substantial with regulatory frameworks encouraging the improvement of existing and the construction of new district heating and district cooling systems.

Both 'hard' and 'soft' measures are needed to improve the performance and economy of DH and CHP. Hard measures are investments in the consumer substations, the DH network and the heat sources, the CHP plant included, whereas the soft measures consist of training of staff, organising cooperation between the DHE and other DHEs, non-governmental organisations and manufacturers. The soft measures used for building the institutional capacity of the staff of a DHE comprise introducing modern management practices such as quality assurance (ISO 9002), environmental management (ISO 14000), preventive maintenance, financial planning and accounting, cost analysis of operations, economic analysis of investments, human resource management, and advanced billing and collection procedures.

Europe sets benchmarks for efficient CHP

(15 Feb 07) Adoption of long-delayed reference values starts marks important milestone for troubled cogeneration directive.

The EU adopted benchmarks for assessing when combined production of electricity and heat is delivering energy efficiently. They will support implementation of a 2004 directive on cogeneration of heat and power. The series of "harmonised efficiency reference values" should have been issued a year ago.

The values establish standard efficiencies of separate production of electricity and heat. Compared with these, cogeneration must delivers primary energy savings of at least 10% to be called high-efficiency.

As most new cogeneration facilities are natural gas-fired, the most widely debated reference value was that for separate electricity production from combined-cycle gas turbines (CCGT).

The best performing CCGT units can achieve efficiencies of up to 60%, but the cogeneration sector argued that actual operational performance is generally closer to 40%. The member state regulatory committee that approved the figures finally opted for a reference value of 52.5% for new facilities.

With the reference values in place, member states now have six months in which to issue producers of electricity from high-efficiency cogeneration with guarantees of origin. By 21 February 2007 EU countries are obliged to report on progress towards increasing the share of efficient cogeneration, but it is unlikely that any will meet the deadline.

Source: www.eceee.org

CHP and other modern energy concepts are demand-driven, hence the importance to take demand aspects into account when discussing supply and vice-versa. Separating supply and demand regulation is artificial and cannot reflect the complexity of today's energy world anymore. Instead, successful policies combine a wide range of tools in a coherent way – taxation, buildings' regulation, urban planning, financing schemes and information from a primary resource perspective (using primary resource factors as benchmarks.[58]

At the European level, the Energy Performance in Buildings Directive (Directive 2002/91) specifies that the positive influence of district heating and cooling shall be included in the calculation of the energy performance of a building. This can only be done by using an integrated approach including the whole district heating or cooling production and distribution system. The related the European Committee for Standardisation (CEN) pre-standards are based on this very principle, which is also guiding already existing buildings regulations in Germany and Sweden. Other countries tend to focus solely on saving final energy in buildings – and thus miss the enormous potential to save fossil fuels by optimising the whole chain of energy production and delivery.

In the same line of thinking, the 'Energy Services' Directive (Directive 2006/32) specifically mentions district heating and cooling systems as energy efficiency improvement measures. No other energy distribution system gains this status. This is clearly in recognition of the contribution of district heating and cooling to the efficiency of the energy system outside the buildings.

Another important piece of European legislation, the Emissions Trading Directive (Directive 2003/87), though has failed to give member states clear guidance on how to take into account the specificities of energy efficient technologies such as cogeneration and district heating. As long as and where the allocation of allowances is based on grandfathering only, the efficiency advantages of CHP/DHC are not economically rewarded. In several countries, producers tend to even reduce heat and power production in their own highly-efficient combined-cycle gas turbine (CCGT) plants and buy from the market.

In how far the Cogeneration Directive (Directive 2004/8) will deliver the expected results remains to be seen. So far it seems that member states have little trust in the mechanisms of the Directive. As the guidelines for implementation have not yet been finalised by the respective CHP Committee established by the Commission, the respective national activities and legislative procedures have been put on ice. As shown in the box above, benchmarks have been set but there are still many concerns about the slow implementation of the Directive.

58 Use of Primary Resource factor according to the methodology developed in the Ecoheatcool project – Work Package 3 available at: ecoheatcool.org.

INVESTMENTS REQUIRED FOR DISTRICT HEATING AND COOLING SECTOR

District heating deliveries in Europe (32 countries: EU 27, two Accession countries (Croatia and Turkey), three EFTA countries (Iceland, Norway and Switzerland)) represent 2 EJ. Since 1990 district heat deliveries in this area decreased on average by 2% per year. The development was different in the different regions of Europe: while in the EU-15 and EFTA countries the expansion was 3% and respectively 2% per year, the decrease in EU-10[59] was 5%.

Based on Swedish experience, the average total replacement investment costs in a district heating scheme can be considered to be €75/GJ. The total investment cost for doubling the Europe 32 district heat deliveries could be estimated at almost €150 billion (for additional 2 EJ). About 40% of the total investment cost is related to investment in distribution, the rest considering various heat generation facilities. However, huge variations exist throughout Europe, resulting not only from differences in equipment and work costs, but also and in particular from local conditions and regulatory requirements (planning, authorisation, environmental impact assessment, etc.).

It is very difficult in practice to provide a coherent answer to the question of which is the level of investments required to ensure the viability of DH/CHP. Such requirements are very much dependent on the specific situation encountered and therefore can strongly differ among countries.

For example in Austria, a country that enjoys of high growth rate (6% per year in the last decade), investments in DH schemes are expected to increase by 10% in real terms (with 2003 as base year). For the period of 2004-2012 an investment volume of €1 billion is foreseen, with €455 million allocated for district heating generation capacities and supply equipment, €436 million for pipeline systems and €81 million for substations and customer installations.

Denmark, where the growth rate for district heating reached 2% per year in the last decade, has seen a constant flow of investments throughout the years (on average more than €152 million annually in the period 1999-2003) that were mainly oriented towards the improvement of distribution systems.

Germany, where the district heat deliveries remained unchanged over the last 10 years, invested approximately €4 billion in the rehabilitation of the district heating sector in East Germany in this period.

The Central and Eastern European countries have been confronted with a decrease of district heat deliveries. In most countries in Central and Eastern Europe and the CIS countries district heating still needs huge investments to ensure continued operation and to remain competitive with other heat sources.

The Russian district heating deliveries decreased significantly especially in the period between 1992 and 1996 due to the loss of industrial heat customers and the reduction of end use heat demands in buildings. This situation is similar into the other former Soviet Union countries.

59 This study was undertaken when Bulgaria and Romania were still accession countries and so are generally not included in the EU-10.

The World Bank estimated that it would cost approx €25 billion over a five to seven year period to improve the energy efficiency of the district heating schemes by 20% in 11 transition economies: Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Lithuania, Poland, Romania, Russia, Slovenia and the Ukraine.

Funds for investments in the CHP/DH sector are made available from a variety of sources (discussed later in the report): national funds, use of financial mechanisms such as preferential taxes and other types of CHP support schemes, grants, credits from national and foreign banks, private investments (especially foreign direct investment) and third-party financing. It should be noted that commercial financing is overall the most important form of financing in the DH sector. It is also the source that has the least published data, as private entities often consider such information as confidential. In Central and Eastern Europe countries, international financial institutions such as the EBRD, the World Bank and the European Investment Bank have played a catalytic role as well. Pre-accession funds and structural and cohesion funds have been also used.

BARRIERS FOR DHC SECTOR

Europe

The following barriers to the expansion of district heating in the institutional and legal framework have been identified by the IEA, the World Energy Council or the World Bank:

- By tradition, policies focus on energy supply from fossil fuels, nuclear, electricity, and biomass in European or national energy policies. Much less attention is given to the actual heat demands. District heating is an efficient short cut between energy supply and heat demands, getting little or no attention when European or national energy policies is discussed.
- In many European countries, a general shift from municipal ownership to private owners is going on. New capital is then mainly used for equity investments. Less capital is used for expansion of DH systems. Energy companies grows by mergers and the top management focus more on large global and national investments and less on local investments in urban district heating systems. The large international energy companies are moving away from the local level, where district heating systems operate.
- The major driving force for district heating is the benefit of combined heat and power. The CHP benefit must be shared between electricity and heat. Sometimes, the whole CHP benefit is allocated to electricity giving no market advantage to district heat. District heating cannot expand without having a significant advantage compared to market alternatives.
- In most transition countries, extensive price regulation is applied due to protection of the poorest part of the population. This prevents rehabilitation and expansion of the networks, since the owner in many cases cannot keep the full return on investments. This situation prevents many private investors to enter the DH sector.
- In some transition countries, price regulation is not harmonised amongst various

energy commodities and does not provide a level playing field for district heating. Natural gas has been sold to final customers at the same prices paid by large power and power plants. The long-term retail distribution costs have not been regarded in the price regulation.

Central and Eastern European countries

The following barriers have been identified for to the viability of CHP/DH schemes in these countries:

- One of the leftovers of Soviet mentality is the common tendency of DH managers to be more focused on production and system operations than on the interests and preferences of consumers. Some DH companies, for instance, do not have direct contact with their customers – they produce heat and charge intermediates like housing service organisations, which on their turn have dealings with end customers. In the long run, this can turn into a major problem. If other ways of heating exist on the market that for a reasonable price provide a more individualised supply, there is a great chance of people switching over. This might lead to irreversible loss for the CHP/DH industry.
- Factors like technical design, poor maintenance, worn out equipment, lack of controls and the insufficient insulation of heat pipes contribute to the creation of the image of low-efficient systems. Heat losses in production, distribution and end use are relatively high and estimated to be between 35% and 77%.
- Another problem is overcapacity. Frequently the supply infrastructure is larger than the now reduced demand. Excess capacity is known to lead to higher costs – large systems have great fixed costs and operating at partial capacity leads to efficiency losses. Such systems also tend to be less flexible and reliable – balancing demand and supply to arrive at the desired production level is done often through rough estimations.
- Poor governance and un-coordinated policy can lead to a difficult environment for developments in CHP/DH. Cases exist in which unbalanced reform policies in the energy sector have worked to the detriment of DH schemes. Corruption varies a lot from country to country and city to city, but can obviously have a strong negative impact. The same counts for inadequate regulatory frameworks.
- Many DH companies in the CIS face serious financial difficulties. Due to the lack of resources available for investments in the improvement of service quality, this may lead to a lower competitiveness and subsequently a decreased viability. In fact, many companies in the regions of Central Asia, the Caucasus and South East Europe have already gone bankrupt. A great number of those that are still running require urgent modernisation and replacement. In Russia, by example, about 50% of heat generation units and networks are in need of replacement, in Kazakhstan 70% of these are obsolete. Increasing tariffs for heat, which are usually below production costs, is unfeasible because of the high poverty rate in the respective areas. Financial stability and competitiveness are interrelated and often form a vicious circle. In the best case one can make full use of the benefits that district heating has to offer, in the worst – it can lead to a complete system collapse.

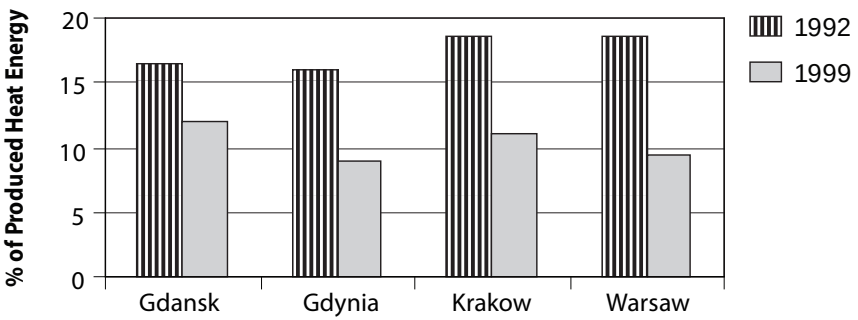
EFFECTIVENESS OF GOVERNMENT AND INTERNATIONAL FINANCING IN IMPROVING THE DH/CHP SECTOR

The reunification of Germany illustrates the great opportunities, which could arise from re-constructing/modernising CHP and District Heating in Central and Eastern Europe. The federal Ministry of Economy in cooperation with the AGFW[60] issued a temporary investment promotion programme for the refurbishment of the DH Sector worth about €150 million per year from 1992 through 1995. The focus of the scheme was on CHP and on house transmission substations. The total value of the scheme was approximately €608.1 million. Under this programme approximately €3.51 billion was invested (€2.89 billion directly promoted) in the Eastern German District Heating Sector from 1992 to 1995. The share of investment aid was about 17% in total, ranging from 27% in Berlin to 12% in Saxony.

The most significant effects of the refurbishment of the DH Sector were a dramatic decrease in noxious emissions; considerable energy savings; job-securing measures; a broad distribution of states aids; and a decrease in the district-heating price. CO_2-emissions were reduced by around 33%, SO_2-emissions by 83%, CO-emissions by 49%, NO_x-emissions by 41%, and emissions of dust by 95%. As about 80% of the DH-generation were refurbished and measures to diminish the transmission losses taken energy savings of 11,180 GWh p.a. were achieved. At the same time DH-prices were reduced by around 25%.

Energy savings resulting from investments in pipelines during the period 1992-1998 in four main cities in Poland are presented below. The heat transmission losses have on average dropped from 18% in 1992 to 10% in 1999.

Figure 5.7: Change in Transmission Losses in Four Polish Cities



Source: World Bank

60 Arbeitsgemeinschaft für Wärme und Heizkraftwirtschaft – e.V., Frankfurt am Main, Germany.

PROSPECTS FOR DISTRICT HEATING AND COOLING

The prospects for the district heating are connected with the developments of the heat demand in industrial, residential and service sectors. The industrial heat demands declined in Central and Eastern Europe. The heat demands for residential sector had also registered a slight decline mainly due to energy savings in buildings but also to the reduction of the heat consumption.

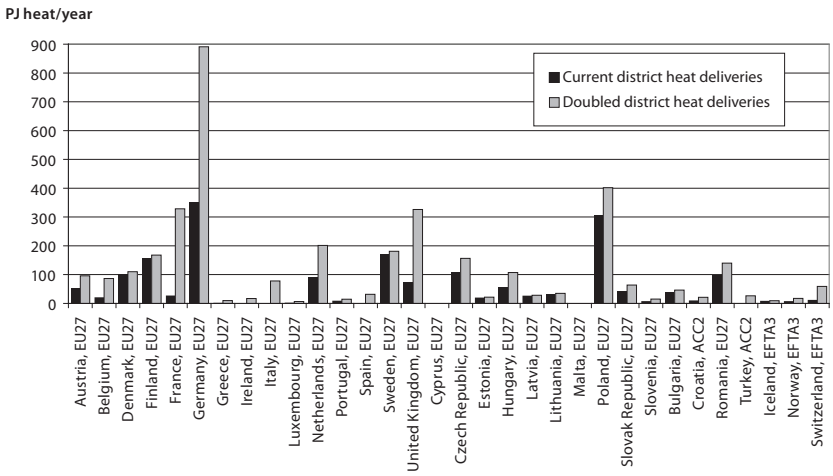
The Ecoheatcool project shows that contrary to existing myths the residential heat demands per capita are lower in the EU 10 than in EU 15 countries. The main explanation is the lower use of residential floor areas in EU 10. The demand for the residential floor areas depends on the national GDP. Higher future GDP in the EU 10 will thus result in higher residential heat demands.

According to European Commission, the development of all heat centrally generated in the baseline scenario is presuming an annual growth of only 1.4% until 2030. The IEA's projections in 2004 foresaw an annual growth rate of 1.3% between 2002 and 2030. However these low growth expectation rates are much lower than many national growth rates achieved during the last decade.

The remaining market shares for fossil fuels in the urban industrial, residential, and service sectors are the main target market for expansion of DH. Hence, the expansion of district heat in each country should be proportional to the remaining market for fossil fuels. National conditions, various constraints and barriers reduce this potential. A doubling of the current annual heat in deliveries from 1.95 EJ to 3.9 EJ in Europe-32 (EU plus accession countries plus EFTA) will require that 29% of the potential market for district heat will be converted to district heat. DH must expand in three large EU countries having low market shares for district heat (France, Germany and the United Kingdom). According to the estimation, 56% of district heat expansion must appear in these countries in order to fulfil the doubling of all European district heat sales. Barriers for more district heat sold in these countries will also be major barriers for more DH in Europe.

Doubling heat sales corresponds to an annual growth rate of 4.7% during 15 years, as between 2005 and 2020.

Figure 5.8: Distribution of Expansion when Doubling the Current District Heat Sales in 32 European Countries (PJ heat/year)



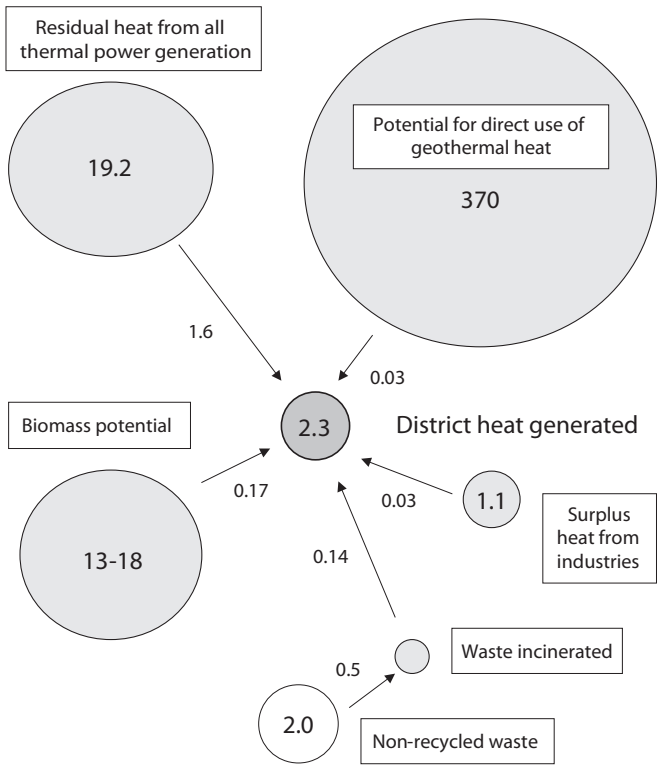
Source: Ecoheatcool project

FIVE STRATEGIC SOURCES, FIVE HUGE POTENTIALS TO REDUCE EUROPE'S CONSUMPTION OF FOSSIL FUELS

The five suitable strategic local heat and fuel resources for district heating include:

- CHP: The potential of residual heat resulting from the thermal power generation is 19.2 EJ/year (out of which only 1.6 EJ/year was used for DH and 1.3 EJ/year in industry). The cumulated present use represents 15% of the potential.
- Waste to energy plants: Out of the 2 EJ/ year non-recycled waste, three-quarters are placed in landfills that produces methanol, the gas with the highest greenhouse effect and only 0.5 EJ/year are incinerated. The present use represents 7% of the potential.
- Surplus heat from industries: The available resources are 1.1 EJ/year and the present use is 0.03 EJ/year and mainly in Sweden, resulting in a current use of 3% from the total potential.
- Biomass: The potential for biomass in Europe is approximately 13-18 EJ/year. Most of the potential is related to agriculture. The present use in DH is 0.17 EJ – 1% of the potential.
- Geothermal: The total technical potential is approximately 15 times higher than total heat demands in Europe (370 EJ). Presently, only 0.03 EJ/year are used (0.008% of the potential). Geothermal heat represents a long term option for the district heating sector in Europe.

Figure 5.9: Heat Flows During 2003 for the Target Area of 32 Countries (in EJ)



Source: Euroheat & Power

POSSIBILITIES WITH MORE DISTRICT HEATING: RECOVERING ENERGY INSTEAD OF WASTING IT

The results of the *Ecoheatcool* study impressively show which possibilities arise if the energy performance of existing district heating and cooling systems is improved and heat sales doubled / new systems built:

- Higher energy efficiency, since primary energy supply for local heat demands are mainly replaced with recovery of heat losses from the energy system. The current benefit is 21.3 Mtoe/year reducing the overall primary energy supply from 1943.1 to 1921.8 Mtoe/year. If the current district heating systems are improved and heat sales are doubled, this benefit will increase to 71.1 Mtoe/year. The possible reduction of 50.7 Mtoe/year is equivalent to the whole annual primary energy consumption of Sweden.

- Higher security of supply, since imports of fossil fuels are reduced and use of domestic renewable resources are increased when district heating systems are improved and district heat sales are doubled. This combined effect will reduce the current import dependency with 105,5 Mtoe/year or 5,5% of all primary energy supply. This is more than the whole primary energy consumption for Poland.
- Lower carbon dioxide emissions, since fossil primary energy supply is reduced from improved and doubling district heat sales. The present avoided emissions (113 million tonnes annually) can be further increased to 516 million tonnes, if district heating systems are improved and district heat sales doubled. The reduction will be 404 million tonnes annually, corresponding to 9.3% of all carbon dioxide emissions from fuel combustion in the target area or more than all annual carbon dioxide emissions from fuel combustion in France.

Furthermore district cooling could avoid 50 to 60 TWh of the yearly electricity consumption and 40 to 50 million tonnes of CO_2 emissions annually, if 25% of the cooling demand would be delivered from district cooling systems by 2020 when the cooling demand is assumed to reach 660 TWh corresponding to a saturation rate of 49%.

With an average market share of less than 10% today, the district heating and cooling industry may not the biggest player in the energy market, and it also does not claim to provide a single solution for all problems. Local by its nature, district heating and cooling discretely makes its contribution to secure, affordable and environmentally friendly supply of heating and cooling. And it provides a more than solid basis and a clear starting point into what will hopefully be a more energy efficient future.

CHAPTER 6

CHALLENGES – SPECIFIC AREAS FOR CONCERN

INTRODUCTION

Energy efficiency is a complex policy area. While the previous Chapter showed good progress in several sub-sectors, even in those areas greater efforts are required. They do reflect, however, areas where improvements are happening and will continue to happen. This Chapter deals with one end-use sector and three cross-cutting themes where there are still major challenges ahead to achieve the results that are needed to meet energy and environmental goals. They are not new areas of concern, but they continue to trouble policymakers and programme implementers.

The first is on improving energy efficiency in the transport sector. This sector is highly dependent on oil and it has a growing contribution to carbon emissions. It is growing at a tremendous pace and this is having a serious environmental impact. Road and air traffic are major concerns. Road traffic for both business and pleasure are growing and this causes emissions problems, growing fuel imports in many countries and congestion that is affecting urban areas in particular. Air traffic, while not directly addressed in this Chapter, is growing at a rate that many feel is unsustainable.

A second concern is to ensure that the specific instruments under the Kyoto Protocol achieve their potential for implementing energy efficiency projects that mitigate GHG emissions. This is particularly true for the Emissions Trading that is now considered one of the most powerful instruments to lower GHG emissions. But within the region, CDM and JI are also important.

Financing energy efficiency projects continues to be a major challenge. Financing measures and barriers that are affecting more investments are discussed in this Chapter. This includes a detailed discussion of the activities of many of the IFIs and how they are helping to overcome some of those financing concerns at the national level.

Integrating energy efficiency and renewable energy has grown in importance in recent years and together they form the two strong pillars of sustainable energy. The Energy Charter Secretariat has analysed the implications of stronger integration of energy efficiency and renewable energy within the region. This is not a challenge on the scale of the others, but the better the integration, the greater the synergy between the two.

***CHALLENGE 1**: IMPROVING FUEL EFFICIENCY AND REDUCING GHG EMISSIONS IN THE TRANSPORT SECTOR*

Since the 1970s, governments have been trying to rein in the growth in the transport sector. The first fuel efficiency standards and labels, driver awareness campaigns and fuel switching programmes started then. But, in road transport, the vehicles per capita have increased, the size of vehicles have tended to increase, freight haulage has often replaced the use of trains for such use, and so on. The transport sector has caused particular problems because it is fuelled almost entirely by oil (globally 98% of the energy consumption by transport is based on oil) and because of its high rate of growth. In the European Union alone, road transport generates more than a fifth of CO_2 emissions, with cars responsible for half of them. And, these concerns are increasingly important as policymakers try to find every possible solution to reduce GHG emissions as part of comprehensive climate change strategies.

Improved fuel efficiency has proven difficult as has fuel switching or modal switches. In some countries, air or road travel has been encouraged to the detriment of trains. In some countries, public transport has been under utilised or lacking in investments to encourage more usage. Because the sector is complex, discussion below will primarily focus on road transport.

The transport sector in itself represents a large amount of economic activities, comprising the activities of, e.g., transport companies, vehicle manufacturers, oil companies, building companies for construction and maintenance of infrastructure, and a range of supply industries and services. In some large European countries 10% of the population directly or indirectly works for the automotive industry.

The transport sector also has a range of negative impacts. The combustion of fossil fuels produces emissions that contribute to environmental problems at a local, regional (e.g., acidification) and global level. Unlike power stations or energy-intensive industries, cars produce air pollution in places where people live and work. At the local level air pollution and noise are the most important problems. At a regional level, acidification is one of the main issues while at the global level the contribution of CO_2 and other greenhouse gases to global warning is the main problem.

Recent analysis by the IEA shows that, by the year 2050, the single most important way to reduce GHG emissions and lower fuel consumption will come through vehicle fuel economy improvements of all existing modes and vehicle types.[61] This beats out switching to hybrid vehicles, switching to biodiesel and so on. The analysis shows the importance of vehicle fuel economy improvements, although since this was a technology study it did not go into such measures as changing driver behaviour.

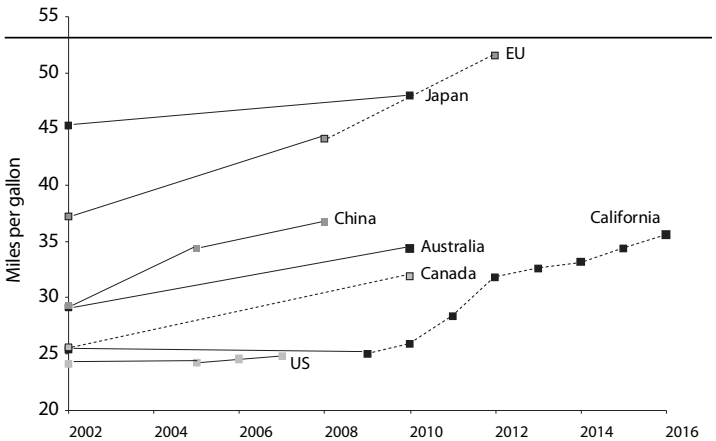
There are many ways that fuel efficiency has been promoted in participating countries.

61 IEA, Energy Technology Perspectives, 2006, OECD, Paris, p. 137.

Information on driver behaviour or on purchase decisions has probably been most prominent. This includes the use of labelling of fuel consumption at the point of sale. There are also mandatory or voluntary fuel efficiency standards for the purchase of new vehicles. The tax system has also been used to encourage fuel efficiency.

Figure 6.1 shows the trend in fuel economy in selected countries and thus the success that countries have had in promoting greater fuel efficiency. The European Union is significantly ahead of other countries or regions. While the graph is in US miles per gallon, it does illustrate the differences. However, this Figure can be misleading because it does not reflect the growing car population or the change in kilometres driven per year.

Figure 6.1: Passenger Car Fuel Economy Trend Lines in Selected Countries



Source: An and Sauer, 2004, For the Pew Center on Global Climate Change; Scott Wallace, Staff, in http://i-r-squared.blogspot.com/2006/04/fuel-efficiency-and-lessons-from.html

While there are many policy options in this area, few have worked with much success. In the 1970s, mandatory fuel economy standards existed in the United States and they were semi-mandatory in Canada.[62] Europe relied on a voluntary approach. There were fuel economy labelling programmes for the purchase of new vehicles, however, and the data on the labels were provided by mandatory test procedures. The IEA came out with a report in 1984 that compared the test procedures of the United States, Europe and Japan.[63] This was important because of the increasing trade in vehicles and the confusion over differing results in the three regions.

Policies lacked long-term effectiveness largely because they were never strengthened over time. With few concerns about energy security and with lowering energy prices in the mid-1980s, there was less political pressure to improve fuel economy and so, while the

62 The standards were voluntary but there was the threat of legislation if the targets were not met.

63 IEA, Fuel Efficiency of Passenger Cars, OECD, Paris, 1984.

policies remained in place, the normal strengthening of targets did not take place.

Throughout the 1980s, vehicles generally got bigger. This was true even in Europe, a region that traditionally had much smaller cars than in North America, and still does. But, the vehicle population grew and the size of vehicles grew. And throughout the entire region, the move towards sports utility vehicles with their large size, poor fuel economy and high carbon emissions, represented a worrying trend.

With the downfall of the Soviet system in the early 1990s, transition countries also bought significantly more and larger vehicles.

There are many benefits, economically and socially, to more mobility through the use of vehicles but current trends are unsustainable from many points of view. The challenge is in maintaining that mobility while reducing GHG emissions and fossil fuel consumption. It is one that is severely taxing policymakers. But, as the IEA study mentioned above stated, for 2050, the best option is improving fuel economy. Undoubtedly research will take place on other fuels and options, but a determined focus on fuel economy is key.

Yet, as the following box shows, consumers are often aware but remain unwilling to really change their approach. Interestingly, consumers were more willing to have smoking banned in public than to have many of the "green" obligations. This approach makes it very difficult for policymakers to get concerted action throughout society.

Green Barometer reveals: UK has green mindset, but not green behaviours

28 March 2007

Over 80% of people believe that climate change is having an impact on the UK right now and yet 40% are doing nothing to reduce energy use.

Knowing and caring about environmental issues is one thing. Making concrete movement towards addressing them is something altogether different – according to the Green Barometer, launched today by the Energy Saving Trust. The Green Barometer is the first national index of public opinion on green issues and will track these on a quarterly basis.

Around three quarters of people in the UK feel a growing pressure to change the way they live in order to reduce the impact of climate change. Climate change is having an impact on the UK right now, 80% of people now believe.

Being seen to be green is popular among 70% and is now considered one of the most virtuous things they can do. Reducing the amount of energy in the home is seen to be as virtuous as donating to charity. Interestingly, reducing the use of cars and planes is rated as significantly less virtuous. Few, however, are actually making the necessary lifestyle changes – with 40% doing nothing at all. That's the difference between what we are saying about climate change and what we are actually doing. It seems that many do a few small things (39%), but few have taken the step-up to make substantial lifestyle changes (4%).

32% say they're prepared to choose a holiday destination that doesn't require flying to reduce carbon emissions, but only 4% have actually done so.

The report highlights that it is strong measures that are not popular. Fewer people consider measures such as 'green' taxes (34%), road pricing (tolls & congestion charging) (30%) and carbon rationing (28%) to be as socially acceptable as same sex marriage (42%). Banning smoking in public places is twice as socially acceptable as any of these green measures.

Source: www.energysavingtrust.org.uk

Throughout the region, there is a re-awakening of policy discussions on how to tackle the sector. The first budget period for the Kyoto Protocol (2008-2012) can be met with little improvement in the transport sector, but subsequent budget periods will definitely require the transport sector to be more effectively addressed.

The following represents many of the steps being taken throughout the region, beginning with those at the EU level, to improve the fuel economy in road transport.

EXPERIENCE IN THE EUROPEAN UNION

The EU passenger car CO_2 strategy rests on three pillars:
- The so-called car industry's 'self commitments' or 'voluntary agreements;'
- Consumer information through CO_2 emission labelling; and
- Co_2-differentiation of taxation.

Voluntary Agreements

In 1998, the automotive manufacturer and importer associations in Europe, in an agreement with the European Commission, committed themselves to reducing the sales-averaged type approval CO_2 emissions of new vehicles. The goal of the industry's self-commitments is to reduce the sales averaged CO_2 emissions of new vehicles to 140 g/km in 2008 (European Automobile Manufacturers Association (ACEA)) or 2009 (Japanese Automobile Manufacturers Association (JAMA) and Korea Automobile Manufacturers Association (KAMA)). This is to be realised mainly through technical measures.

The 2004 evaluation of progress made by the associations (COM(2006)463) showed that poor annual reduction rates raised concern with the European Commission about whether the 140 g/km target will actually be met. Although the associations are formally still on track, i.e., within the band-widths of their intermediate targets, the gaps to be closed, expressed in required annual decrease, have further increased during 2004. Between 2004 and 2008/9 annual reduction rates of around 3.5% will be necessary to meet the 2008/9 target. Currently, the average across Europe is 163g/km, while in the UK new cars are emitting an average of 167.2g/km.

In February 2007, the Commission adopted a Communication outlining a comprehensive new strategy to reduce carbon dioxide emissions from new cars and vans sold in the European Union. The new strategy and a revision of EU fuel quality standards proposed on January 31, 2007 further underline the Commission's determination to ensure the EU meets its GHG emission targets under the Kyoto Protocol and beyond. The strategy will enable the EU to reach its long-established objective of limiting average CO_2 emissions from new cars to 120 grams per km by 2012 – a reduction of around 25% from current levels. By improving fuel efficiency, the revised strategy will deliver substantial fuel savings for drivers. To encourage the car industry to compete on the basis of fuel efficiency instead of size and power, the Commission wants manufacturers to sign an EU code of good practice on car marketing and advertising.

These plans were reconsidered after disagreement between members of the commission on the impact of the new rules on the European car industry. The new rules, which car makers have warned will increase the price of new vehicles and could threaten jobs in Europe, will require manufacturers to reduce CO_2 emissions to an average of 130g/km by 2012. Most of the reduction is expected to come through improvements in technology, greater use of biofuels and the promotion of smoother driving techniques.

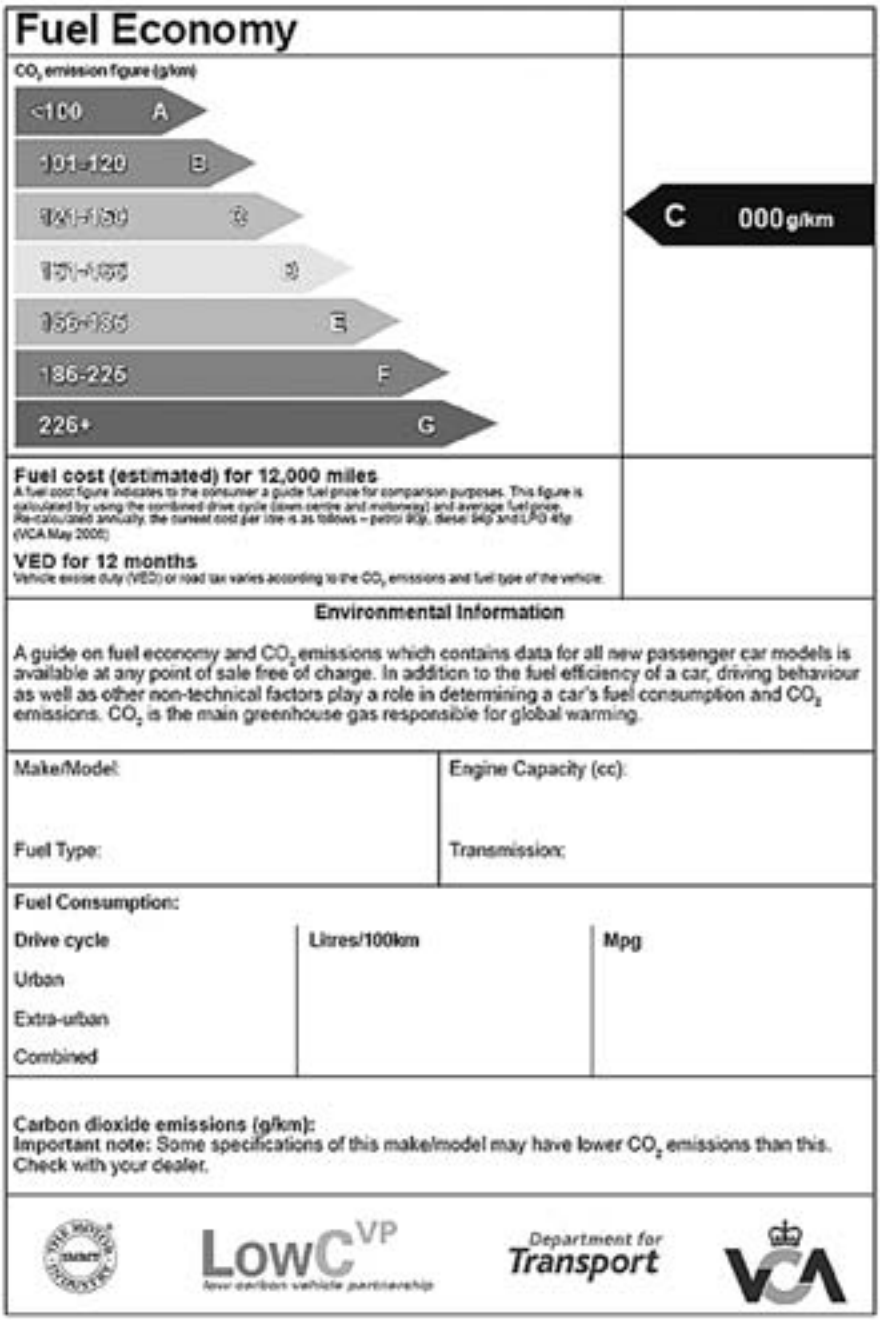
The proposals for legally binding limits follow the failure of the carmakers in Europe, Japan and Korea to meet voluntary targets of a 25% cut to 140g/km by 2008/09 and 120g/km by 2012. In fact, average emissions on new cars have only been cut by 12.4% from 1995 levels, a result the commission described as "not satisfactory".

CO_2 labelling

The objective of labelling cars with information on fuel efficiency and CO_2 emissions is to provide potential buyers with information on these in the hope that this will influence their purchasing decision. Hence, the measure does not directly impact on a car's CO_2 emissions, rather it aims to increase the average fuel-efficiency of the car fleet and thus reduce total CO_2 emissions from transport. In addition, the measure is intended to stimulate the market for more fuel-efficient/lower emission cars through increasing awareness.

In the 1990s, a number of member states developed fuel efficiency/CO_2 labels for cars. In 1999, Directive 1999/94/EC was adopted to require all EU member states to display a fuel efficiency/CO_2 label on new cars, and set out certain requirements in order to ensure the consistency of the label and its contents. It was required to include the official fuel consumption (in litres per 100 kilometres) and the official specific emissions of CO_2 (in grams per kilometre) for that particular mode. The label should also include a reference to the fact that a free fuel economy guide is available, state that CO_2 is the main greenhouse gas responsible for global warming and inform the consumer that driving behaviour and other non-technical factors also influence fuel economy and CO_2 emissions. In addition, the Directive requires the production and provision of a fuel economy guide, showroom information posters and references to fuel consumption and CO_2 emissions to be made in the relevant promotional literature.

Figure 6.2: A Typical Fuel Economy Label Used in Europe



Fuel Economy

CO_2 emission figure (g/km)

<100 A

101-120 B

121-130 C

131-150 D

151-165 E

166-185 F

186-225 G

226+

C 000 g/km

Fuel cost (estimated) for 12,000 miles

A fuel cost figure indicates to the consumer a guide fuel price for comparison purposes. This figure is calculated by using the combined drive cycle (town centre and motorway) and average fuel prices. Re-calculated annually, the current cost per litre is as follows – petrol 90p, diesel 94p and LPG 47p (VCA May 2008)

VED for 12 months

Vehicle excise duty (VED) or road tax varies according to the CO_2 emissions and fuel type of the vehicle.

Environmental Information

A guide on fuel economy and CO_2 emissions which contains data for all new passenger car models is available at any point of sale free of charge. In addition to the fuel efficiency of a car, driving behaviour as well as other non-technical factors play a role in determining a car's fuel consumption and CO_2 emissions. CO_2 is the main greenhouse gas responsible for global warming.

Make/Model:	Engine Capacity (cc):
Fuel Type:	Transmission:

Fuel Consumption:

Drive cycle	Litres/100km	Mpg
Urban		
Extra-urban		
Combined		

Carbon dioxide emissions (g/km):
Important note: Some specifications of this make/model may have lower CO_2 emissions than this. Check with your dealer.

LowCVP low carbon vehicle partnership

Department for Transport

VCA

Source: http://www.fuel-economy.co.uk/images/greenlabel.png

Energy Efficiency in Transport – Throughout the EU

Participating cities in the "In town without my car!" event (held each 22 September since 1998), present their urban centres in a different light for one day by restricting motorised traffic in certain areas, encouraging the use of sustainable modes of transport and raising awareness for the environmental impacts of citizens' modal choice. For example, there were 126 participating cities and towns in Austria in 2003.

Many of the same cities in the EU also conduct events on sustainable mobility as part of the associated week-long European Mobility Week. There were 14 participating cities and towns in Austria in 2003.

A review of EU-15 Member States' experience with implementing the Directive revealed that all 14 member states of the EU-15 that responded had implemented the Directive, including the introduction of the label, and that six had gone beyond the requirements of the Directive.

Fiscal measures

The third pillar of the EU strategy, CO_2 differentiation of vehicle taxation, is the least developed. In July 2005, the Commission published a proposal for a Directive on passenger car taxes (COM(2005) 261). The proposal seeks to increase the harmonisation of Circulation Tax (CT) and Registration Tax (RT) across member states by a phase out of RT over a five to ten year time frame, a refund of RT and CT for consumers penalised by the movement of vehicles between member states, and a restructuring of the tax base of RT and CT to be totally or partially CO_2-based.

The main environmental rationale for the proposal is to introduce the 'polluter pays' principle in the area of passenger cars and to implement the third strand of the Community Strategy on Passenger Car CO_2 Emissions (COM(95)689) on fiscal instruments. The proposed phase out of RT, however, will make it more difficult to design a Co_2-based vehicle taxation that effectively influences consumer behaviour at the moment of car purchase.

Over the last few years many member states have introduced various forms of Co_2-based vehicle taxation or have started considering the options. In the UK tax bands for Circulation Tax are coupled to the absolute Co_2-emission of vehicles. In July 2006 the Netherlands introduced a Co_2-based differentiation of Registration Tax coupled to the Dutch labelling system based on the relative Co_2-performance of a vehicle compared to other vehicles in the same class. Vehicles with A and B labels receive a tax rebate while vehicles with D to G labels face an additional RT charge. Higher rebates are available for hybrid vehicles with A or B label. France adopted an RT scheme for business cars where a charge per gram of CO_2 per kilometre is introduced. This charge is a function of the label, increasing from €2 per g/km for A-label cars to €19 per g/km for G label vehicles. In Denmark circulation tax is differentiated in 24 bands related to fuel consumption.

This has resulted in a significantly increased share of low Co_2-vehicles in recent new vehicle sales.

White Paper on Transport Policy

In a recent communication from the European Commission entitled "Keep Europe moving – Sustainable mobility for our continent" (COM(2006) 314), improving energy efficiency in transport was mentioned as important factor in EU's energy policy:

> A European energy policy which aims at ensuring competitiveness, security of supply and environmental protection has to focus, *inter alia*, on further transport policies which reduce energy consumption by improving fuel efficiency on the vehicle side and gradually replacing oil by other fuels be it biofuels, natural gas, hydrogen, electricity or others.

That communication was a mid-term review of the 2001 White Paper on Transport ('European transport policy for 2010: time to decide' (COM(2001)370), and it represented a major change in emphasis because the 2001 White Paper hardly mentioned energy efficiency. The 2006 Communication also stated that major research and technological development efforts and investments are necessary in the field of transport and energy, including energy efficiency. In the review, the following actions are listed regarding transport and energy: 'promote energy efficiency at EU level on the basis of the . . . action plan [see below], encourage EU actions, including voluntary agreements; support research, demonstration and market introduction of new technologies such as optimisation of engines, intelligent vehicle energy management systems or alternative fuels, such as advanced biofuels and hydrogen or fuel cells or hybrid propulsion; launch user awareness actions on smarter and cleaner vehicles and a major future-oriented programme for green propulsion and energy efficiency in transport.'

Cold starts – Finland

Fuel-efficient cars have been the focus by arranging a yearly competition to designate the most ecological car of the year in cooperation with the most widely read motoring magazine in Finland. The impact of cold starts on consumption has been studied in the "Cold" project. As a result, recommendations on proper pre-heating of cars and information on different technical solutions for preheating have been circulated.

Germany unveils emission-weighted car tax plan

In February 2007, the transport minister announces vehicle duty restructuring but Berlin says no progress expected on EU directive

Germany has announced an overhaul of its car taxation system linking the amount paid by motorists to emissions of carbon dioxide and other air pollutants from their vehicles. The tax would be based on releases of CO_2, carbon monoxide and fine particles instead of, as now, on engine size.

The plans will be written into a draft law by the finance ministry and could be approved by the German parliament by the end of the year.

Source: www.eceee.org

Action Plan for Energy Efficiency

The Commission's 2006 Action Plan includes several areas of action for transport. Other than the above-mentioned regulations, the actions include, *inter alia*:

- developing markets for cleaner, smarter, safer and energy-efficient vehicles through public procurement and awareness-raising.
- a mandate for a recognised European norm and possible international standard for maximum rolling resistance limits and labelling for road vehicle tyres. It will furthermore facilitate voluntary agreements and consider other measures to encourage the fitting of tyre pressure monitoring and inflation systems on road vehicles, including compulsory fitting of tyre pressure monitoring systems on new road vehicles.
- The Commission will, in the framework of the forthcoming Green Paper on urban transport put forward joint solutions based on concrete measures that have been successfully tested, including, if appropriate, infrastructure use and road and congestion charges. These will include new approaches to encourage the use of public transport, car-sharing, non-motorised transport modes and telecommuting in European cities.
- For improving the energy efficiency in other transport modes, the Commission will consider market-based instruments for the maritime sector and will, following the recent Communication on climate change and aviation, propose measures for the aviation sector such as its inclusion under the Emission Trading Scheme, without putting into jeopardy these sectors' overall competitiveness. Energy efficiency in rail transport will be promoted by complete implementation of its legal framework by 2007.

OTHER COUNTRY INITIATIVES

Canada

Canada has several programmes to promote fuel efficiency in transport. The Motor Vehicle Fuel Efficiency Initiative is based on the earlier Motor Vehicle Fuel Consumption Programme (MVFCP) initiated in the late 1970s which encourages motor vehicle manufacturers to meet voluntary annual company average fuel consumption (CAFC) targets for new automobiles sold in Canada. The Motor Vehicle Fuel Consumption Standards Act was passed by Parliament in 1981, but the Act was not proclaimed as the Canadian vehicle manufacturers offered to meet the requirements on a voluntary basis. The manufacturers have made good on their offer and have met the programme objectives. CAFC calculates a sale-weighted average fuel consumption for all new model year vehicles that are sold by each company. In 2001, the target goal for the passenger cars is 8.6 L/100 km and 11.4 L/100 km for light trucks.

The commercial highway freight sector is responsible for close to 10 percent of Canada's greenhouse gas emissions. FleetSmart offers free practical advice on how energy-efficient vehicles and business practices can reduce your fleet's operating costs, improve productivity and increase your competitiveness.

The Government of Canada launched the ecoEnergy for Fleets Initiative benefiting trucking companies and other commercial fleet operations by helping them cut their fuel costs and reducing harmful emissions. The ecoEnergy for Fleets Initiative will emphasise information-sharing and training to help commercial vehicle fleets increase their fuel efficiency. Natural Resources Canada will manage the 22 million Canadian Dollards, four-year programme, which emphasises information-sharing and education to help commercial and institutional vehicle fleets increase their fuel efficiency.

There is also a Federal Vehicles Initiative that aims cut costs of government ministries by increasing the efficiency of their fleets.

Georgia

The rail system has embarked on a major modernisation and rehabilitation programme. This is important since the railway is the largest single energy consumer in Georgia. This is an on going effort and has been supported by a combination of international and national funding.

Public transport is also important to Georgia and, for example, the metro system has identified a high potential of savings and has been developing a programme for on-going rehabilitation.

Japan

In Japan a policy to promote fuel-efficient cars is based on the 'top runner approach'. For different weight classes target standard values (expressed in km/l on the Japanese 10-15 test cycle) are set which are based on the fuel economy of the most fuel-efficient vehicle on sale in that class at the time the targets are set. For petrol vehicles the target

year is 2010, for diesels it is 2005. Separate standards are set for petrol and diesel. For trucks and buses Japan has also set target standard values that aim at a fuel economy improvement of about 12% between 2002 and 2015.

Smart driving – Japan

In the transportation sector, most of emissions are generated by vehicles and the amount generated by passenger vehicles is steadily increasing. To stem this trend, smart driving campaigns such as "anti-idling campaigns" and other forms of campaigns have been taken by a means of reducing CO2 emission in the transportation sector. The "anti-idling campaign calls for engines to be turned off when vehicles are stationary, and various agencies have initiated promotional activities nationwide, such as using placards with a message asking ongoing car drivers to stop engines (idling-stop) at traffic lights across the country. Research from the Energy Conservation Centre in Japan suggests that even a small reductions in engine use can have significant impacts over time in terms of emissions and fuel use.

Within Japan's May 2006 National Energy Strategy, the Energy Conservation Top-Runner Programme reinforces the national strategy to reduce petroleum consumption. Setting a target to improve energy efficiency by 30% relative to 2006 by 2030, the Japanese government pledges to realise a state-of-the-art energy supply-demand structure within a market of high prices that the government expects to endure for the medium to long-term.

Beyond an earnest promotion of energy efficiency, the Japanese government pledges to optimise energy use: reducing oil dependence through improvements in the energy intensity of the oil-intensive transport sector.

The Energy Conservation Top Runner Programme aims to reduce oil dependency to a level below 40% by 2030.

In January 2006, Japan's Ministry of Land, Infrastructure and Transport (MLIT) announced plans to avoid annual emissions of 21 Mt CO_2 in the transport sector by 2010 through various efficiency measures:

- 3 mt will be cut by improving roads in Japan to ease the flow of traffic; and
- 18 mt will be saved by improved fuel efficiency, usage of new energy sources and convincing drivers to turn off the engine when the car is not moving.

The Japanese government's 2001 Action Plan on Promoting Low-Pollution Vehicles aims to deploy 10 million low-pollution vehicles by 2010 (such as CNG cars, electric cars, hybrid cars, methanol cars, etc.) and 50,000 fuel-cell cars. The plan required the government to set an example by replacing all of its official vehicles (some 7,000) with low-pollution vehicles between 2002 and 2005, inviting local government to change existing vehicles into low-polluting vehicles, as well as providing tax or financial incentives for private purchasers, and launching publicity campaigns.

Russian Federation

The 2001 Energy Efficiency Programme encompasses measures in transport along with other sectors. These measures were projected to deliver energy savings in transport of the order of 8-10 Mtce in 2002-2005 and, similarly, in 2006-2010. The focus of this programme is on the introduction of an energy-efficient fleet, the introduction of modern oil additives and increased shares of high-octane petrol; improvements in the technical operation and organisation of transportation; and replacement of liquid fuels by alternative fuels. Overall, it is projected that energy-saving measures would account for a decrease in fuel and energy demand of 3.5% by 2000 and 9.5% by 2005 relative to 1998.

Switzerland

The Heavy Vehicle Fee, in force since January 2001, is a tax related to distance and weight and is intended to internalise costs of freight transport, including costs of effects on health and the environment. The maximum charge is set at SF 0.02 per km-tonne in 2001 and will increase to SF 0.03 in the future. The tax will raise approximately SF 750 million per year (2001 and 2002) and will be used for investments in rail infrastructure. The first visible effects of the new tax are a stabilisation of distances travelled by trucks linked to the improvement of the road-freight system (logistics, use of vehicles, increase of weight limits, etc.).

United States

First enacted in 1975, the purpose of Corporate Average Fuel Efficiency Standards (CAFE) is to reduce energy consumption by increasing the fuel economy of cars and light trucks. The CAFÉ standard was combined with mandatory fuel economy labelling and a guide comparing all vehicles to make it easier for the purchaser.

In March 2006, the NHTSA's Department of Transportation set final fuel economy standards for the light truck vehicle category (sports utility vehicles (SUVs), pick-up trucks), raising the standard from 21.6 to 24 miles per US gallon during the period Model Year 2008 to 2011. Between 2008 and 2011, each auto manufacturer will choose the method of compliance with the standards: either through the traditional CAFE structure or through direct application of the standards released in March 2006.

Under the traditional CAFE, light truck efficiency will increase as follows:

- Model Year 2007 – Fuel Economy 22.2 mpg
- Model Year 2008 – Fuel Economy 22.5 mpg
- Model Year 2009 – Fuel Economy 23.1 mpg
- Model Year 2010 – Fuel Economy 23.5 mpg
- Model Year 2011 – Fuel Economy 24 mpg

Fuel economy for each manufacturer is based on the mix of vehicles sold. Fuel economy is set as function of vehicle size. An overall fleet-wide average for each manufacturer for

each model year is established by averaging the individual fuel economy of the mix of vehicles sold by the manufacturer.

Beginning in Model Year 2011, all manufacturers will be required to comply with the CAFE structure as announced in March 2006.

Concerning tax credits, the Internal Revenue Service (IRS) published a notice on 13 January 2006 that provides initial guidance on claiming a federal tax credit for the purchase of a hybrid vehicle or a vehicle with an advanced lean-burn engine. The Energy Policy Act of 2005 allows a tax credit of as much as $3,400 for buyers of the most fuel-efficient vehicles. The new IRS guidance describes how manufacturers can certify to the purchasers of these vehicles that the vehicles are indeed eligible for the tax credit and what size tax credit they will earn. This certification removes most of the burden from the purchaser: if one has the manufacturer's certification in hand, the tax credit can be claimed.

For each manufacturer, the new tax credit stops after it sells 60,000 eligible vehicles, with the count starting at the beginning of this year. Buyers can claim the tax credit until the end of the first calendar quarter after the quarter in which the manufacturer reaches 60,000 sales.

"Advanced lean-burn technology" is a clean-burning diesel engine that operates with more air than is necessary for the complete combustion of the fuel. According to the Diesel Technology Forum, the emissions requirements included in the tax credit means that eligible vehicles will probably not be available until the 2007 model year. Because the Energy Policy Act also provides tax credits for fuel cell vehicles, alternative fuel vehicles, and hybrid heavy trucks, guidance will be issued on certification procedures for these vehicles.

Every new car and light truck sold in the U.S. is required to have a fuel economy label fixed to the window of the vehicle, listing the city and highway miles-per-gallon estimates that are designed to help consumers compare and shop for vehicles. As proposed in February 2006, the Environmental Protection Agency (EPA) is revising its test methods to determine the fuel economy estimates (city and highway) that appear on the window stickers of all cars and light trucks sold in the U.S. These changes will be reflected in newly-designed labels to appear on the 2008 model fleet.

The United States also has an extensive research programme related to transportation and transport fuels.

CHALLENGE 2: *ENSURING THE KYOTO PROTOCOL'S FLEXIBLE MECHANISMS PROMOTE ENERGY EFFICIENCY*

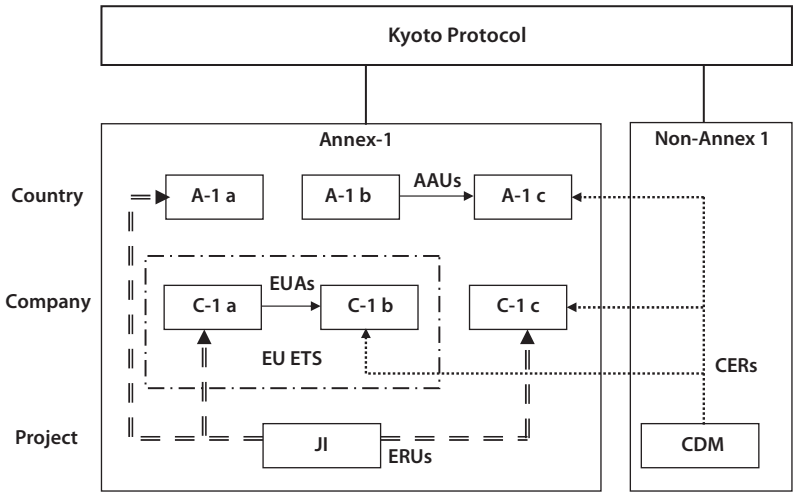
The Kyoto Protocol is based on having Annex 1 countries reach negotiated targets for GHG emissions reductions. Countries with targets can reach their targets by a combination of reducing domestic emissions or buying credits from other countries. The Protocol finally came into effect in 2005 and the first commitment period is 2008-2012.

The Kyoto Protocol established three innovative mechanisms known as Joint Implementation (JI), the Clean Development Mechanism (CDM) and Emissions Trading. These are designed to help Annex 1 Parties cut the cost of meeting their emissions targets by taking advantage of opportunities to reduce emissions, or increase GHG removals, that cost less in other countries than at home. All of these are used within the region. Emissions trading allows for trading between Annex 1 countries by governments. Parties, however, can devolve part of their assigned units to industries or other entities. This is the case in Europe at the moment with its Emissions Trading System, described below. The Kyoto Protocol also allows for credits to come from the other two flexible mechanisms.

OVERVIEW OF THE INTERNATIONAL CARBON MARKET

As a result of the introduction of the Kyoto mechanisms, an international market is developing in which the emission allowances and credits will be traded between parties in order to comply with their Kyoto target. The demand for emission reductions is from those legal entities that, under the Kyoto Protocol, are subjected to a cap on their GHG emissions. In practice this means Annex 1 governments such as EU member states, Canada, Japan, Norway and Switzerland. These Parties can trade Assigned Amount Units (AAUs) under the mechanism International Emission Trading or purchase CERs/ERUs from CDM/JI projects. Although a few trades have been reported International Emission Trading is not expected to start until after 2008. Many EU governments (such as the Netherlands, Denmark, Austria, Spain) and the Japanese government are active on the market via direct purchase programmes or via development banks (the best known example is the World Bank Prototype Carbon Fund).

Figure 6.3: Overview of Different Emission Permits (AAUs, CERs, ERUs and EUAs) in the Kyoto Compliant Carbon Markets



Furthermore, substantial demand will come from European, Canadian, and Japanese businesses, which have been engaged in the CDM for some time.

Thirteen participating countries to PEEREA are not Annex 1 countries and thus can take advantage of the CDM. The following is a description of the use of the three flexible mechanisms.

Joint Implementation (JI)

Entities may participate in JI projects to generate emissions credits, known as Emission Reduction Units (ERU), in order to use them for compliance with their targets or to sell on the international emissions trading market. JI projects may begin as of the year 2000 but can only generate ERUs beginning in 2008.

After several years of operation in the use of the flexible mechanisms, the Energy Charter Secretariat has identified the following barriers in Russia and the Ukraine that are affecting the overall effective of Joint Implementation:

- Institutional and legal framework for JI projects still under development;
- Lack of confidence of Western companies regarding investment environment;
- High interest rates applied by commercial banks for loans and thus lack of financing for some project developers;
- Lack of experience and knowledge of Kyoto process and required project documentation;
- High transaction costs of smaller JI projects; and
- "Additionality dilemma": investors looking for financially sound projects even without the carbon component, while strict financial additionality requires the opposite.

From the Czech Republic

The Prototype Carbon Fund (PCF) has worked with Czech departments of Energy and Environment through the Joint Implementation (JI) mechanism of the Kyoto Protocol on initiatives to reduce carbon emissions. Through its work with the Czech Republic the PCF has learned new ways to reduce the time and energy required to prepare small JI projects.

The Czech Umbrella Project demonstrates the PCF's ability to work with government agencies to review, develop and approve projects. For these projects, the Czech Energy Agency (CEA) screened and grouped small projects so that the PCF could support their operations. World Bank Carbon Finance Business is also working with the State Environmental Fund (SEF) to further streamline processes and to bundle even smaller projects in the SEF portfolio.

The PCF project for the Czech Republic has narrowed its focus to three project categories: district heating, energy efficiency and renewable energy projects. For each project category a generic tool has been developed to assess the eligibility of potential JI projects and to estimate their emission reductions. These baseline methods evaluate a project's eligibility, and can easily be applied to any project in that project category. The following projects have undergone independent validation using the first two of these generic methods, and about ten small hydro projects are expected to be validated during the fall of 2004 using the third baseline tool.

The tools used for the Rozmital District Heating Project were the first ever to be applied to a district heating project submitted for PCF review. Rozmital pod Tremsinem is a small town of 5,000 in Central Bohemia, the western part of the country. The city government created the Rozmital District Heating Programme to update coal-fired boilers that provided space and tap water heating. The new gas burning boiler system heats municipal water efficiently while a newly installed generator provides heat and electricity. The project also refurbished the city's heating distribution system by refitting old pipe networks with insulation and installing new pipes.

The more energy efficient piping along with the updated boilers is expected to reduce emissions by roughly 15,000 tonnes of carbon dioxide equivalent (t CO_2e) over the course of its life. The PCF has been asked to purchase around 10,000 tonnes of these reductions.

Source: http://carbonfinance.org

The Clean Development Mechanism

CDM, as outlined in Article 12 of the Kyoto Protocol and elaborated in the Marrakech Accords, is a project-based mechanism that allows public or private entities to invest in GHG mitigating activities in developing countries and earn abatement credits, which

can then be applied against their own GHG emissions or sold on the open market. CDM projects have the dual objective of contributing to the sustainable development of the host country.

Globally, of the registered projects, only 2% are on energy efficiency (11 of 547 projects).[64] In the region, of the thirteen countries eligible, only three have any CDM projects registered: Moldova with 3, Armenia with 2 and Mongolia with one.

Emissions Trading and Energy Efficiency – an In-depth Review

Emissions Trading is going to have a significant impact on emissions reduction and the largest programme to date is in Europe.

In the EU, the European Emission Trading Scheme will initially cap CO_2 emissions of the large scale European industry at 2.2 Gigatonne per year. The scheme has only recently started and there are still many market uncertainties, for example the allocation of allowances for 2008-2012 is still unknown. Although equilibrium prices are not yet known, general consensus is that CDM/JI projects will provide cost effective emission reductions compared to domestic emission reductions especially during the period 2008-2012. If demand for CERs/ERUs ranges between 5% and 15% of total current emissions, this means a demand for CERs/ERUs of between 550 and 1,650 megatonnes of CO_2 until 2012. This makes the EU ETS the biggest market for CERs/ERUs.

In 1996, the EU Council adopted as its long-term climate objective, a global-mean temperature change that would not exceed 2 degrees Celsius compared with pre-industrial level. To achieve this goal, in July 2003, the European Council formally adopted the Emissions Trading Directive. The Directive laid out the framework for the European Emissions Trading Scheme (EU ETS). In order to minimise the economic costs of its Kyoto commitments on combating climate change, EU countries agreed to set up an internal market enabling companies to trade carbon dioxide emissions. On the first of January 2005, the European Union launched its Emission Trading Scheme, allowing some 12,700 industrial installations spread across all 25 EU member states to buy and sell permits to emit carbon dioxide, covering about 45% of EU CO_2 emissions.

The first phase of the EU ETS runs from 2005-2007 and the second phase will run from 2008-2012 to coincide with the first Kyoto Protocol Commitment Period. Compliance is required on an annual basis within these periods, but the allocation of allowances will be decided separately for the two periods. Further five-year periods are expected subsequently. National Allocation Plans (NAPs) are prepared by each member state for each phase.

So far, the EU ETS only covers the power sector and high-energy use sectors of industry: energy activities (combustion installations with a rated thermal input exceeding 20MW, mineral oil refineries, coke ovens), production, and processing of ferrous metals, mineral industry (cement clinker, glass and ceramic bricks) and pulp, paper, and board activities.

64 www.unfccc.org. Update is of March 15, 2007.

Moreover, only CO_2 is included in the first phase with the potential to expand this to the other five GHG from 2008. Aviation and maritime shipping area to be included in the second phase.

The 'cap-and-trade' approach, initiated in the EU ETS, sets an overall cap or maximum amount of emissions per compliance period. Companies are given allowances, which represent their target or 'cap' for a compliance period. The number of allowances allocated to each installation for any given period, is set down in a document called the National Allocation Plan. Member states must ensure that by 30 April each year at the latest, the operator of each installation surrenders a number of allowances equal to the total emissions from that installation during the preceding calendar year. Installations will therefore have to surrender allowances for the first time by 30 April 2006 equal to their emissions during 2005. The cap needs to be ambitious enough to ensure that there are effective emissions reductions.

When an installation's emissions are below its cap, the installation then has allowances to sell; if not, the installation must purchase allowances from companies that have exceeded their emissions reductions targets. Each allowance permits the holder to emit one tonne of CO_2. Fines of 40 Euros per excess tonne of CO_2 emitted will be imposed on companies exceeding their target, rising to 100 Euros for the second phase of the scheme. For comparison, the prices for carbon allowances are in the 20 Euros per tonne range. By offering a much cheaper alternative to fines, the Commission hopes that the EU ETS will stimulate innovation and create incentives for companies to reduce carbon emissions. Specifically, investments in cleaner technologies can then be turned into profits while helping the EU meet its Kyoto commitments on climate change. This unique system has earned the EU the reputation of global leader in fighting climate change; the ETS is the world's first multi-country emissions trading system and the largest scheme ever implemented.

THE LINKING DIRECTIVE

The "Linking Directive", proposed by the EU Parliament in April 2004, allows ERUs generated by the project-based Kyoto mechanisms to be used for compliance by companies operating under the EU ETS. The rationale for this linkage is that cost-effective CDM credits (CERs) may reduce the costs of compliance for European industry. The linking is possible because both EU allowances and CDM credits are also defined as one tonne of CO_2 equivalent.

CERs have been allowed into the system as of January 2005, and ERUs are allowed as of January 2008. Only an operator – the owner of the installation that has an obligation under the EU ETS – can actually use CERs and ERUs. There are some restrictions on the use of CERs and ERUs, both in terms of amounts and types of projects that generate the emission reductions:

- The EU has allowed each member state to cap the use of JI/CERs to comply with the supplementarity rule. This rule state that a significant part of an Annex 1 country's emission reductions must be made domestically;

- Credits from nuclear projects may not be used;
- Credits from land use, land-use change and forestry activities (the so-called 'sinks') may not be used either; and
- Credits from hydroelectric power production projects with a generating capacity above 20 MW may be used only if the relevant international criteria and guidelines are respected.

INTERACTION BETWEEN EU ETS AND ENERGY EFFICIENCY MEASURES

Energy efficiency projects can be undertaken both in the demand and the supply side of energy systems. In terms of GHG emission reduction activities, energy efficiency on the supply side is the introduction of more energy-efficient generation and production technology, which can include fuel-switching elements. Energy efficiency on the demand side involves improvements in end-use technologies and in improved building insulation and energy management.[65] Since most of the GHG emissions in the EU are energy-related (81% of EU-15 emissions in 2002), the way in which the energy sector evolves will largely determine future GHG emissions.

Direct and Indirect Influences of the EU ETS

Under an emissions trading scheme such as the EU ETS, emission allowances are allocated on the basis of an installation's direct, on-site emissions, whether process or combustion-related. This leaves out emissions associated with the production of an industry's inputs, the most important inputs being electricity and transportation emissions related to the industry's activity, referred to as indirect emissions. As a result of these indirect emissions, consuming industries will see an increase in the cost of one of their inputs. Emissions arising from the consumption of electricity purchased from the grid are an example of indirect emissions.

Furthermore, under the EU ETS, the power generators are allocated allowances on the basis of their direct emissions – the cost of which is fed through to industrial and other consumers, introducing an additional cost (or indirect impact) related to the constraint on emissions. Industry's direct emissions can be divided in two distinct categories: process emissions and energy related emissions. Energy-related emissions are GHG emissions (mostly CO_2) from fossil fuel combustion. Process emissions are not generated by fuel combustion, but as a result of chemical reactions in defined as non-energy related emissions and are emitted during the production process of a product. In regards to impacts on energy efficiency, the EU ETS impacts energy efficiency in two significant ways:

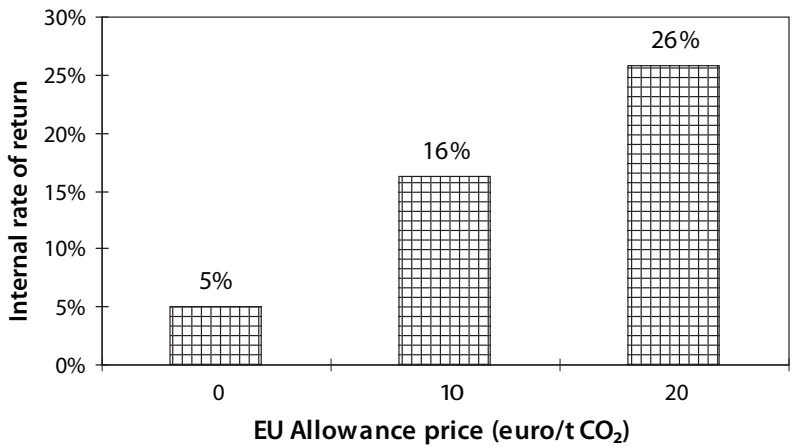
1. Impact on direct emissions;
2. Indirect impact via the electricity price.

65 PEEREA, Carbon Trading and Energy Efficiency, Energy Charter Secretariat, Brussels, 2005.

Impact on Direct Emissions

By putting a value on direct CO_2 emissions, the reduction of such emissions via energy efficiency measures results in direct savings for the company. For example, in the case of a waste heat recovery measure in a paper mill, it leads to direct reduction in the use of coal and hence in the CO_2 emissions from coal. As a consequence the IRR of the project increases substantially. Figure 6.4 shows the impact of a waste heat project where the initial IRR (without emission trading) is 5% and which increases substantially with a EU Allowance price of €10 and €20.

Figure 6.4: Impact of EU Allowance price on IRR of a Waste Heat Recovery Project with Different Allowance Prices



In theory, the value of carbon emission allowances should be reflected in the short-term generating costs of fossil-fired plants, because emissions from generation have to be offset with allowances held or purchased on the CO_2 market.[66] If the market price does not cover its incremental costs including the value of the allowances, the power producer is better off not to produce and to sell unused allowances. Nevertheless, the decision to pass-on the full opportunity cost of allowances or only part of it depends on several factors – notably on the nature of the power market design and on type of contract the generator has with its customers, including energy-intensive users in a liberalised market.

Indirect Impact via the Electricity Price

The purpose of emissions trading is to trigger least-cost emission reductions through the introduction of a price attached to emissions. The stronger and the more clear this price signal is to consumers, the more efficient emission reductions measures are. In economic

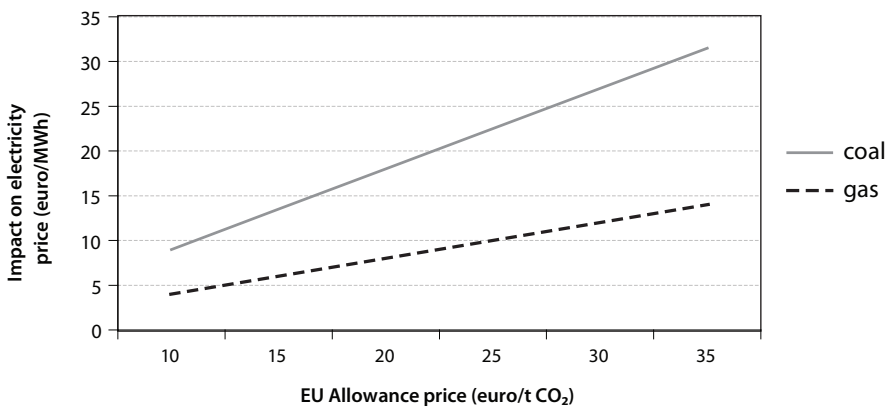
66 J. Reinaud, Emissions trading and its possible impacts on investment decisions in the power sector. IEA information paper, Paris, 2003.

theory, this justifies that opportunity cost of holding allowances be passed on to consumers who will, in turn, have an incentive to lower their demand for electricity. Power generators have an incentive to reduce their emissions to lower their carbon cost and maintain the attractiveness of electricity with these consumers.

Energy efficiency projects generate both direct savings at the owner's facility and indirect savings (including financial savings) for electricity suppliers. Direct savings relates to reduction in fuel consumption for electricity. According to the Prototype Carbon Fund, the CO_2 reduction depends on the carbon content of the fuel, which ranges from 53.1 $kgCO_2/GJ$ for natural gas to 92.2 $kgCO_2/GJ$ for coal. Indirect savings occur in the upstream energy supply systems as a result of reduced extraction, processing, and transmission energy use. These include financial savings related to reduced fuel purchases and load-related savings from deferral or avoidance of investment in new generating capacity, especially to meet peak demand. Similarly, according to the PCF, the CO_2 reduction depends on the carbon content of the fuel used by the generating unit and the type of technology used. The fuel content ranges from 440 $kgCO_2/MWh$ for combined-cycle natural gas units to over 1,000 $kgCO_2/MWh$ for conventional coal-fired plants.

The EU ETS results in an increase in the power prices because of the additional costs for thermal power stations. Power companies will pass these costs on to their end users, which leads to an increase in power prices. Figure 6.5 shows the impact of generation costs for power operators.

Figure 6.5: Impact of EU Allowance on Generation Costs for Power Operators



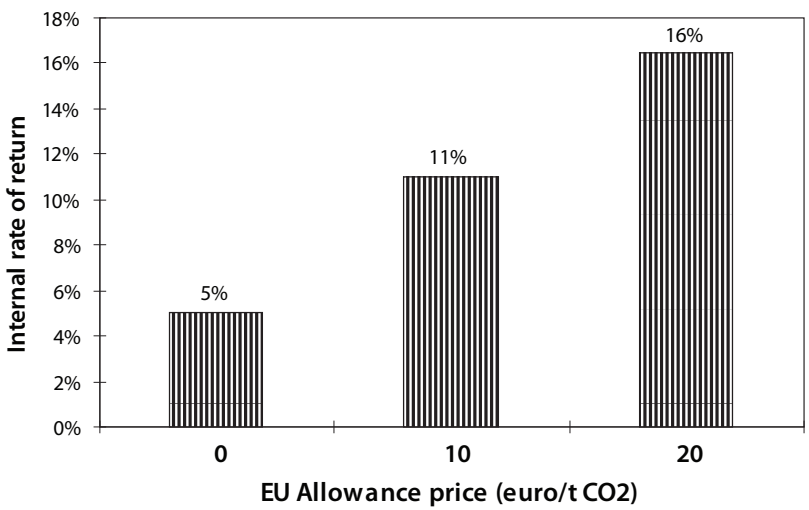
The impact of EU allowances related to the fuel type can be observed on the graph. For power generators the allowances will have an impact in the fuel they use to generate electricity, expressed by the carbon emission factor, consequently the higher emission factor impacts the price of allowances. Finally this will affect the final price of electricity.

Within the merit order of power generation dispatch, the relatively cheaper coal fired plants generally run before the relatively more expensive gas plants are fired up. However, coal emits roughly twice the emissions per MWh as gas. In a perfect market, allowance prices should rise to the point of substitution between coal generation and gas generation. In other words, the higher the price for CO_2 emissions, the sooner gas will substitute coal generation. Conversely, the bigger the spread between coal and gas costs, the more coal will be used. Therefore, changes in fuel prices as well as changes of EUA prices will influence the merit order and substitution threshold of fuels used in generation.

As the power sector is one of the largest emitters of CO_2, the EU ETS was always expected to have a significant impact on electricity prices. The question that most observers are trying to identify is how large this impact will be. Prices in any market are determined by the most expensive resource called upon to meet demand. In the case of most European electricity markets, the reference unit will be a thermal power station consuming coal or gas. As fuel prices vary, so will the cost of production. With carbon, the appropriate response at an operational level is quite straightforward: the value of CO_2 should be included in the cost structure of generation in the same way as fuel costs are. This is true even if adequate free allowances are held to cover the output because those allowances have an opportunity cost equal to the revenue that would have been earned by selling.

A case study to illustrate this is, is a cogeneration project next to a refinery. The project does not change its direct emissions but will generate additional power. Figure 6.6 shows the impact of the IRR of the cogeneration plant with different allowance prices.

Figure 6.6: Impact of EU Allowance on the IRR of the Cogeneration plant with Different Allowance prices



According to a recent study by the IEA, the immediate impact of the EU ETS will be on the operating costs of power plants. If allowance prices reach €20 per tonne, the study suggests a switch in competitiveness between gas and coal plant. However, if allowance prices remain below this level, they forecast little impact on coal-fired plant. If allowance prices increase much beyond the €20 mark, however, generators may well find it more economical to build new CCGT capacity than continue to run existing coal plant. Increased operating costs will result in increased wholesale electricity prices – some studies have suggested by as much as 40% – although the extent to which the power generators pass on these carbon costs remains to be seen. Increased wholesale power prices will clearly affect not only the competitiveness of EU electricity users, but will also have serious implications for investment levels and competitiveness of the power sectors itself. The potential for relocation of industry and the reduction in competitiveness of the EU as a whole is worrying – but the uncertainty surrounding the post-Kyoto climate change negotiations is the most disruptive concern, for industry, investors, and regulators alike.

CHALLENGE 3: *FINANCING ENERGY EFFICIENCY*

Since the first energy efficiency strategies were prepared after the first oil crisis in 1973, governments have been challenged to ensure there was adequate financing available for cost-effective energy efficiency measures. In transition economies, this became an acute problem because domestic financial institutions were either just forming or were not familiar enough with investing in energy efficiency. Also, end-use energy prices were generally quite low and, thus, "good" energy efficiency projects were not considered "cost effective" at the individual level, even though there could be good national benefits. Analysis shows that consumers often have different views on what is cost-effective, on how to integrate the environment and other externalities into cost considerations, how there has been and sometimes continues to be a problem of access to capital and so on. There are still problems with financing because many energy efficiency investments are relatively small and financial institutions are reluctant to provide funding, due to high transaction costs relative to the total cost of the investments. There is still a problem for vulnerable segments of society (e.g., aged, poor) and those countries with such problems are trying to address them. In other cases, investment support is provided, not because of a lack of capital, but to improve the financial viability of a project, to make it more appealing to the consumer.

Part of the problem of energy efficiency investment, identified in analysis conducted by the Energy Charter Secretariat,[67] is often that lines of responsibility and accountability are unclear. In the building sector, for example, there are many parties involved in building a house. In addition, the lifetime of a house is longer than that of the original investor, making it difficult to oversee the full impact of energy efficiency. There are also the different interests of landlords and tenants, where energy efficiency issues tend to fall between the two.

The body of literature on issues related to financing energy efficiency investments is extensive and governments generally have a good grasp. An argument sometimes heard is that finance ministries are reluctant to fund initiatives if they are cost-effective – if a project is viable, it should happen anyway. But, this is not always the case; market barriers can be persistent and many still remain. This was overcome in some countries by combining energy efficiency improvements with multi-family building re-modernisation programmes (often due to seriously deteriorating buildings).

For many economies in transition, there was also some difficulty in knowing the project development process. To assist on this issue, the Energy Charter published an application manual on financing energy efficiency.[68] It explains the principles and strategy to prepare energy efficiency projects, discusses feasibility studies and business plans, and gives sources of financing for projects.

The Charter also published a separate report on fiscal policies for improving energy efficiency, looking at the role and application of taxation, grants and subsidies.[69] Later, in 2004, it analysed this issue further in *Investing in Energy Efficiency, Removing the Barriers*.

Financial incentives are well established measures used by both industrialised and transition countries. They are more widely used in IEA countries. The incentives are generally well targeted to meet specific objectives or to promote specific technologies. For example, many countries target the vulnerable or aging segments in the society by providing grants for insulation.

The financial instruments normally include subsidy/grant schemes, soft loans, and funds. These are often funded by national, regional or local governments but there can also be obligations to energy supply companies to undertake investments.

NATIONAL FINANCING SCHEMES

Some of the more interesting financial measures being implemented today by participating countries include:

- Croatia: In 2003, the Environmental Protection and Energy Efficiency Fund was established. The resources will be disbursed as loans, interest rate subsidies, grants and donations, in general, on the basis of public tenders invited by the Fund.

67 Energy Charter, Investing in Energy Efficiency, Removing the Barriers, Brussels, 2004. p.7. The entire report, available at www.encharter.org provides a detailed analysis of the barriers to financing energy efficiency.

68 Energy Charter, Financing Energy Efficiency, An Application Manual Brussels, 2001.

69 Energy Charter, Fiscal Policies for Improving Energy Efficiency: Taxation, Grants and Subsidies, Brussels, 2001.

- Denmark: The Electricity Saving Trust is financed by 0,7 øre (app. 0.1 €-cent) per kWh consumed by private households and public institutions. The objective of the trust is to facilitate electricity savings inter alia by campaigns and promotions. Since 2006 companies distributing energy have been committed to initiating energy savings in the end-use of energy.
- Czech Republic: The State Housing Development Fund manages the so-called "Panel" Programme. The Fund provides a reduction of the loan interest by 3% points. It provides subsidies for repair, modernisation of panel buildings. The purpose of the repairs is to: extend the useful life of existing buildings by no less than 30 years; reduce energy intensity; and increase the standard of living.
- Moldova: The National Fund for Energy Conservation was established in November 2002. The Fund is financed by a 0.2% allocation from the state budget, by a 20% allocation from fines for violations against the provisions of the Law on Energy Conservation and from voluntary donations.
- Romania: The Romanian Fund for Energy Efficiency (FREE) is a public interest institution, with legal personality. FREE finances investments in energy efficiency projects, in accordance with the priorities established in the annual programmes by the Government. FREE is offering financing services for covering maximum 80% from the investment costs of the approved energy efficiency projects.
- United Kingdom: The Energy Efficiency Commitment requires energy supply companies to spend a certain amount of money per customer to undertake energy efficiency measures[70]. At least 50% of energy savings must be focussed on a priority group of low-income consumers in receipt of certain benefits and tax credits/pension credit. So it is expected that the EEC will also contribute to the eradication of fuel poverty. The gas and electricity regulator, Ofgem, is responsible for administering the EEC. The first phase of the EEC ran from 1 April 2002 to 31 March 2005 and is expected to save 0.37 MtC annually by 2010. The second phase of the EEC runs from 1 April 2005 to 31 March 2008 and requires around double the level of activity. There is an illustrative mix of possible energy efficiency measures on which the EEC 2005-2008 obligation is based. Consultation is underway for the phase between 2008-2011.

For many countries, it has been difficult to access capital locally. Bilateral and multilateral sources have become very important to many of these countries. For some, it is practically the only source of financing.

70 For more information, see http://www.defra.gov.uk/Environment/energy/eec/index.htm.

INTERNATIONAL SUPPORT FOR FINANCING ENERGY EFFICIENCY

International Financial Institutions

Energy efficiency is becoming a global point of concern. One can witness more and more private, local, governmental and international activity to do with energy efficiency and renewable energy. The main centres of this activity, encouraging those private and state and bringing them together, are international financial institutions (IFIs), such as the European Bank for Reconstruction and Development (EBRD), the World Bank Group (WBG), and the Global Environmental Facility (GEF). The activities of the IFIs have been important because they were able, through financing projects, to show local financial institutions that financing energy efficiency could be good business, that there was money to be made, that the risks were not that onerous.

The European Bank for Reconstruction and Development[71]

Energy efficiency is an important priority for the EBRD, which has kindly provided the following detailed, in-depth assessment of its activities in the transition countries in energy efficiency for this report.

The EBRD and sustainable energy in transition countries

The European Bank for Reconstruction and Development was established in 1991 when communism was collapsing in central and eastern Europe and ex-soviet countries needed support to nurture a new private sector in a democratic environment. Today the EBRD uses the tools of investment to help build market economies and democracies in countries[72] from central Europe to central Asia. The EBRD is the largest single investor in the region and mobilises significant foreign direct investment beyond its own financing.

The Bank's shareholders are 61 governments,[73] plus the European Commission and the European Investment Bank. But despite its public sector shareholders, it invests mainly in private enterprises, usually together with commercial partners. The EBRD provides project financing for banks, industries and businesses, both to new ventures and for investments in existing companies. It also works with publicly-owned companies, to support privatisation, restructuring state-owned firms and improvement of municipal services. The Bank uses its close relationship with governments in the region to promote policies that will bolster the business environment. The mandate of the EBRD stipulates that it must only work in countries that are committed to democratic principles.

71 See www.ebrd.com.

72 EBRD countries of operations are Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Georgia, Hungary, Kazakhstan, Kyrgyz Republic, Latvia, Lithuania, Moldova, Mongolia, Montenegro, Poland, Romania, Russia, Serbia, Slovak Republic, Slovenia, Tajikistan, The Former Yugoslav Republic of Macedonia, Turkmenistan, Ukraine, Uzbekistan.

73 A list of EBRD shareholders is available at http://www.ebrd.com/about/basics/members.htm.

Energy, environment and efficiency

Respect for the environment is part of the strong corporate governance attached to all EBRD investments. This fits well with the economic and security incentives for acting against the disproportionately high levels of energy inefficiency in eastern Europe and the former Soviet Union. Countries in the EBRD region use up to seven times more energy to produce each unit of GDP, compared with western Europe.

These inefficiencies are an enduring relic of the communist era and are rooted in the ongoing, albeit diminishing practice of subsidising energy costs. Energy-rich countries are wasting resources which they could sell on export markets at world prices; energy-importing countries are subsidising inefficiency which undermines their energy security; and across the region the long-term competitiveness of enterprises is undermined by this wastefulness.

It is these arguments, as well as opportunities arising from a nascent carbon market, that are beginning to encourage transition countries to start improving their energy efficiency. Most significantly, the Russia-Ukraine dispute over energy pricing in January 2006 woke up countries across the transition zone to the need to stop wasting valuable energy resources.

After the United States and China, transition economies are among the highest greenhouse gas emitters in the world, with 13% of the global total. This will worsen if energy efficiency in the region does not improve: their energy use is projected to rise by 50% over the next 25 years. Economic growth and a decline in carbon dioxide emissions can go hand-in-hand if energy saving policies are introduced and financing is available to upgrade the industrial and energy base. In central Europe, carbon dioxide emissions fell in relation to GDP by over 35% between 1990-2002. In these countries, energy price rises between 1995-2000 were among the reasons why the least-efficient industries closed down while investment in more promising operations helped improve efficiency to western European levels.

However, many transition countries remain unimpressed by concerns about climate change which they tend to view as a western, 'rich country' problem. Other than in EU accession countries which must adhere to EU emissions requirements, the argument that transition countries need to reduce emissions for the sake of the planet is a non-starter, viewed as an attempt to limit their economic growth.

In its policy dialogue with transition country governments, the EBRD has learned that the most effective approach is to use economic and energy security arguments to promote greater energy efficiency, and carbon credit trading as a means to pay for upgrading industrial and other infrastructure.

Regardless, improved energy efficiency will mean lowered emissions per unit of GDP, a benefit to the global environment even if it is not one of primary importance to countries in the region.

Similar to energy efficiency projects, renewable energy (other than hydro) has not been widely adopted in transition countries as it has been too costly vis-à-vis more conventional energy sources. Pricing and access to national grids have boosted

alternative energy in the West but these, along with regulatory frameworks to promote renewables, have not yet been put in place in the transition countries.

The EBRD and sustainable energy

The EBRD was created to be 'additional' to private sources of financing in the transition countries. That is to say, the Bank does not compete with the private sector for clients; it operates only where financing is either unavailable or disadvantageous (for example, loan terms are not long enough to warrant a given investment).

Energy efficiency has emerged as an area in which the EBRD is clearly 'additional', as it is ideally positioned to address hindrances to investment in improved efficiency including:

- first and foremost, energy efficiency does not pay when energy prices are low, as they have been for decades in most transition countries.
- lack of awareness in businesses and government as to the cost and energy savings that can be achieved through efficiency gains.
- inexperience and lack of technical expertise in local banks vis-à-vis lending for energy efficiency and renewable energy investments means it is difficult for businesses and homeowners to access loans for such projects.
- short investment horizons in transition country enterprises. There is a lack of interest in investing in energy efficiency improvements that may take several years to pay for themselves. This is changing as energy prices rise.
- a focus, by many transition country enterprises, on increasing production rather than cutting costs as a means of increasing profitability.
- lack of technical expertise in the region to evaluate energy use and costs, assess potential efficiency gains, and devise investment programmes to realise those gains.
- Inexperience (and, until recently, disinterest) in using the Kyoto Protocol's carbon credit trading mechanism to finance efficiency and renewable projects. As a result the region is far behind many developing countries in putting in place the appropriate national frameworks to manage carbon credit projects. However, this situation is changing rapidly for the better with central European and Baltic countries, Bulgaria, Romania and Ukraine already having approved carbon credit transactions stemming from energy efficiency projects. Russia is widely expected to have its framework in place in 2007.

As mentioned, the January 2006 pricing dispute between Ukraine and Russia provided a region-wide wake-up call for action on energy inefficiency, pricing, energy security, and energy trading relations. It coincided with final preparation of the EBRD's Sustainable Energy Initiative, officially adopted at the Bank's annual meeting in May 2006. The initiative was conceived to focus EBRD minds, effort and money on energy efficiency and renewable projects.

Under the SEI the Bank aims to invest at least €500 million per year between 2006 and 2008 in sustainable energy projects, with the bulk going to improving energy efficiency.

In 2006, the Bank invested close to €750 million in projects that are helping energy utilities, companies and households to become more energy efficient and boosting finance for renewable energy sources. Carbon emission reductions from SEI projects signed in 2006 are expected to exceed seven million tonnes of carbon dioxide per year. This is equal to the annual emissions from three million cars in the EU, one million UK households, or 0.5% of Russia's annual carbon emissions.

Some of the SEI projects signed in 2006:

- In two Ukraine steel mills, energy efficiency and waste energy recycling projects financed by the EBRD will knock a full percentage point off national energy consumption and annual domestic GHG emissions. Through improved energy efficiency, Mittal Ukraine is cutting energy use by 10%. Alchevsk Steel is establishing an on-site power plant to use waste gases from steel-making as fuel, producing enough energy (290 MW) to cover all the steel complex's needs, with potential surplus that could be sold on the market.
- a €185 million rouble-denominated loan to finance refurbishment of RAO-UES hydropower stations in Russia, adding a quarter-century of life to power stations responsible for 10% of Russia's electricity supply.
- Azdres, a power plant producing most of Azerbaijan's electricity, is obsolete. With EBRD finance it will switch from oil to less carbon-intensive gas, and undertake energy efficiency improvements that will slash 10% off of Azerbaijan's national production of greenhouse gases, and reduce domestic energy consumption by 2.5%.
- District Heating Company (Colterm), Romania: The EBRD provided a €15 million loan to Colterm to switch from oil to more environmentally-friendly gas turbines. This will cut CO_2 emissions by around 120,000 tonnes per year, producing up to €4 million worth of carbon credits, to be sold to the EBRD-Netherlands Emissions Reduction Cooperation Fund.
- The EBRD has loaned €155 million to Bulgarian banks for 'on-lending' to entrepreneurs and households for energy efficiency and renewable energy projects; these benefit from small donor-funded subsidies. To date, nearly 70 corporate projects and over 6,000 residential projects (particularly for insulation and new windows) have been approved. A similar initiative is being rolled out in Ukraine, with plans to do the same in Croatia, Georgia, Romania, Russia and Slovakia.

These results reflect some important institutional changes within EBRD in support of the Sustainable Energy Initiative:

1. Creation of a sustainable energy working group, chaired by the First Vice-President for Banking and including the EBRD's most senior officials. The group is tasked with mainstreaming energy efficiency and renewable energy throughout EBRD operations.

2. Shared responsibility, among EBRD's banking teams, for generating renewable and energy efficiency projects. Generally, teams have either sectoral (e.g., agribusiness, power and energy, financial institutions) or geographic (e.g., Russia, Caucasus, Balkans) responsibilities. Until 2006, a single team was responsible for energy efficiency investments. Now all banking teams are expected to be on the lookout for sustainable energy investment opportunities within their realms of responsibility, and their results in this regard are evaluated as part of annual performance reviews.

3. Re-focusing and strengthening of the Bank's Energy Efficiency and Climate Change (E2C2) team, with a number of new staff positions in EBRD London headquarters and in Ukraine and Russia. The team, which includes engineers, bankers and carbon credit experts, analyses all projects proposed to the Bank's operations committee as to whether they might be expanded to include energy efficiency investments and/or carbon finance. The team then helps steer those particular aspects of such investments/finance, particularly by providing expert advice, some of it funded by donors as is often the case with expensive, time-consuming energy audits. The latter form the basis of efficiency investment programmes and help ensure carbon credits are generated in accordance with Kyoto Protocol rules. The team is also in charge of EBRD's carbon finance activity.

4. More generally, the Bank is promoting sustainable energy internally and externally through its own communications via the web, speeches, etcetera, and via the media. The EBRD's role as a leader on energy efficiency and climate change issues in transition countries was acknowledged when the then UK Chancellor Gordon Brown asked the Bank to host an international gathering on 'Financing Clean Energy' in March 2007. The conference brought together representatives of the world's most powerful multinational corporations and the multilateral development banks to address the blockages in financing solutions to climate change.

5. The EBRD and the European Investment Bank created the €165 million Multilateral Carbon Credit Fund in December 2006. The Fund will help finance emission reduction projects that will generate carbon credits for MCCF members, including governments and private businesses. Key to the MCCF is that it guides local businesses and governments in project planning and implementation, and takes on much of the regulatory burden of ensuring projects meet Kyoto requirements. All this is essential if the resulting carbon credits are to be deemed valid under Kyoto Protocol rules. The MCCF builds on the experience gained through the €50 million EBRD-Netherlands Emissions Reduction Cooperation Fund, in operation since 2003 and under which all EBRD carbon credit finance has thus far taken place.

Energy policy frameworks in transition countries

Energy prices are the main determinant for investment in energy efficiency. According to data from an EBRD survey,[74] a 1% increase in the energy price is associated with about 0.5% reduction in energy intensity (the amount of energy used to produce each unit of GDP).

As previously mentioned, historically low energy prices in the transition countries have encouraged waste. Prices throughout the region are now on the rise and so energy efficiency and, to a lesser extent, renewable energy projects are becoming more attractive.

Advanced transition countries

Advanced transition countries[75] have long been more energy efficient than other former communist countries to the east and south, as even in the days of central planning they had to pay for imported energy from the former Soviet Union. As a result, when communism ended, CEB states were already more energy efficient than their energy-rich neighbours. EU accession, coupled with foreign investment, have greatly improved energy efficiency in CEB countries.

Policy and institutional efforts have included establishment of competent and experienced energy efficiency agencies, some of which are now self-funded and provide comprehensive services to public and private sector clients. Many countries also have established targeted financial support schemes to provide soft loans and grants for energy efficiency. Some banks have started lending for energy efficiency projects as part of improving their clients' competitive position and profitability.

Despite this progress, and even on a purchasing power parity basis, most advanced transition countries still use more energy per GDP than the EU-15. Closing this gap may be much more difficult to achieve than were earlier gains. The 'low hanging fruit', such as raising energy efficiency in steel- or glass-making, have already been grasped; what remains to be done is to improve efficiency in housing and in general industry outside the more energy-intensive sectors.

With the adoption of the EU framework for renewables, all new member states have now set targets for higher levels of renewable power by 2010. Enabling regulatory frameworks have been implemented, although in several countries the detailed arrangements are still under development and a significant number of developed projects (particularly in the wind sector) are waiting to proceed. Apart from co-firing, little has been done to develop the biomass or bio fuel sectors and wind power capacity is still at a very low level.

74 EBRD Business Environment and Enterprise Performance Survey, 2005 (http://www.ebrd.com/country/sector/econo/surveys/beeps.htm)..

75 'Advanced transition countries' are those that have made the greatest strides in their shift toward the market economy. Generally they include the EU-8 plus Croatia.

Early and intermediate transition countries (excluding Russia)[76]

In these countries, electricity tariffs are still relatively low and in the majority of cases below cost recovery. Low and unbalanced tariffs, compounded by payment arrears and low collection rates, are at the core of poor financial and technical performance by power utilities. This means that they have not had the resources to invest in energy efficiency improvements. In the Kyrgyz Republic, Turkmenistan and Uzbekistan, electricity consumers pay less than two US cents per kilowatt-hour, compared with a cost-recovery level of two to three times that amount. Efforts to address low cost recovery are constrained by poverty. Reforms need to be complemented by parallel measures to mitigate potential affordability problems for low-income consumers.

Progress in improving energy efficiency has been slow. Low tariffs, the slow pace of industrial re-structuring and more limited access to debt finance undermine incentives for energy efficiency and keep it at the bottom of investment priority lists. Policy support is generally positive but this is rarely backed up with resources and targeted financial support for energy efficiency is extremely limited. Most activity to date has been in smaller, more progressive companies which have set their sights on competing internationally – there are many examples in the food sector and in energy-intensive processes such as glass manufacture – largely driven by booming demand for food and drink products.

Regulatory reforms to support renewables are largely absent or inadequate in early/intermediate transition countries, many of which are still grappling with basic sector reforms. Together with low wholesale energy prices, the commercial environment for developers remains hostile. Some exceptions do, however, demonstrate that progress can be made: Kazakhstan is working to improve the regulatory framework, Bosnia and Herzegovina is seeking developers for wind and hydro resources, and Armenia has developed targeted policies for renewable energy and one financial organisation, Cascade Credit, is financing small-scale hydropower projects. The biomass sector has received little structured support.

Russia

As a country endowed with vast natural resources which have traditionally been available to consumers at very low prices, Russia historically has had little inclination towards improving energy efficiency. The Russian government calculates the country could save up to 40% of its current annual energy consumption through improved efficiency. With recent increases in domestic gas and electricity prices, this situation is slowly changing but still has a long way to go. Improving insulation in the housing stock is one major area requiring attention. Much remains to be done on the industrial side as well. For example, 22% of Russian steel output in 2004 was by inefficient open hearth furnaces versus 3.9% in India and 0% in the EU.

Leaders in both the power sector (dominated by RAO UESR, due to be unbundled by 2008)

76 This includes countries of Southeast Europe plus Moldova, Belarus, Ukraine, the Caucasus and Central Asia.

and the oil and gas sector (dominated by Gazprom) recognise their infrastructure is highly inefficient and wasteful. Both are looking for significant investment to improve efficiency in the coming years and expect to use carbon credits to achieve part of that.

Russia has vast technical potential for renewables, particularly in hydro, biomass and wind.

Hydro generation is the main source of renewable energy in Russia, providing 20 percent of all the power produced. It acts as the backbone of the power industry, stabilising supplies and maintaining the reliability of the country's entire system, as well as generating economically efficient electricity. The government has now put HydroOGK (unbundled from RAO UESR) in charge of developing all renewable energy resources in Russia, including windfarms, tidal and small hydro projects. In September 2006 the EBRD loaned HydroOGK the rouble equivalent of €185 million to add 25 years of service to hydropower stations on the Volga-Kama river system. Coupled with the loan was a grant of €165,000 to assist HyroOGK in the development of a regulatory framework for windfarms in Russia.

Generally, though, the lack of a legal-regulatory framework for renewables and low energy prices mean few technologies can compete commercially in the current environment. Activity to date has been limited to RAO UESR hydropower and a few exceptional projects (e.g., wind development in remote areas of Siberia that are cut off by ice in winter) or small-scale early-stage technology development such as tidal power. Significant activity in the renewables sector will be unlikely without targeted policy and regulatory support.

Trends for the future

The transition zone is waking up to the benefits of improving energy efficiency. While central European and Baltic countries are the most advanced in this regard, governments, financiers and businesses in other countries (notably Bulgaria, Romania and Ukraine) have recently made energy efficiency a priority. Russia seems to be quickly catching up as it views domestic energy waste, both by its customers enjoying low energy prices and in its outdated energy infrastructure, as the loss of resources that could be sold for higher prices internationally.

Eighteen months ago, almost no transition countries were using the Kyoto Protocol to generate and sell carbon credits. Today, there is growing appreciation for carbon trading as a financing mechanism to improve infrastructure and competitiveness. Russia is expected to have in place in 2007 all the necessary legal and regulatory frameworks required to govern carbon credit generation and trading, and this is sure to impress those smaller, less developed transition countries that have yet to act in this regard.

That said, there is a large gap between interest in using Kyoto, and ability to do so, particularly in terms of technical expertise and project finance. This is rapidly growing, however, as cutting energy waste is seen as a business opportunity. The EBRD is supporting this through its investment in individual projects, through credit lines to local banks which then on-lend for smaller industrial and residential efficiency projects, and through its two carbon credit funds.

The World Bank Group

Among international financial institutions and bilateral donors, the World Bank Group is one of the largest financiers of renewable energy and energy efficiency projects in developing countries including in transition economies.

The way the financing is secured for energy efficiency projects:

- The WBG has four closely associated World Bank institutions, which directly support renewable energy and energy efficiency activities. The four institutions are the IBRD, IDA, IFC, and MIGA. In addition, the WBG is an implementing agency for the GEF;
- The International Bank for Reconstruction and Development (IBRD) aims to reduce poverty in middle-income and creditworthy poorer countries by promoting sustainable development through loans and guarantees, and in the non-lending area analytical and advisory services. One hundred and eighty-four countries are members of the IBRD (http://www.worldbank.org/ibrd);
- The International Development Association (IDA) provides highly concessional financing to the world's poorest countries that have little or no capacity to borrow on market terms. IDA's resources help support country-led poverty reduction strategies in important policy areas, including raising productivity, providing accountable governance, improving the private investment climate, and improving access to education and health care for poor people. One hundred and sixty-five countries are members of the IDA (http://www.worldbank.org/ida);
- IBRD and IDA are together the greatest WBG renewable energy and energy efficiency contributors. Their financial commitments in 2005 amounted to $445 million (energy efficiency: $23 million, representing 5.2%), and to $6590 million (energy efficiency: $1733 million, representing 26.3%) over the period of 1990-2005;
- The International Finance Corporation (IFC) furthers economic development through the private sector. Working with business partners, it invests in private enterprises in developing countries and provides long-term loans, guarantees, and risk management and advisory services to its clients to develop promising opportunities in markets deemed too risky by commercial investors in the absence of IFC participation (http://www.ifc.org);
- IFC renewable energy and energy efficiency financial commitments in 2005 amounted to $61 million, and over 1990-2005 – to $921 million (energy efficiency: $93 million);
- The Multilateral Investment Guarantee Agency (MIGA) provides political risk insurance against non-commercial risks to eligible foreign investors and commercial banks for qualified investments in developing member countries (http://www.miga.org);
- $91 million was MIGA's contribution to the WBG renewable energy and energy efficiency commitments in 2005 and $519 million (energy efficiency: $5 million, representing 5.5%) over the last 15 years.

Since 1990, the World Bank Group support for renewable energy and energy efficiency has exceeded US$9 billion. Nearly US$2.5 billion was for new renewables and US$2.2 billion for energy efficiency. Hydropower projects (greater than 10 MW per facility) received US$4.4 billion in commitments. Since 1990, the WBG has supported more than 260 renewable energy and energy efficiency projects in approximately 70 countries.

In 2005 the WBG's financial support for renewable energy and energy efficiency totalled US$748 million (40 projects in 28 countries were supported). The commitments comprise of US$449 million for hydropower greater than 10 MW, US$212 million for new renewable energy, and US$87 million for energy efficiency. The WBG share of renewable energy and energy efficiency financing was 26.2% of total energy sector commitments. As a share of power sector commitments, renewable energy and energy efficiency financing was 50.4%. Because WBG support for renewable energy and energy efficiency, as for all forms of energy, is driven by demand from its client countries, there is considerable year-to-year variation in commitment levels.

Project: A.D. Cementarnica USJE in the FYROM

In its first project in the FYROM, MIGA issued a guarantee totalling $19 million in coverage to Balkcem Limited (Balkcem) of Cyprus, a joint venture of the cement companies Titan Cement (Greece) and Holderbank, (Switzerland) for its equity investment in the acquisition of A.D. Cementarnica USJE (Cementarnica), a cement company located in Skopje, the capital of the FYROM. The MIGA guarantee will cover the investment against the risks of war and civil disturbance.

The investor will support the modernisation and expansion of the only cement plant in the FYROM. The objective of this investment is to modernise Cementarnica by upgrading its facilities and machinery and thereby improve efficiency, reduce costs, and protect the environment. Upon the successful diversification of Cementarnica, with its first ready-mixed concrete unit in Skopje, Balkcem's long-term objective is to explore the possibility of setting up additional ready-mixed concrete plants in other parts of the FYROM.

Source: www.miga.org

Carbon Finance

Both the IBRD and the IFC have Carbon Finance units that leverage public and private investment for projects that generate GHG emission reduction units (ERUs) in both developing and transition economies. The funds are provided by private companies and governments seeking to purchase ERUs to learn how to originate transactions in this complex emerging market. Typically, climate-friendly projects tend to be highly capital-intensive, so that even if they are competitive with fossil fuel technologies in economic terms, they are not financially viable at the rates of return required by emerging market

investors. Carbon finance is emerging as a powerful tool to improve the viability of clean technology investments, particularly in the renewable energy, energy efficiency, and waste-to-energy sectors. Carbon Finance business is a relatively new business for the WBG. It can be divided into separate business lines: the IBRD Carbon Finance and the IFC Carbon Finance.

IBRD Carbon Finance products include the Prototype Carbon Fund, the Netherlands Clean Development Facility, the Community Development Carbon Fund, the BioCarbon Fund, the Italian Carbon Fund, and the World Bank Staff Climate Protection Programme (http://www.carbonfinance.org).

The PCF is a public/private partnership whose objective is to buy carbon credits from JI and CDM projects (about 50% each) mainly from projects in renewable energy and energy efficiency on behalf of its stakeholders. Six governments and 17 companies—including power and oil companies from Japan and Europe, and leading global banks—all from industrialised countries, have contributed US$180 million in funds to the PCF, which to date has projects with an Emission Reduction potential of more than US$100 million under preparation.[77]

The 2005 commitments from all these units amounted to $23 million (energy efficiency: $4 million) and to $91 million (energy efficiency: $18 million) since 2001 – the first year of existence.

IFC has its own Carbon Finance unit that manages funds to purchase carbon credits and is developing new products to help buyers and sellers mitigate risks in the emerging carbon market. The facilities are arrangements under which IFC will purchase carbon credits for the benefit of the Government of the Netherlands under the international trading mechanisms of the Kyoto Protocol. IFC currently has about US$85 million under management in two facilities to purchase credits: the IFC Netherlands Carbon Facility operating under the rules of the CDM and the Netherlands European Carbon Facility (operating under the rules of JI and managed jointly with IBRD). (http://www.ifc.org/carbonfinance)

The link between environmental financing and energy efficiency projects

The WBG's Energy Programme stresses the importance of the following:

- Improving access to modern energy services for the poor;
- Improving macroeconomic and fiscal balances;
- Promoting good governance and private sector development; and
- Protecting the environment.

Renewable energy and energy efficiency investments support all four of the above-mentioned objectives. renewable energy and energy efficiency can help resolve the conflict between the seemingly contradictory objectives of helping eliminate poverty

77 Source: http://www.prototypecarbonfund.org.

through the greater use of modern energy sources, and reducing the effect of increased energy use on the local and global environment. The WBG aims to use renewable energy and energy efficiency to bring increased access to modern energy services for the poor with less harm to the environment. renewable energy and energy efficiency have several benefits, such as:

- renewable energy can help improve the livelihoods of people by accelerating the development of modern energy services at a lower cost than alterative approaches and through the promotion of income-generating activities, particularly in hard-to-reach rural and unserved areas;
- renewable energy and energy efficiency can help countries grow in an environmentally Sustainable way and without contributing to global warming;
- renewable energy and energy efficiency contribute to energy security by broadening the portfolio of options for energy resources and for reducing dependence on fuels with significant price volatility and availability concerns; and
- energy efficiency measures are often "no-regret" measures that reduce expenditures for households and businesses.

Energy efficiency and renewable energy projects in CIS countries

Four energy efficiency and renewable energy projects were developed in CIS countries in 2005. Two of them are in Russia (energy efficiency component financing of $8.75 million and $7 million); one in Ukraine (hydropower) with $85.86 million of renewable energy financing; and one in Moldova (biomass) with $0.68 million of renewable energy financing.

Around 20 energy efficiency and renewable energy projects have been developed in CIS countries by the WBG since 1991. The energy efficiency and renewable energy financing amounted to $900 million. The greatest investment has been made in Russia and Ukraine thanks to two large-scale projects – Enterprise Housing Divestiture in Russia ($300 million) and Kiev District Heating Improvement in Ukraine ($200 million). Projects have been also developed in Belarus, Estonia, Georgia, Kyrgyz Republic, Moldova and Tajikistan. IBRD/IDA have been the main financing source. GEF participated in financing of four of the mentioned projects.

The Global Environment Facility

The GEF, which is the World Bank's largest partner in the area of renewable energy and energy efficiency investments, provides both project preparation services and investment funds. The GEF is the financing mechanism for a range of international environmental agreements, and it provides financing for projects that have global environmental benefits. Since the establishment of the GEF in 1991, the WBG institutions have worked closely together to implement the GEF's role as the financial mechanism for the UNFCCC.

The World Bank, UNDP and UNEP are the three Implementing Agencies of the GEF. Each Agency finances GEF activities within its respective areas of competence.

The World Bank's primary role is in ensuring the development and management of investment projects. The Bank draws upon its investment experience in eligible countries to promote investment opportunities and to mobilise private sector, bilateral, multilateral, and other government and non-government sector resources that are consistent with GEF objectives and national sustainable development strategies. International Finance Corporation (IFC), the Bank Group's private sector arm, particularly focuses on mobilising private sector resources (http://www.worldbank.org/gef).

GEF-WB activities can be split into two groups – GEF-IBRD/IDA and GEF-IFC. By the end of 2005 the GEF-IBRD/IDA energy efficiency and renewable energy commitments had amounted to $717 million (energy efficiency: $304 million), and in 2005 – $100 million (energy efficiency: $53 million). GEF-IFC contribution was $145 million over the whole period (energy efficiency: $55 million), and in 2005 – $8 million (energy efficiency: $7 million). The World Bank is by far the main GEF implementing agency to do with energy efficiency.

The United Nations Development Programme's primary role is in ensuring the development and management of capacity building programs and technical assistance projects. Through its worldwide field office network, UNDP draws upon its expertise in institution strengthening, human resource development, non-governmental and community participation to assist countries in designing and implementing activities consistent with the purpose of the GEF. In addition, UNDP manages the Small Grants Programme on behalf of the GEF (http://www.undp.org/gef).

As of June 2005, UNDP's GEF programme portfolio was spread over 140 countries with over 1000 projects, and ranges from national to multi-country initiatives. The portfolio stands at US $1.8 billion with over US $3 billion raised in additional co-financing. A climate change portfolio was of $1.6 billion ($551 million in GEF grants and $1.07 billion in co-financing) covering 142 countries, with 30 million tons of carbon dioxide emissions eliminated in fiscal years 2003 and 2004 alone.

The United Nations Environment Programme's primary role is in catalysing the development of scientific and technical analysis and advancing environmental management in GEF-financed activities. UNEP helps to relate GEF-financed activities to global, regional and national environmental assessments, policy frameworks and plans, and to international environmental agreements.

UNEP's cumulative work programme since 1991 to December 2004 is financed to US$865 million, including $444 million in GEF resources. Including projects that UNEP co-implements with UNDP and/or the World Bank, this includes 70 full-size projects and 65 medium-sized projects. The work programme is implemented in 153 countries. $69 million have been spent on climate change activities.

GEF Climate Change operational programmes include removal of barriers to energy efficiency and energy conservation and promoting the adoption of renewables by removing barriers and reducing implementation costs. However, GEF-UNDP and GEF-UNEP do not mark out energy efficiency and renewable energy activities, as the World Bank does.

THE EUROPEAN INVESTMENT BANK

The European Investment Bank (EIB)[78] is an autonomous body set up to finance capital investment furthering European integration by promoting EU policies, including the EU environmental policy. In the pursuit of sustainable development the EIB applies a broad definition of the term "environment" and closely associates energy efficiency and renewable energy projects with its environmental activity. They are referred to as either climate change or renewable energy activities.

Three new climate change initiatives were launched by the EIB in 2004, including:

- the €500 million Climate Change Financing Facility (CCFF) – of which €100 million is allocated for CDM and JI projects – in support of European businesses participating in the EU's ETS. It started on 1 January 2005;
- the €10 million Climate Change Technical Assistance Facility (CCTAF), designed to provide conditional grant finance for preparing JI and CDM projects;
- the World Bank-EIB Carbon Fund for Europe (CFE), subject to approval by the Board of Directors of the IBRD; and
- The Multilateral Carbon Credit Fund (MCCF) with the EBRD.

EBRD-EIB carbon fund helps eastern Europe realise full potential – 12 participants have committed €165 million to buy carbon credits

The supply of carbon credits across countries from Central Europe to Central Asia will be increased significantly under the EBRD-EIB Multilateral Carbon Credit Fund, which became active in December 2006 with a commitment of €165 million from six countries and six companies. It is the only carbon fund dedicated specifically to this region.

The inefficient use of energy, a legacy of the region's command economy past, means these countries have huge potential for cost effective reduction of greenhouse gas emissions – responsible for global warming – through energy efficiency improvements. The region currently contributes around 13% of global carbon emissions, yet it generates just 3% of global carbon credits, created when projects reduce or avoid GHG emissions. The potential is much higher, at about 20%. Under the Kyoto Protocol carbon credits can be traded between buyers and sellers.

By joining the MCCF, countries – which must be a shareholder of either the EBRD or EIB – and companies can buy carbon credits from emission reduction projects financed by either institution.

78 See www.eib.europa.eu.

In addition to the MCCF, which is fully subscribed, sovereign participants can also participate via the MCCF in Green Investment Schemes, which are innovative ways of facilitating trade in carbon credits between governments whereby trade revenues are used to support investments in more climate friendly projects in the selling country.

Speaking at the first MCCF assembly meeting in London, EBRD President Jean Lemierre said the region has huge potential to address the issues of climate change and energy security, which are 2 themes that dominate the global agenda. The EBRD is helping the region to realise this potential by financing the efficient use of energy that will cut demand and imports, and also reduce pollution and adverse climate change, said Mr Lemierre. The by-product of these actions are carbon credits, which have financial benefits for those generating the credits and at the same time help MCCF participants meet their own Kyoto targets, he added.

Simon Brooks, Vice-President of the EIB, said that it is now clear to the international community that sustainable economic growth and development require determination and market-based action to bring about tangible and rapid results. The EU policy on environmental improvements is providing leadership and concrete support to countries and businesses eager to ensure a better future worldwide.

Typical projects under the MCCF will include industrial energy efficiency, power plant and district heating renovation, renewable energy (for example, biomass, wind and mini-hydro) and landfill gas extraction and utilisation projects across all 29 EBRD countries of operations, where the EIB also works extensively.

Fund participants are: Belgium (on behalf of Flanders), Finland, Ireland, Luxembourg, Spain, Sweden, and 6 private participants: Abengoa (Spain), ČEZ (Czech Republic), Gas Natural (Spain), Endesa (Spain), PPC (Greece) and Union Fenosa (Spain).

The negotiation, contracting and monitoring of carbon credit transactions will be outsourced to private "Carbon Managers" selected by a competitive process.

A key strength of the MCCF is that the projects from which carbon credits will be sourced will be financed and appraised by either institution – or both, if projects are co-financed – in line with standard requirements for project viability and sustainability, integrity and corporate governance.

Source: www.ebrd.com

CHALLENGE 4: *INTEGRATING ENERGY EFFICIENCY AND RENEWABLE ENERGY SOURCES — TWO PILLARS OF A SUSTAINABLE ENERGY STRATEGY*

Energy efficiency and renewable energy are closely linked. In policymaking there is a rationale for this linkage because they both seek to reduce the need for conventional, commercial fuels and they both address environmental concerns. Many participating countries have created these linkages and consider them the twin pillars of a sustainable energy strategy. Some are doing it as part of an overall energy strategy, combining all elements of the energy policy because the combination can play a powerful role to, for example, improve energy security.

Climate change policy is also a catalyst for energy efficiency and renewable energy policies to be integrated to make a coherent low-carbon energy strategy. National climate change strategies often include support for research in new technologies for higher energy efficiency and renewables. Also, the flexible mechanisms under the Kyoto Protocol support the development and implementation of energy efficiency and renewables in the host countries by capacity building, demonstration of the benefits and technology transfer.

A recent report from the Energy Charter Secretariat[79] stimulated a policy discussion in the PEEREA constituency in support for better coordinating policies for energy efficiency and renewable energy. The objective was to provide guidance to policy makers in finding the most appropriate balance between policies and to take advantage of the synergies between policies promoting energy efficiency and renewables.

There are different approaches among participating countries to integrate energy efficiency and renewable energy policies and programmes. Some countries have created strong linkages by developing and implementing energy efficiency and renewable energy programmes in single agencies or ministries. Often individual programmes are directed at both energy efficiency and renewable energy where possible. In some countries, the links are weak or totally absent.

However, there is evidence that the combination of energy efficiency and renewables can lead to higher economic, social, and environmental efficiency:

- The overall environmental performance of energy supply and use is improved;
- The investment support provided to renewable energy by public funds or by increased consumer commitments calls for efficiency of energy consumption;
- The competition between energy efficiency and renewable energy projects within a defined policy framework is a driver for increased effectiveness;

79 Energy Charter, Integration of Energy Efficiency and Renewable Energy Policies, Brussels, 2005, available at www.encharter.org.

- Examples of approaches to integrated implementation include combined energy efficiency and renewable energy national programmes and one and the same implementing agency for energy efficiency and renewables.

Many PEEREA countries have created links between energy efficiency and renewable energy policies. Some are doing it as part of an overall energy strategy, combining all elements of energy policy. Others link energy efficiency and renewables as part of their climate change strategies, as shown in a previous section. Still others are making this linkage through sustainable energy strategies. A few examples are:

- The National Strategy for Development of Energy and Energy Efficiency until 2010 in Bulgaria includes the optimal use of local energy resources as well as energy efficiency;
- The Czech Republic's 2001 Energy Management Act established a National Programme for Energy Efficiency and the Use of Renewable Energy Resources;
- The Fourth National Environmental Policy Plan (2001) of the Netherlands includes both energy efficiency and renewables as main elements in the strategy to achieve climate change targets;
- Preparation by the Slovak Ministry of Economy and the World Bank of action plans for energy efficiency and for renewable energy (2002) for the Slovak Republic.

In summary, many participating countries have made the link between both energy efficiency and renewables beyond the policy stage. A few examples of the linkage include:

- At the implementation stage, many national energy agencies implement both energy efficiency and renewables. The European Commission's Intelligent Energy Executive Agency clearly makes this link;
- Microgeneration at the building level is a perfect example of integrating energy efficiency and renewable energy technologies. This can lead to low-energy or even zero-energy buildings through a combination of energy efficiency measures (insulation, better appliances and lighting) and self-generated electricity (solar, wind, etc.);
- Cogeneration using renewables; and
- Vehicles using biofuels.

EU consults on renewable heating and cooling

It was announced in August 2006 that the European Commission launched a public consultation on renewable heating and cooling ahead of legislative proposals due from the EU executive by the end of the year.

The consultation seeks to analyse obstacles and opportunities. It probes the feasibility of targets, harmonised indicators, and the use of local markets or EU standards to drive progress. The potential value of residual heat is examined. Stakeholders had until 6 October to provide comments.

Source: www.eceee.org

The Energy Charter's report, released in 2005, gave general conclusions about integrating energy efficiency and renewable energy, including:

- Energy efficiency and renewables need to be seen in an integrated, sustainable energy approach. But for this to happen there is a need for an adjustment in the policy framework.
- Integrating energy efficiency and renewable energy into energy strategies have important contributions to make to energy security, diversification and other energy goals.
- There is no hard and fast rule as to the right balance in setting priorities and funding for energy efficiency and renewable energy policies and programmes. The balance in any country depends on national circumstances and can only be derived through thorough analysis.
- Implementation of energy efficiency and renewable energy strategies can easily be managed within single agencies.

Norway earmarks billions for greener energy

Norway announced in June 2006 that it is to invest NKr20 billion (E2.6 billion) in renewable energy and energy efficiency, the government has announced. At the same time, a national target for increased environment-friendly energy production and saving is to rise from 12 TWh per year by 2010 to 30 TWh by 2016.

Describing the move as "historic", energy minister Odd Roger Enoksen said in a statement on Sunday that focusing on bioenergy, wind and water power would create "new opportunities, new jobs and new optimism through the country".

The money is to be invested in a new fund in two equal tranches, at the new year and again in January 2009. Annual income, reckoned at NKr800 million when fully invested, will be administered by the energy agency Enova, which already manages an energy fund generating NKr700 million per year.

Enova will be expected to build up the infrastructure for district heating, promote the domestic use of renewable energy and set up a deposit and return system for scrapped oil-fired boilers. The agency will also be responsible for a feed-in renewable electricity support system to be introduced in the 2007 national budget.

Source: www.eceee.org

Most programmes/instruments that both address renewable energy and energy efficiency focus on the benefits at the institutional, organisational and programme/project level. Few instruments focus explicitly on the efficient use of renewable energy. An exception is the stimulation of biomass in CHP plants, which is clearly efficient use of

renewable energy. Efficiency criteria for, e.g., solar heat do not exist yet.

Sustainable energy policies and programmes, based on an integrated approach, are being introduced throughout much of the region. Some examples include:

- Building regulation in Italy (Milan Province), prescribing mandatory measures for new and retrofitted buildings, including a variety of energy efficiency measures and solar thermal systems;
- Energy investment deduction scheme in the Netherlands, providing an offset of the investment cost against taxable profit, provided that the equipment is included in a special Energy List of both energy efficiency and renewables energy measures;
- Mandatory Rational Energy Use public service obligations imposed on electricity distribution grid operators since 2003 in Flanders, Belgium, requiring mandatory information provision to customers, audits/energy management, rebates, and financial help to municipalities;
- Soft programme in Germany for implementing energy saving measures and renewable energy technologies in buildings, combined with awareness and motivation measures.

There are many benefits and there is a synergy effect in their integration that can support both energy security and climate change policies. Countries that have not linked these two policy areas should give this careful consideration.

CHAPTER 7

INTERNATIONAL COOPERATION

INTRODUCTION

International cooperation to promote energy efficiency can take many forms, from sharing of knowledge to making joint commitments to helping to finance projects in other countries or regions. International cooperation can be bilateral or it can be multilateral, although this Chapter will largely focus on multilateral and primarily on cooperation involving governments and not on business or non-government organisations.

Many participating countries have a wealth of experience in developing and implementing energy efficiency strategies. Every country with a 'mature' energy efficiency strategy has gone through the process of revising, eliminating or designing new programmes depending on national circumstances and analysis of the effectiveness of existing measures. This has been taking place since the 1970s when countries took energy efficiency seriously as a government-supported policy field after the first oil crisis.

MAJOR INTERNATIONAL ORGANISATIONS AND THEIR INITIATIVES

ENERGY CHARTER – PEEREA

Since its creation in 1998, the Energy Charter's PEEREA Working Group has actively promoted implementation of the Charter's Protocol on Energy Efficiency and Related Environmental Aspects through an exchange of experiences amongst its participating countries. The main outputs are standard and in-depth reviews of energy efficiency policies, along with specific studies. The in-depth reviews are peer reviews with the reviewing teams made up of representatives from selected participating countries. Recommendations are endorsed by all participating countries at the Working Group of PEEREA and then at the Energy Charter Conference, the decision-making body of the Energy Charter. The reports are then published and made available on the Energy Charter's website (www.encharter.org).

In-depth reviews in the past four years include: Denmark, the Czech Republic, Croatia, Georgia, Latvia, Sweden and the Former Yugoslav Republic of Macedonia.

The Working Group, which meets twice a year, has an ambitious work programme to deal with many of the pressing issues related to promoting energy efficiency. In particular, over the past three years, the Working Group addressed a number of these issues through the following studies, all of which have been made publicly available:

- Third Party Financing – achieving its potential (2003);
- Cogeneration and District Heating – role of municipalities (2006);
- Integrating energy efficiency and renewable policies (2006).

The Working Group has also undertaken work on other issues such as the evaluation of energy efficiency policies and the importance of energy efficiency in the residential and transport sectors. The Working Group has also an important networking function, inviting representatives of NGOs, industry groups/associations, international organisations and IFIs to discuss energy efficiency issues with the WG.

EUROPEAN UNION EXTERNAL POLICIES AND PROGRAMMES

The European Commission's 2006 Action Plan on Energy Efficiency includes proposed measures to be taken within the EU, and also emphasises the need for energy efficiency issues to be addressed on a global level through international partnerships.

"Notwithstanding that energy efficiency starts at home, it is also very much an international issue. The EU should use its bilateral and international trade and development policy, agreements, treaties and instruments (including dialogues) to promote the development and use of energy-efficient technologies and techniques."

European Commission 2006 Action Plan on Energy Efficiency

One proposal included in the Action Plan is for a new multilateral partnership for energy efficiency and the development of an international framework agreement. The proposed agreement could focus on promoting energy efficiency worldwide and could include various areas of cooperation such as regulatory cooperation; information exchange on energy saving strategies; methods of measurement; and research cooperation on energy efficient technologies. The intention is that such a framework agreement should cover all end-use sectors, including transport, as well as energy transformation, where the global potential is particularly large.

International cooperation on energy efficiency is also an important component of EU assistance programmes, such as Tacis, Phare and (from 2007) the new European Neighbourhood and Partnership Initiative. An important aspect of the European Neighbourhood Policy, and the strategic partnership with Russia, is to extend new forms of technical assistance to these partners; Legislative approximation, regulatory convergence and institution-building will be supported through mechanisms which proved successful in transition countries that are now EU Member States, i.e., targeted expert assistance (Technical Assistance and Information Exchange – TAIEX), long-term twinning arrangements with EU Member States' administrations – national, regional or local – and participation in relevant Community programmes and agencies.

Russia and the EU agree to join efforts to promote energy efficiency

At the second meeting of the Permanent Partnership Council (PPC) on Energy in Moscow on 8 December 2006, the EU and Russia agreed to work together to enhance energy efficiency, recognising the huge mutual challenge and potential for energy savings that they quantify annually at around 400 million tonnes of oil equivalent each by the year 2020.

The main aim of the PPC is to ensure continued political impetus to EU – Russia energy cooperation in the framework of the successful Energy Dialogue. Energy cooperation is a crucial component of the relationship between Russia and the EU, and the PPC discussed ways of reinforcing this relationship and enhancing its mutual benefits. Russia is a major long time energy supplier to the European Union and the EU continues to be the most important market for Russian energy exports. Thus, there is a natural and growing partnership between the EU and Russia and both have shared interests in ensuring a safe, reliable and sustainable flow of energy.

The PPC recognised that energy security is an important challenge, both for suppliers and consumers, and that secure, diverse and sustainable energy supplies are a fundamental necessity for economic and social prosperity. The EU and Russia are key international players and enhancing mutual confidence and cooperation through an open and constructive discussion and exchange of information will help to address many of the real concerns and issues which exist.

The PPC reviewed the reports and approved their recommendations for further work. These recommendations include closer work to compare energy strategies, forecasts and scenarios, moving ahead with implementing the detailed list of actions under the Joint Initiative on Energy Efficiency, further exchange of information and discussions on the practical workings of competitive energy markets and how the various instruments available can help to underpin energy security.

Given the scope of the recommendations approved, it was agreed that the number of groups would be reduced to three, with one focusing on energy efficiency, another on market developments and a third on energy strategies, forecasts and scenarios. The PPC also discussed the next steps in the Joint Initiative in the field of energy efficiency and energy saving, taking note of the successful seminar on ESCO's (Energy Service Companies) and gas flaring that was held on 26 October 2006 in Moscow. It was agreed that the Action Plan presented by the Thematic Group on Energy Efficiency formed a good basis, in particular the comparison of the legislative and regulatory frameworks in the area of energy efficiency and energy savings in order to exchange experiences and identify areas for improvement. The importance of reducing gas flaring was also discussed.

Bilateral cooperation in the context of other international organisations, mechanisms and agreements, such as the Energy Charter Treaty, the Kyoto Treaty, and the G8 was also discussed. The PPC acknowledged Russia's work on energy security during its G8 presidency and welcomed in particular the G8 conclusions on Global Energy Security that were adopted at the Summit in St.-Petersburg in July, which established a clear set of energy security principles. The PPC underlined the importance of a determined follow-up of these commitments.

The Permanent Partnership Council (PPC) is a standard forum for discussing EU-Russia affairs. It consists of Ministers from Russia, the EU Presidency, the incoming EU Presidency, and a European Commissioner. This format allows full discussion of issues on which the EU and Member States share competency. It is also a small forum, facilitating decision-making, and can be called by the EU, or Russia.

Source: http://europa.eu/rapid

INTERNATIONAL ENERGY AGENCY

The IEA has been a major international promoter of improved energy efficiency since its creation in the 1970s. Of its 27 member countries, three transition economies (the Czech Republic, Hungary and the Slovak Republic) are within the IEA. The Slovak Republic is expected to join in 2007.

Under its treaty, the objectives of the IEA are:[80]

- To maintain and improve systems for coping with oil supply disruptions;
- To promote rational energy policies in a global context through cooperative relations with non-member countries, industry and international organisations;
- To operate a permanent information system on the international oil market;
- To improve the world's energy supply and demand structure by developing alternative energy sources and increasing the efficiency of energy use; and
- To assist in the integration of environmental and energy policies.

The IEA has one unit dealing specifically with energy efficiency and another dealing with non-member countries. Energy efficiency has a high priority and the IEA, in recent years, has produced a number of important studies, relevant to both its members and to non-members. These include studies that have been referred to throughout this report, on energy technology scenarios, energy-efficient lighting, appliances, district heating and so on. A recent book on *Optimising Russian Natural Gas, Reform and Climate Policy*, makes the link between natural gas policy and energy efficiency.[81] It states that one fifth of Russian exports to European OECD countries could be saved every year by enhanced technology or energy efficiency.

The IEA also has implementing agreements in various technology areas, including several related to energy efficiency, including demand side management, buildings and so on. There is currently a Proposal for new Implementing Agreement on the Deployment of Efficient Electrical End-use Equipment and Appliances. Non-members are allowed to participate in these agreements.

The IEA has published some important studies on energy efficiency in recent years that have helped member countries, as well as non-members, in developing their energy efficiency policies. These include: *Light's Labour's Lost: Policies for Energy-efficient Lighting* (2006), *Energy Technology Perspectives, Scenarios and Strategies to 2050*, also published in 2006.

The IEA maintains an on-line database of energy efficiency policies and programmes of member countries and selected non-IEA countries.[82]

The G8's Gleneagles Plan of Action in 2005 mandated the IEA to identify pathways for G8 policy makers to realise the goal of ensuring a "clean, clever and competitive energy future". Most of the results will be presented at the G8 summit in Japan in 2008. Key priorities for the IEA were identified:

80 See www.iea.org.

81 IEA, Optimising Russian Natural Gas, Reform and Climate Policy, OECD, Paris, 2006.

82 See www.iea.org/textbase/effi/index.asp.

- Alternative energy scenarios and strategies.
- Increased energy efficiency, especially in buildings, appliances, transport, industry.
- Cleaner use of fossil fuels.
- Carbon capture and storage.
- Renewable energy.
- Enhanced international cooperation.

UNITED NATIONS ECONOMIC COMMISSION FOR EUROPE – ENERGY 21[83]

The Energy Efficiency 21 project is a region-wide project to enhance trade and cooperation in energy efficient, environmentally-sound techniques and management practices in order to help close the energy efficiency gap between actual practice and best technologies, and between ECE countries, in particular market developed countries and economies in transition. It is the successor of the Energy Efficiency 2000 Project that was launched in 1991.

The Project supports the efforts of Central and Eastern Europe and CIS countries to enhance their energy efficiency and security to ease the energy supply constraints of economic transition. EE 21 assists these countries in meeting international environmental treaty obligations under the UNFCCC and the United Nations Economic Commission for Europe (UNECE).

Since 2000, investment projects to reduce carbon emissions have been developed under EE21 with local counterparts in Belarus, Bulgaria, Kazakhstan, Russian Federation, and Ukraine. While approximately US$60 million of proposals have been prepared, investment projects of US$14.9 million have been financed to date. These account for an estimated 136,000 tonnes of carbon dioxide avoided per year.

The objectives of the current three-year programme (2006-2009) are to:

- Enhance regional cooperation on energy efficiency market formation and investment project development to reduce greenhouse gas emissions in economies in transition;
- Accelerate regional networking between national participating institutions and international partners by enhanced Internet communications for value added information transfers on financing energy efficiency projects and training;
- Promote municipal level projects to enable local and concrete energy efficiency development, also strengthening reforms, skills and capacities needed for investment projects that meet international environmental treaty obligations under the UNFCCC and the UNECE; and
- Develop and harmonise regional policies and standards to introduce the economic, institutional and regulatory reforms needed to support energy efficiency investments to reduce GHG emissions.

83 See www.ee-21.net.

Extra-budgetary resources for this project are contributed by a variety of sources, notably governments, development agencies and UN organisations, such as the GEF. Over the last ten years, cash contributions to the Trust Fund have averaged about US $200,000 per year. In addition, significant financial and "in-kind" contributions are directly provided to support the activities of the project. For example, the European Commission provided about €400,000 to support a joint project on energy efficiency labelling and standards in a number of transition countries under the auspices of the EE 2000 Project and the EU SAVE programme (part of the Intelligent Energy – Europe programme). This study has been issued as an e-book publication by the United Nations, with a CD-ROM containing 500 pages of text and graphical illustrations.

The EE 21 project is guided and monitored by a Steering Committee composed of delegates from national participating ministries and institutions, international organisations and donor agencies. The Steering Committee determines the activities, results, work methods, participation, procedures, budget, calendar of events and timetable of the project, and secures cooperation from other interested parties. In addition, the Steering Committee provides general guidance and oversight to the other operational activities of the Sustainable Energy Section of the Industrial Restructuring, Energy and Enterprise Development Division (IREED) in the field of energy efficiency.

A new project proposal on "Financing Energy Efficiency Investments for Climate Change Mitigation" will provide for the establishment of a public-private partnership dedicated fund to finance energy efficiency investments in UNECE transition economies. This new phase of the EE21 Project is mainly supported by United Nations Foundation (UNF), the Global Environmental Facility (GEF), the Fonds Français pour l'Environnement Mondial (FFEM) and the European Business Congress (EBC) with an approved amount of US $7.750 million for technical assistance activities.

The Fund ranging between US $100 and US $250 million will be established as a dedicated source of equity and quasi-equity finance with the participation of public and private sector investors. It will invest exclusively in energy efficiency and renewable energy projects that have a quantifiable impact on the reduction of greenhouse gas emissions and that are located in the twelve participating countries: Albania, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Kazakhstan, Republic of Moldova, Romania, Russian Federation, Serbia, the Former Yugoslav Republic of Macedonia, and Ukraine.

UNITED NATIONS DEVELOPMENT PROGRAMME (UNDP)

The UNDP regional centre unit based in Bratislava for the European countries is active in promoting energy efficiency. As shown above, there are many GEF projects in the region, but there are also specific efforts to develop some knowledge material. For example, last year the unit published "How-to Guide on Local Financing for Energy Efficiency".[84]

The UNDP has a strong focus on capacity building as shown in the example below. Capacity building is also available from CDM and JI.

84 The guide is available at http://europeandcis.undp.org/index.cfm?wspc=EnvG_Home_EGP.

Project Title: Capacity Building to Reduce Key Barriers to Energy Efficiency in Russian Residential Buildings and Heating Systems

Project Development and Immediate Objectives:

The development objective of the project is to provide sustainable and replicable models to overcome barriers to the implementation and realisation of energy efficiency improvements and energy conservation in residential buildings and heating systems in Russia. In particular, the project will develop a prototype system for consumption-based metering and billing that will create new incentives for investments in energy efficiency. It will study and demonstrate the technical, economic, institutional and geographical feasibility of developing autonomous (building-level) heat supplies. The project will also develop the skills to conduct the economic and financial analysis required by private and public investors interested in energy efficiency.

Main Results:

1. Conceptual and legal framework for consumption-based metering and billing service developed.
2. Autonomous boilers installed at three apartment buildings.
3. Ownership and maintenance model for the autonomous heat supply sources established: local normative acts aimed at establishing new models of operation and maintenance for municipal property prepared; Prerequisites created for development of competitive market in the field of autonomous heating.
4. Project results allowed development of recommendations for the Russian Government on how to reform municipal heat supply.

Lessons Learned:

1. The functions of the residential heat billing service should be expanded to carry out the monitoring of the municipal heat supply system and serve as an important management tool for local authorities.
2. Decision on the appropriate balance between autonomous and central heating should be based upon thorough consideration of economic, technical and technological issues for each concrete location.
3. Preparation of complex technical specifications, organisation of international tenders and interaction with foreign sub-contractor concerning implementation of complex construction projects should be planned very carefully and involve not only technical specialists, but also lawyers, economists and financial specialists.

Expected Situation at the End of the Project:

Energy efficiency and conservation measures should be implemented and the district heating distribution system rehabilitated. It is expected that the autonomous heating sources effectively supplement district heating where economically feasible. The municipal consumption-based billing and metering service will provide timely and accurate information on the heat supply and consumption, as well as contribute to sustainability of energy efficiency measures.

UNDP/GEF Project in Poland: Polish Energy Efficient Motors Programme

Started: November 2003, Amount of GEF Financing: $4,304,300.00

The purpose of the full-scale project to be developed is to remove barriers to the improvement of energy efficiency of the electric motors and their operating systems. The electric motors account for some 30-40% of the total electricity consumption in Poland. In terms of capacity, the estimated energy savings would correspond to roughly 1000 MW of saved production capacity. The resulting reduction of Poland's GHG emissions was estimated to be about 6.6 million tonnes of CO_2 annually. Despite the apparent economic and environmental benefits of introducing new energy efficient motors and their operating systems in the Polish industry and municipalities, there are a number of barriers that still prohibit the realisation of this potential. A detailed analysis of these barriers and the measures to overcome them will be undertaken.

Source: http://cfapp2.undp.org/gef/site/blank.cfm?module=projects&page=webProject&GEFProjectCode=1645

UNITED NATIONS ENVIRONMENT PROGRAMME (UNEP)

UNEP has been active in supporting energy efficiency, in large part through its promotion of sustainable development and making energy efficiency a major component. UNEP has a vigorous energy programme to address the environmental consequences of both energy production and use. This would include global climate change and local air pollution. Within UNEP is the Energy Branch of the Division of Technology, Industry, and Economics.

The Energy Branch addresses the environmental consequences of energy production and use, such as global climate change and local air pollution. The Branch aims to promote policies that place energy and transport within a broader sustainable development context, and to steer project developers and the investment community towards greater engagement in the renewable energy and energy efficiency sectors.

With its two Collaborating Centres, the UNEP Risø Centre on Energy, Climate and Sustainable Development (URC) and BASE (Basel Agency for Sustainable Energy), the Energy Branch is working with a wide range of stakeholders to diversify and increase the global share of renewable energy sources, improve access to environmentally sound energy resources and services, remove market distortions, provide access to energy markets, and accelerate the development and dissemination of better energy efficiency methods and technology.

In April 2007, UNEP published a new report on buildings stating that the sector could deliver emission reductions of 1.8 billion tonnes of CO_2 worldwide.[85] "Passive" measures

85 UNEP, Buildings and Climate Change: Status, Challenges and Opportunities, 2007.

such as better insulation and encouraging behavioural changes by building users could create massive savings, it said. The report states that these should be made eligible for technology-transfer support under the Kyoto Protocol's flexible mechanisms. "Active" energy saving measures such as installing solar panels are already eligible.

REGIONAL COOPERATION

Nordic Council

Official Nordic cooperation is channelled through two organisations: the Nordic Council and the Nordic Council of Ministers.[86] The Nordic Council was formed in 1952 and is the forum for Nordic parliamentary cooperation. The Council has 87 elected members, representing the five countries and three autonomous territories. Members of the Council are members of the national parliaments, who are nominated by their respective political party. There is thus no procedure for direct election to the Nordic Council.

Nordic parliamentary cooperation aims at promoting the development of political, economic, environmental, social, and other spheres in the Nordic countries and northern Europe. The Nordic Energy Cooperation is a strong and active player in the development of energy policy in the Nordic region and the EU. *The Action Plan for Nordic Energy Cooperation 2006-2009* is therefore targeted at creating a visible and

sustainable contribution to solving the most important and politically most relevant energy policy challenges faced by the Nordic region. The Action Plan includes several activities related to energy efficiency including knowledge sharing, evaluation of market-oriented instruments, a framework for improving price signals, technological development and providing joint-Nordic inputs and positions in the EU and other international fora.

BASREC – Baltic Sea Region Energy Cooperation

Energy Ministers of the Baltic Sea Region Countries and the European Commission decided in their conference in Helsinki in October 1999 that the energy cooperation in the region should be more formally organised.

The countries and institutions participating in BASREC are the governments of Denmark, Estonia, Finland, Germany, Iceland, Latvia, Lithuania, Norway, Poland, Russia and Sweden. The European Commission is represented by the Directorate General for Transport and Energy.

BASREC cooperation provides a forum to build up a regional view of the energy policy strategies. The networks and the BASREC´s organisational structure give administrations and business actors in the energy sector the ability to analyse the possibilities to develop the market framework and rules in order to effectuate the energy supply and to reduce environmentally impacts of energy production, use and transmission.

86 See www.norden.org.

BASREC has conducted several studies, analysed the status and possibilities of development in energy policy strategies in the region, published handbooks and studies, and organised seminars and workshops.

Recently a BASREC conference on energy efficiency and renewable energy was arranged on November 6-7, 2006 in Stockholm. In March 2007, a BASREC Conference on Energy related Climate and Financing issues was held in St.-Petersburg.

The Nordic Council of Ministers also launched a programme for a limited number (10 programme and 3 task grantees) of participants to achieve individual competence and capacity building in the field of energy.[87]

The programme has started with 10 programmes (one being energy efficiency) and 3 task experts and will be carried out mainly in the period January-June 2007 (task experts started already in November 2006). The first phase is to prepare study and training plans.

Black Sea Regional Energy Centre[88]

The Black Sea Regional Energy Centre (BSREC) was established following the Chalkidiki Ministerial Meeting in May 1994 at the joint initiative of the European Commission under the former SYNERGY programme and eleven countries of the BS region. Currently, the BSREC has 13 member-countries, i.e., Albania, Armenia, Azerbaijan, Bulgaria, Georgia, Greece, Moldova, Romania, Russian Federation, Turkey, Ukraine and the newly joined the Former Yugoslav Republic of Macedonia and Serbia & Montenegro[89]. The BSREC was officially registered in 1995 in Sofia, Bulgaria and it acts according to the Bulgarian legislation. The BSREC activities are aimed at the implementation of the EU *aquis* and harmonisation of the energy policy of the Black Sea region countries with the EU.

The main objectives of the BSREC are as follows:

- Facilitation of implementation of long/medium term integrated strategy of security of supply and sustainable development;
- Promotion of market reform, with reference to EU Directives on electricity and gas, the Energy Charter and the world-wide accepted restructuring process;
- Encouragement of investment and funding opportunities in the energy sector of the BS region;
- Provision of coordination services for international and bilaterally funded projects addressing the individual countries and the region; and
- Easing the access of foreign and international institutions and companies to the Black Sea region countries' energy sectors.

87 See http://domino.basrec.net.

88 See www.bsrec.bg.

89 At the time of writing, Serbia and Montenegro had not yet revised the status of their membership in BSREC as independent states.

ROLE OF INTERNATIONAL NON-GOVERNMENT BODIES

The role of non-governmental bodies to promote energy efficiency and, in many cases, help with the delivery of programmes has been significant in creating awareness, providing "alternative" analysis and lobbying governments to raise the priority for energy efficiency, often in the context of environmental action.

ENERGY EFFICIENCY PROMOTERS – GENERAL

eceee[90]

The European Council for an Energy Efficient Economy, eceee, is a non-profit, independent organisation that offers governments, industry, research institutes and citizen organisations a unique resource of evidence-based knowledge and reliable information. eceee promotes the understanding and application of energy efficiency in society and assists its target groups – from policy makers to programme designers to practitioners – with making energy efficiency happen. eceee participates actively in the European policy making process, The organisation participates in a number of EU policy making and advisory fora, and frequently comments on European energy policy through position papers and responses to public consultations.

The strength of eceee as an organisation is partly due to the success of the bi-annual Summer Study. Since 1993, the Summer Study has been a meeting place for researchers, public policy makers, representatives of the energy utility industry, non-profit organisations and commercial organisations interested in promoting energy efficiency.

The heart of the summer study is the presentation and discussion of refereed papers in panel sessions. Keynote speakers address plenary sessions. In 2007, there were over 230 refereed papers accepted in nine thematic panels.

Energy Efficiency Watch[91]

In January 2006, several Members of the European Parliament as well as of several EU member states published their Call for an "Energy Efficiency Watch" (EEW). The aim of this call is to promote energy efficiency and good policy in the field of energy efficiency within Europe. Based on this call, an Energy-Efficiency-Watch-Initiative started its work over the year 2006.

The objectives of the EEW-Initiative are:

- Monitoring, Evaluating and Highlighting of best (and worst) policy practice or

90 See www.eceee.org.

91 See www.energy-efficiency-watch.org.

missing pieces of political and legislative measures, instruments and activities in the field of energy efficiency and energy savings within the framework of the "National Action Energy Efficiency Plans" as prescribed in the Directive on the promotion of End-use efficiency and Energy Services with the early involvement of Parliamentarians across Europe at all levels;

- Awareness raising of Parliamentarians and Civil Servants in the national administrations about the benefits, political and legislative measures, instruments and activities in the field of energy efficiency and energy savings;
- Experience and information exchange of/ Network building amongst Parliamentarians and Civil Servants about political and legislative measures, instruments and activities within the framework of the Energy Efficiency Action Plans (EEAPs) for a better regulation/implementation;
- Awareness raising of the civil society about the benefits, political and legislative measures, instruments and activities in the field of energy efficiency and energy savings;
- Establishing a common platform for the "Energy Efficiency Community" – "A Flag for Energy Efficiency" (industry, associations, NGOs, science and all other interested major players); and
- Establishing the 1st Energy Efficiency Watch Conference.

Besides the renewable energy association, EUFORES, additional managing partners are the Wuppertal Institute, the Upper Austria Energy Agency; ECOFYS; and eceee.

Partners of EEW include COGEN-Europe, the European Insulation Manufacturers Association, EuroACE, the European Lamp Companies Federation, the European Copper Institute, the European Association of Flat Glass Manufacturers and the World Wide Fund for Nature (WWF).

The Renewable Energy and Energy Efficiency Partnership (REEEP)[92]

The Renewable Energy and Energy Efficiency Partnership (REEEP) is an active, global public-private partnership that structures policy and regulatory initiatives for clean energy, and facilitates financing for energy projects. It was conceived at the 2002 World Summit on Sustainable Development at Johannesburg and formally started in 2004. It is based in Austria.

The partnership's goals are to:

- Reduce greenhouse gas emissions;
- Deliver social improvements to developing countries and countries in transition, by improving the access to reliable clean energy services, and by making REES more affordable; and
- Bring economic benefits to nations that use energy in a more efficient way and

92 See www.reeep.org.

increase the share of indigenous renewable resources within their energy mix.

Backed by more than 200 national governments, businesses, development banks and NGOs, REEEP contributes to international, national and regional policy dialogues. The partnership's aim is to accelerate the integration of renewables into the energy mix and to advocate energy efficiency as a path to improved energy security and reduced carbon emissions, ensuring socio-economic benefits.

REEEP has a network of eight regional secretariats and more than 3,500 members worldwide. The partnership has funded more than 50 projects in 44 countries that address market barriers to clean energy in the developing world and economies in transition. These projects deliver new business models, policy recommendations, risk mitigation instruments, handbooks and databases.

INDUSTRY GROUPS

Euroheat & Power[93]

Euroheat & Power unites the combined heat and power, district heating and cooling sector throughout Europe and beyond, with members in 32 countries: all existing national district heating associations in EU countries and the majority of new EU Member States; utilities operating DHC systems; industrial associations and companies; manufacturers; research institutes; consultants and other organisations involved in the CHP/DHC business.

Euroheat & Power works for energy supply in balance with ecology, promoting the advantages of CHP/DHC in general and the use of waste heat and renewable energies to preserve primary energies in particular, and pursues international measures to enhance innovation and the further development of the sector.

Euroheat & Power undertakes analyses and organises seminars and conferences.

EuroACE[94]

EuroACE, the European Alliance of Companies for Energy Efficiency in Buildings, was formed in 1998 by twenty of Europe's leading companies involved with the manufacture, distribution and installation of a variety of energy saving goods and services. EuroACE member companies together employ 438,000 people and have a turnover of €70 billion.

The mission of EuroACE is to work together with the European institutions to help Europe move towards a more sustainable pattern of energy use in buildings, and therefore to reduce emissions of carbon dioxide, one of the principal climate change gases.

93 See www.euroheat.org.

94 See www.euroace.org.

The main objectives for EuroACE in 2006-2007 are to:

1. Concentrate on the follow up of existing directives to strengthen member state implementation and focus on energy efficiency in buildings on national level.
2. Work for an extension of the EU's Energy Performance in Buildings Directive.
3. Support work on new energy efficiency action plans following on from the EU Green Paper on energy efficiency, including EU and national action plans.
4. Support initiatives on other upcoming directives relating to energy savings and energy security from buildings.
5. Support activities strengthening financial tools for retrofitting the existing building stock, such as use of structural funds, VAT incentives, regional funding etc.
6. Strengthen the network and relations with parliamentarians, Directorates General and other strategic partners at EU level.

EuroACE provides an information exchange, undertakes policy exchanges, as well as organising and sponsoring seminars and conferences.

***EURIMA*[95]**

EURIMA is the European Association of Insulation Manufacturers and represents the interests of all major mineral wool producers throughout Europe.

EURIMA members manufacture a wide range of mineral wool products for the thermal and acoustic insulation and fire protection of domestic and commercial buildings and industrial facilities.

EURIMA was established in 1959 to promote improved standards and regulations for the use of insulation materials. More recently, it has developed to reflect the growing environmental concerns of society.

***COGEN-Europe*[96]**

COGEN Europe is the European Trade Association for the Promotion of Cogeneration. Its principal goal is to work towards the wider use of cogeneration in Europe for a sustainable energy future. Its main sphere of interest is the European Union but it has members from all over the world. There are over 100 members.

COGEN Europe promotes the widespread development of cogeneration in Europe and worldwide. To achieve this goal, COGEN Europe works at the EU level and with member states to develop sustainable energy policies and remove unnecessary barriers to its implementation.

COGEN Europe represents the cogeneration industry at the EU level and works with policy makers to achieve the potential for cogeneration in Europe. It does this through

95 See www.eurima.org.

96 See www.cogen.org.

focussing on the liberalisation of Europe's energy markets, a common EU energy policy, and delivering the EU commitment to doubling cogeneration in 10 years.

COGEN Europe tracks the developments of EU legislation and informs the European legislators and business communities on the benefits of cogeneration through:

- Dissemination of information relating to cogeneration and market developments;
- Development of national promotional organisations for cogeneration;
- COGEN Europe's annual high-level policy conference in Brussels;
- R&D projects with a number of funding bodies and industry partners; and
- Publications such as country reports, policy studies, briefings etc.

European Renewable Energy Council (EREC)[97]

Created in 2000, the European Renewable Energy Council (EREC) is an umbrella organisation of the European renewable energy industry, trade and research associations active in the fields of photovoltaic, small hydropower, solar thermal, biomass, wind energy and geothermal energy, thus representing the entire renewable energy sector.

EREC is composed of the following non-profit associations and federations: AEBIOM (European Biomass Association), EGEC (European Geothermal Energy Council), EPIA (European Photovoltaic Industry Association), ESHA (European Small Hydropower Association), ESTIF (European Solar Thermal Industry Federation), EUBIA (European Biomass Industry Association), EUREC Agency (European Renewable Energy Research Centres Agency), and EWEA (European Wind Energy Association).

The objectives of the organisation are:

- To act as a forum for exchange of information and discussion on issues related to renewables as well as to represent the European RES industry & research community;
- To provide information and consultancy on renewable energies for the political decision makers on local, regional, national and international levels;
- To launch policy initiatives for the creation of positive frameworks for renewable energy sources; and
- To promote European technologies, products and services on global markets

  EREC works closely with the energy efficiency community, seeing the importance of the close coordination and integration of the two areas.

ENVIRONMENTALISTS

There are several environmental groups and networks within the region that promote energy efficiency, often together with renewable energy. Many also participate at the global level. Important region-wide associations are:

97 See www.erec-renewables.org.

INFORSE

INFORSE[98] is a worldwide network consisting of 140 NGOs working in about 60 countries to promote sustainable energy and social development. The Network was established in Rio de Janeiro in 1992 to secure follow-up in the political decisions at the United Nations Conference on Environment and Development.

INFORSE is actively engaged in international awareness raising. It follows and influences sustainable energy issues in international negotiations and is accredited to the UN Economic and Social Council.

The network evolves around members supported by "National Focal Points" in some countries and eight Regional Coordinators working in their respective regions. The regional group, INFORSE-Europe, has 70 members in 33 countries.

INFORSE is active in information sharing amongst its members. INFORSE also undertakes studies that promote sustainable energy development.

Climate Action Network Europe

The Climate Action Network (CAN) is a worldwide network of over 365 NGOs working to promote government and individual action to limit human-induced climate change to ecologically sustainable levels.

CAN members work to achieve this goal through the coordination of information exchange and NGO strategy on international, regional and national climate change issues. CAN has seven regional offices which coordinate these efforts in Africa, Central and Eastern Europe, Europe, Latin America, North America, South Asia, and Southeast Asia.

With over 100 members in 25 European countries, the regional arm of CAN, CAN-Europe,[99] works to prevent dangerous climate change and promote sustainable energy and environment policy in Europe.

European ECO Forum[100]

The Pan-European ECO Forum, with its secretariat in Slovenia, is a broad, inclusive coalition of sustainable development NGOs (environmental citizens organisations as well as NGOs with related scopes like human rights NGOs, health organisations, etc.) which are interested in participating in the official Pan-European processes (Environment for Europe ministers conferences as well as related processes like environment and health, environment and transport, environment and agriculture etc.) with the final goal of promoting sustainable development in Europe and globally. The goal of the coalition is to serve the NGO community and to facilitate the participation in these

98 See www.inforse.dk.

99 See www.climnet.org.

100 See www.eco-forum.org.

processes in order to be together stronger and more influential.

NGOs of the UNECE region are sharing the above mentioned goals can become members of the Pan-European ECO Forum.

INFORSE-Europe is coordinator of the European ECO-Forum's Energy & Climate Group.

Energie-Cités[101]

With over 150 members in 24 countries and representing more than 500 towns and cities, Energie-Cités is the association of European local authorities for the promotion of local sustainable energy policies.

Its main objectives are to:

- develop local initiatives through the exchange of experiences, the transfer of know how and the organisation of joint projects;
- allow cities to benefit from the organisation's expertise in local energy strategies;
- strengthen the local role and skills in the sphere of energy efficiency, in the promoting renewable and decentralised energy sources and in protection of the environment; and
- influence the policies and proposals made by EU institutions in the fields of energy, environmental protection and urban policy.

CEE Bankwatch[102]

The CEE Bankwatch Network is an international NGO with member organisations from 11 countries across central and eastern European. The aim of the network is to monitor the activities of the IFIs that operate in the region, and to propose constructive alternatives to their policies and projects in the region.

The CEE Bankwatch Network, formally set up in 1995, has become one of the strongest networks of environmental NGOs in central and eastern Europe. Members of the CEE Bankwatch Network are from Bulgaria, the Czech Republic, Estonia, Georgia, Hungary, Lithuania, Poland, Romania, the Slovak Republic, the FYROM and Ukraine. Bankwatch focuses mainly on energy, transport and EU enlargement, while working at the same time to promote public participation and access to information about the activities of the IFIs across our region. Members of the CEE Bankwatch Network attend the annual meetings of the IFIs and are engaged in an ongoing critical dialogue with their staff and Executive Directors at the national, regional and international levels.

101 See www.energie-cites.org.

102 See www.bankwatch.org.

PART 3

PART 3 – DELIVERING ENERGY EFFICIENCY CRITIQUE AND OVERALL ASSESSMENT

PART 3 documented the progress being made in delivering energy efficiency within the region. Progress is being made but the urgency for improved energy efficiency, as shown above, also shows that more needs to be done throughout the region.

CHAPTER 8

CRITIQUE

INTRODUCTION

Energy efficiency is gaining a stronger foothold throughout the region covered by this report. Alongside many international declarations and forms of commitment, including those from the Environment for Europe process, national governments are, more and more, appreciating the need for a comprehensive approach to energy efficiency with respect to both energy and climate change policies. However, despite this stronger commitment, many believe energy efficiency is still not fully integrated into energy policies. Furthermore, while the differences between the approaches taken by western countries and transition countries may be narrowing, there is still a large gulf.

The European Union is setting a global standard in much of what it is doing in energy efficiency, particularly as it relates to the links to combating climate change. And it is making a closer link to improved energy efficiency and energy security, as the latter gains in priority once again.

This report focuses on delivering energy efficiency. Participating countries, even transition countries, have had a considerable period to get their policies and their delivery institutions in place, since even before the convincing arguments for an accelerated energy efficiency approach was discussed and approved at the Aarhus Environment for Europe Conference in 1998 and then reinforced at the 2003 Kiev Conference. This Chapter assesses how successful participating countries have been in creating that delivery framework and making it 'deliver' results.

POLICY DEVELOPMENT

Policy development is multi-faceted, from setting priorities to designing and approving policies to setting targets and integrating energy efficiency policies into key areas that will be a win-win situation for both. All those elements are important in developing a comprehensive, sustainable energy efficiency policy that will lead to effective implementation.

PRIORITY FOR IMPROVED ENERGY EFFICIENCY

In recent years there have been important changes in policies to give greater *priority to energy efficiency*. The two major drivers today are energy security and global climate change for most of the participating countries. This is a recognition that improved energy efficiency can make an important contribution to both energy security and climate change. And, increasingly, improved energy efficiency is expected to make that contribution. However, it should not be lost that energy efficiency can help other policy areas, especially when it comes to improving competitiveness at the plant level as well as at the national or regional level.

At the international level, the support for energy efficiency has never been stronger. The EU, IEA, UN and the major IFIs are all strongly endorsing greater energy efficiency. Improved energy efficiency is expected to play a large role in countries achieving their Kyoto Protocol GHG emissions targets. Improved energy efficiency is seen as integral to sustainable development.

Among the countries covered by this report, those in the EU and other participating IEA countries have largely accepted that energy efficiency is a major component of overall energy policy, even if it does not always get the priority it deserves. The priority has been reinforced recently because of the renewed concern about energy security. And undoubtedly, global climate change has been a major factor, which itself is increasingly linked to energy security issues.

Some of the participating countries, particularly within the CIS, have not had the same energy security concerns because of abundant supplies of domestic oil and gas, in particular. Also, although many are Annex 1 countries under the UNFCCC and thus bound to meet the Kyoto Protocol GHG emissions targets, they are well under their target, following economic decline in the 1990s, and thus climate change is less of a priority. There are, however, other CIS countries that have poor domestic energy resources and where the priority for energy efficiency is increasing.

However, all transition countries, regardless of their resource base, there is a strong argument that improved energy efficiency has many other benefits from improving district heating systems, to modernising industry to make it more competitive, to reducing local pollutants.

ENERGY EFFICIENCY POLICIES

For many countries, the increased priority has meant a change to improvements in energy efficiency policy. Annex 1 documents those changes. The changes, however, are largely driven by the EU and the policy developments that it has pushed forward faster than most. This has been done through the various communications (Green Paper, Action Plan, White Paper on Energy Policy) as well as the major directives that have required member states to prepare action plans.

Not all EU member states are giving energy efficiency the same priority but there is a now a requirement for a certain core policy. Many member states are going well beyond this minimum. In addition, non-EU countries that may or may not have a lower priority for energy efficiency, are required to or are encouraged to implement a more rigorous legislative framework through their relationship with the EU. Thus many non-EU countries have been brought quite far through the EU obligations.

In some CIS countries, overall the developments have been less ambitious. While there is talk about energy efficiency, there is less rigour in the approach taken. Overall, the policy priority is lower and this is reflected in the results. For the early and intermediate transition economies, the EBRD[103] states: "Progress in improving energy efficiency has been slow. Low tariffs, the slow pace of industrial re-structuring and more limited access to debt finance undermine the incentives for energy efficiency and push it down the priority list of investment options. Policy support is generally positive but this is rarely backed up with resources and targeted financial support for energy efficiency is extremely limited".

The EBRD[104] makes similar points in relation to Russia, noting that "as a country endowed with vast natural resources which have traditionally been made available to all consumers at very low prices, Russia has historically had little awareness or inclination towards energy efficiency. With recent increases in domestic gas and electricity prices this situation is slowly changing but still has a long way to go. Government policy supports energy efficiency but provides very limited resources of either financial or institutional nature".

TARGET SETTING

Targets play an important role in motivating actors to take action and by setting benchmarks to judge performance of delivery. They can be set at any level, from a home or business to an entire country or region. They can be for energy savings, improvements in energy intensity or for reductions in GHG emissions.

In the past several participating countries had targets for energy efficiency, although sometimes they were for specific sectors or technologies. Also, Annex 1 countries to the UNFCCC had targets for GHG emissions reductions that often implied, explicitly or implicitly, a target for energy efficiency improvements.

103 EBRD, Energy Operations Policy, London, July 11, 2006, p. 71.

104 EBRD, Energy Operations Policy, London, July 11, 2006, p. 80.

Now all EU member states have quantitative targets for energy efficiency as a requirement under the Energy End-use Efficiency and Energy Services Directive. Under the Directive, member states are expected to achieve a minimum annual energy savings target of 9% by the ninth year in the period from 2008 to 2016. The energy savings targets are indicative, rather than mandatory, and therefore not legally binding. However, it is felt by many analysts that if the Directive is fully implemented, then the target should be reached.

Of non-EU transition countries, Belarus, Moldova, the Russian Federation and the Ukraine have quantified targets. For example, in Belarus, the target in the current period (2006-2010) is to reduce energy intensity by 15-20% compared to 2005.

POLICY INTEGRATION

It has long been argued that energy efficiency, to be truly effective, needs to be integrated into other economic and social spheres of policy, from industrial development to transport to environment and, essentially, all spheres of responsibility of government. Integration is complex. Many governments make pronouncements on highway or airport expansion and on land-use planning, for example, without giving the implications of energy efficiency full consideration.

A major focus has been on integration with environmental policy, particularly in relation to global climate change. Improved energy efficiency is seen as a major instrument in climate change strategies and all Annex 1 countries to the Kyoto Protocol confirm its importance. Almost all national or regional energy efficiency strategies also make the direct link with climate change policy.

There is evidence in other countries of good integration in other areas. In the Czech Republic, and others, there is integration of energy efficiency into modernisation of poor quality multi-family buildings. In the United Kingdom, the Energy Efficiency Partnership for Homes has working groups that link energy efficiency with the health sector, for example, because of the high level of health problems linked to poor quality housing.

Many countries have integrated renewable energy policies and measures with energy efficiency, often calling the combination a sustainable energy strategy. This is well established and the benefits have been proven.

DEMAND ANALYSIS AND END-USE INDICATORS

Good policy formulation requires strong analysis. While participating countries were not asked directly about the analysis they undertake, it can be seen from studies and country reviews undertaken by the Energy Charter that that this is a relatively weak area.

The IEA has promoted energy indicator analysis for many years and recently produced

a guide on how to do the indicators.[105] The EU, through its ODYSSEE Project, is working with member states to develop a comprehensive approach to analysis through energy indicators. ODYSSEE has a regular newsletter to help promote its work and results.[106]

Understanding the dynamics within end-use sectors is very important in developing, monitoring and evaluating energy efficiency policies and programmes. In some in-depth reviews undertaken by the Energy Charter, such good analysis was found to be lacking. Data collection and analysis can be costly but they are essential in order to obtain and sustain good results.

ENERGY PRICING

Developments in energy pricing are encouraging greater energy efficiency. Energy prices overall have become a major issue in the past years, primarily because of strong price increases for petroleum products. The world price of crude oil has increased sharply since 2000, and the same has been true for natural gas prices. Moreover, since 2005, all CIS countries are facing sharply higher prices for natural gas as Gazprom has introduced 'market-based' prices in all its export markets,[107] replacing the former system that combined 'friendship' pricing with barter arrangements for transit services.

The EBRD, in its 2006 transition report,[108] essentially stated that the transition process for energy pricing is over, giving a quite positive assessement of progress made by all transition economies in price liberalisation. A remaining issue is tariff setting, and the important link between tariffs and affordability that has concerned all transition countries at one time or another.

Tariffs and Affordability
From the EBRD's Energy Operation's Policy, 2006

A closer analysis of energy poverty in the Region yields the following insights:

- The main problem of energy poverty in the Region is the affordability of consumption. Unlike in other emerging markets, in the Bank's Countries of Operation's (COOs) access to the network and the affordability of connection is less of a problem, certainly in the case of electricity.
- Affordability problems are currently masked by the low effective electricity tariffs that still prevail in many transition countries – that is, the combination of low tariffs and low collection rates. In most COOs, power bills are generally affordable for average households. This would still be the case even if tariffs were raised to cost-recovery levels and payment enforced in full.

105 IEA, Energy Statistics Manual, OECD, Paris, 2005.
106 See http://www.odyssee-indicators.org/Newsletters.
107 Energy Charter, Putting a Price on Energy, International Pricing Mechanisms for Oil and Gas, Brussels, 2007.
108 EBRD, Transition Report 2006, London, 2006, pp.4-5.

- Affordability is, however, a concern for low-income households, as people on low incomes spend a disproportionate amount of their income on energy. For example, if tariffs rose to cost-recovery level and bills were paid in full, many low-income households in poorer transition countries would spend more than 10% of their income on electricity.

- There are well-established measures to mitigate such affordability problems – most notably lifeline tariffs (where a certain amount of power and/or heat, which has been estimated to meet the basic needs of a household in a particular country, is provided for free, or at a low cost) and targeted benefit programmes. However, the institutional capacity and political will to implement these schemes is often lacking.

Source: EBRD, Energy Operations Policy, London, July 2006, p. 6

Energy pricing includes taxation and several participating countries have some form of carbon tax, as has been noted in several Energy Charter studies. A significant recent development is the seventh 'priority action' in the EU's Action Plan on Energy Efficiency, which focuses on the coherent use of taxation to promote energy efficiency.

Priority Action 7
A coherent use of taxation

The Commission will prepare a Green Paper on indirect taxation (2007) and will subsequently review the Energy Tax Directive in 2008 to facilitate a more targeted and coherent use of energy taxation by integrating notably energy efficiency considerations and environmental aspects.

In addition, the Commission will consider in 2007 the costs and benefits of using tax credits as incentives for enterprises, on one hand, to promote the increased production of certified energy-efficient appliances and equipment and for consumers, on the other, to promote the purchase of such appliances and equipment.

Source: EU Action Plan on Energy Efficiency, October 2006

DELIVERING ENERGY EFFICIENCY: INSTITUTIONS, DELIVERY CAPABILITY AND RESOURCES

Good delivery requires a good delivery mechanism and the resources to undertake implementation. As shown in the Annexes, most participating countries have some form of implementing organisation. Often this organisation is closely affiliated with the ministry responsible for energy or for environment, either integrated within the ministry

or as a body owned by the ministry. Some implementing bodies report to more than one ministry.

There have been some improvements in the institutional capability to implement programmes, but in many transition countries in particular it is still a slow process. For example, in Georgia, three of the Energy Charter's recommendations on its energy efficiency policies and programmes related to the need for a better institutional framework, more strengthening of capacity to develop and implement programmes, better coordination between relevant ministries, and ensuring that organisations have the proper mandate and resources available.

Many ministries are involved in different aspects of energy efficiency and, thus, effective coordination can have a major effect on overall results. Ministries have different responsibilities and priorities, and it is seldom easy to get all parties concerned have the same level of commitment to energy efficiency as from the ministry with the lead responsibility. The linkage with global climate change has helped, but not completely overcome problems.

For many countries, the question about adequate resources is crucial and there is often a shortage both for the programmes themselves and for the organisations to deliver them. In the recent in-depth review of Sweden, the Energy Charter report, which was endorsed by the Charter's governing body, recommended that the "government should ensure that the growing policy requirements in the area of energy efficiency and renewables are matched with adequate capacity in the responsible implementing institutions."

There is a need for both capability and resources for enforcement of thermal efficiency standards. This is true in transition and non-transition countries. For example, in the United Kingdom, the Building Research Establishment undertook a study that showed that almost half of new houses failed to meet the energy standards required by law. This was in part due to the lack of resources at the local level to do the enforcement, and in part due to inadequate training of the building inspectors.

Mandates can also change. In recent years, the Danish Energy Authority had its role in energy-related environmental issues given to the Environmental Protection Agency of the Ministry of Environment but it still maintains its role in promoting energy efficiency.

Within the EU, the EnR network of national energy agencies places a crucial role in planning, managing or reviewing of national research, development, demonstration or dissemination programmes in the fields of energy efficiency and renewable energy. At a policy level, many of the national energy agencies, as core members, use the eceee as a vehicle for discussion and promoting energy efficiency.

There is a growing use of local agencies to deliver programmes. Many local authorities have their own advisory/delivery agencies. This is often done with the support of the national agency. For example, in Sweden, the national energy agency, STEM, supports local energy advisers and the regional energy agencies with information and financial assistance, and also contributes to their networking. For many years, the European Commission has provided initial funding for the creation of local energy offices.

There are many non-governmental bodies that play a vital role in promoting energy

efficiency, sometimes even in delivering programmes. Whether they are representing the various energy efficiency industries (insulation, control systems, lighting, district heating, cogeneration, etc.) or advocating certain positions to promote energy efficiency at the EU level or in IFIs, their voice has grown and they have been instrumental in improving the awareness of the importance of energy efficiency and the decisions made at the national, regional or the international levels.

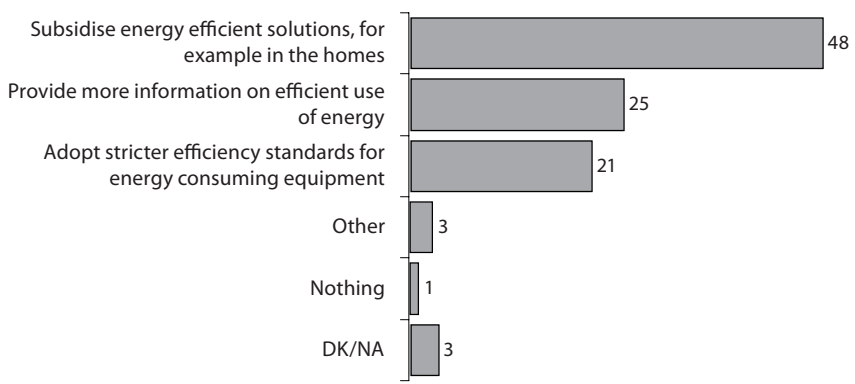
It is well understood that energy efficiency cannot be delivered by these organisations alone. A key challenge is to mobilise a range of market actors is key, including end-users themselves. There is growing interest in public-private partnerships that can support a range of activities from creating awareness, helping in technology development and even mobilising financing for energy efficiency projects.

DELIVERING ENERGY EFFICIENCY: USE OF POLICY INSTRUMENTS AND SPECIFIC SECTORAL ISSUES

The full range of policy measures is being used to improve energy efficiency, although not in all countries. The measures range from information/advice to financial instruments to regulatory measures (both mandatory and voluntary). What has shown to be most effective over the years is a judicious combination of measures, such as mandatory measures combined with information or with financial incentives. Measures implemented on their own have proven less effective.

A 2007 Eurobarometer survey of EU member states asked what governments can do to help people reduce energy consumption.109 The following Figure shows the overwhelming case for increased subsidies.

Figure 8.1: What Governments Should Do to Encourage People to Reduce Energy Consumption (%)



Source: Flash Eurobarometer, Attitudes on issues related to EU energy policy, March 2007

109 See http://europa.eu/rapid/, March 5, 2007.

There are many reasons why countries choose a certain array of measures. Starting with EU countries (and those following the EU approach), there is a major emphasis on mandatory measures that are EU-wide ranging from appliance labelling to minimum energy performance standards for a range of products (including buildings) and limits to carbon emissions for vehicles. These measures have also been implemented by countries joining the EU. CIS countries have some equivalent mandatory requirements but they are generally not as comprehensive, and many are old and need updating. In any event, as shown above in the previous section with the example of the United Kingdom, mandatory measures still require effective enforcement.

All participating countries have a range of information programmes, from general awareness to specialised advice to energy audits to labelling. OECD / EU countries tend to spend more on information and take a more comprehensive approach. CIS countries still tend to lag behind. Energy labelling on appliances, vehicles and buildings is one of the key measures used by most participating countries. There are moves to expand the range of products covered by labelling and this is important, given that many of the products are distributed globally. This globalisation of energy-consuming products is also having an impact on the use of minimum performance standards.

Following Eurobarometer's findings, financing energy efficiency remains one of the key issues that has not yet been fully solved. Subsidising the purchase of energy-efficient equipment or products can be very expensive when done on a national scale. There are innovative approaches to financing, including through the Kyoto Protocol and its flexible mechanisms. So far, CDM and JI have not had as many energy efficiency projects as originally expected and is a concern that is being dealt with, both within the development of the flexible mechanisms themselves and with the use of other bilateral and multilateral instruments. The EU's Emissions Trading System can also help as it expands its coverage.

Organisations such as the UNDP/GEF have helped establish energy efficiency funds in countries such as Romania and other IFIs, such as the EBRD, have developed carbon funds that will hopefully finance energy efficiency projects. Public-private partnerships, such as the World Bank-led Protocol Carbon Fund (PCF), have also shown great promise.

Concerning the sectors, the primary emphasis has been on buildings and appliances, which have been a priority both inside and outside the EU. The potential for energy savings is high in this sector, with many of the technologies needing to be deployed already in existence and cost-competitive.

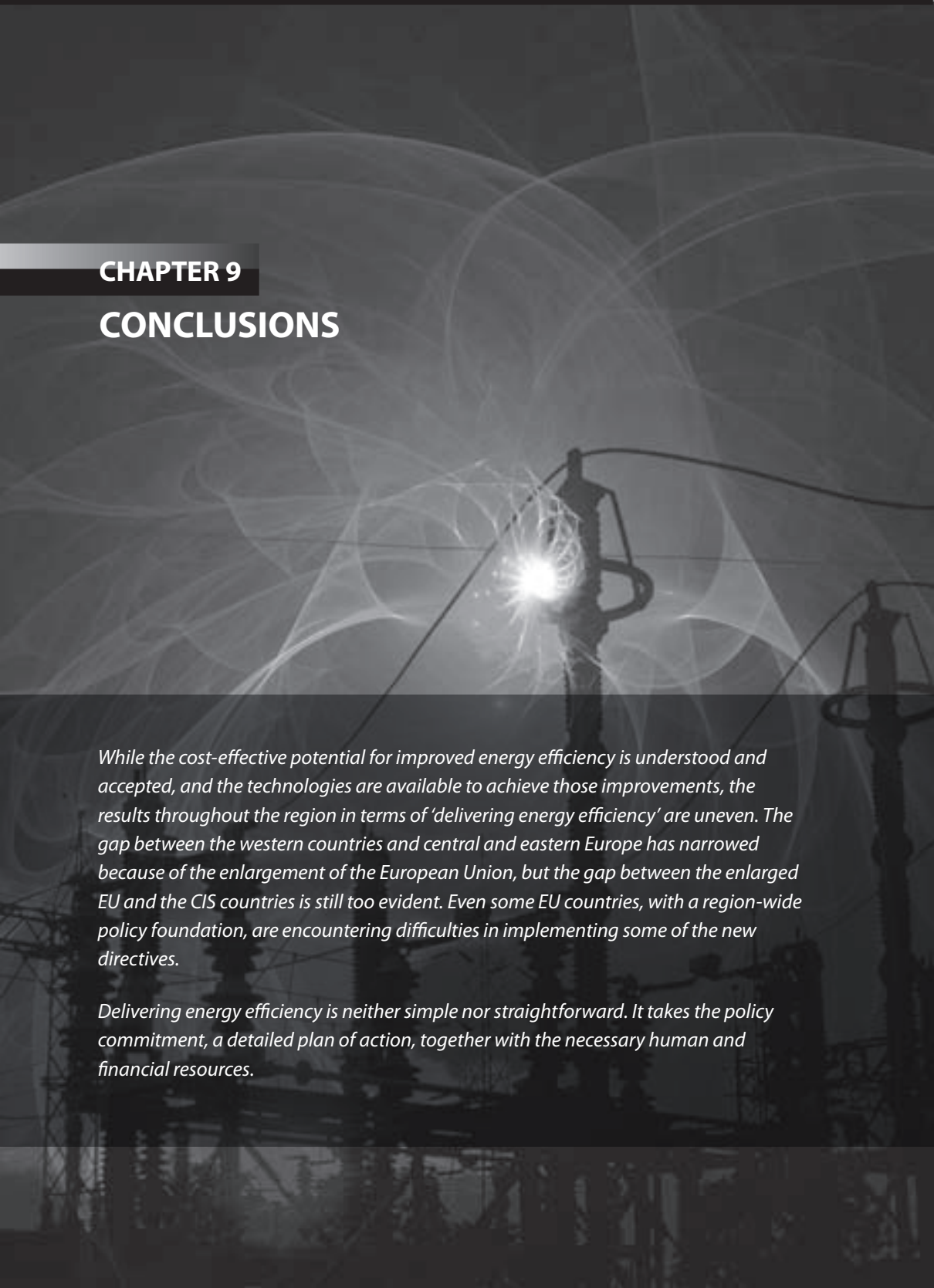
The EU's directive on the Energy Performance of Buildings is leading the way in developing new methodologies and requiring energy certification of buildings. At the technical level, the idea of using micro-generation together with high energy efficiency, is working towards the introduction of low or zero carbon buildings. The buildings sector has also been very important in transition countries, where the potential for energy savings has increased as heating costs have risen due to energy price increases.

Recent analysis shows that there is significant potential to reduce the energy consumption in lighting. Australia has announced its intention to ban incandescent light bulbs and the EU is considering the same. Australia has announced its intention to ban incandescent light bulbs and the EU is considering the same. An IEA study states that global emissions caused by lighting amount to 1,900 Mt of CO_2, which is 70% of the emissions of global passenger cars and three times more than the emissions from aviation.[110]

The industry sector is important for energy savings and emissions reductions. Large industry in the EU is participating in the EU ETS and there are plans to expand the trading system to more sub-sectors.

Transport is a high priority for many reasons, including the increasing effect it is having on GHG emissions and its high dependence on fossil fuels. This has been a challenge for government for decades, due to the lack of many cost-effective alternatives. Cities are increasingly congested and seeking new ways of reducing congestion while maintaining the mobility. Both the CO_2 limitations per km in the EU and the revised fuel efficiency standards in the US are expected to help in curbing energy demand in the transport sector. Other measures like labelling of cars, eco-driving, the introduction of biofuels, use of taxation and modal shifts are contributing to improving the overall efficiency of the transport sector, but have been slow to make any significant headway. In relation to air traffic, the European Commission has recommended that airlines should join the next commitment phase of ETS: air traffic has increased significantly and the projections show that increase only continuing.

110 IEA, Light's Labour's Lost, Policies for Energy-efficient Lighting, OECD, Paris, 2006, p. 31.



CHAPTER 9

CONCLUSIONS

While the cost-effective potential for improved energy efficiency is understood and accepted, and the technologies are available to achieve those improvements, the results throughout the region in terms of 'delivering energy efficiency' are uneven. The gap between the western countries and central and eastern Europe has narrowed because of the enlargement of the European Union, but the gap between the enlarged EU and the CIS countries is still too evident. Even some EU countries, with a region-wide policy foundation, are encountering difficulties in implementing some of the new directives.

Delivering energy efficiency is neither simple nor straightforward. It takes the policy commitment, a detailed plan of action, together with the necessary human and financial resources.

Government commitment to energy efficiency is not consistent throughout the region. The two main drivers for most countries are energy security (fuelled in most cases by higher and more volatile prices, and increased dependence on internationally traded energy) and global climate change, followed by the need to improve business competitiveness.

Concerning the need to tackle global climate change, most countries accept this challenge through the Kyoto Protocol, but the size of the challenge varies. Among Annex 1 countries (which have GHG emissions targets for the period 2008-2012), there are those which have quite ambitious targets and concerns about reaching them; there are also Annex 1 transit countries which are well on course to meet their 2008-2012 targets, since GHG emissions were significantly reduced below their baseline due to economic decline in the 1990s.

Much has been accomplished over the last few years. Better policy and legislative foundations should bring strong results in the future. Momentum is strong and the policy drivers of climate change and energy security are giving energy efficiency a high profile. Both energy and environment policymakers should feel confident that there will be strong improvements in energy efficiency across the countries covered by this report. However, for results to be delivered in a timely and cost-effective manner, there are still many areas that need improving, and governments need to devote adequate resources and resolve in order to ensure that results are forthcoming.

The main conclusions in this report are:

- While there has been good progress in many parts of Europe, the results are uneven and the gap is growing in terms of developing and implementing policies and measures to promote energy efficiency between EU member countries and CIS countries.
- Energy efficiency policies are improving and the regular update of policies to reflect changing circumstances and priorities is welcome. The priority for energy efficiency at the international level has never been higher. This is also true at the national level, although the level of commitment depends on national circumstances, such as the energy security situation and/or concerns about global climate change. There is some evidence of an imbalance in the priorities for energy efficiency and renewable energy, with many cost-effective energy efficiency opportunities being overlooked.
- There are several countries which have made significant efforts and progress in the area of energy efficiency. The European Union is a major driver in promoting energy efficiency and global climate change strategies and its regulatory influence extends well beyond its border of 27 countries.
- Implementing energy efficiency policies is complex and requires a good delivery mechanism (implementation agencies or set of agencies) together with the necessary human and financial resources. Too often, national efforts are under-resourced, particularly in many transition countries. There are signs of improvements but they are slow to materialise, given the benefits that can be expected. Good implementation also means the best use of available stakeholders from local authorities, industry groups,

energy supply companies, energy service companies and non-government organisations.

- The full range of policy instruments is being used throughout the region: from information to financial incentives, fiscal policies and regulatory measures. However, these instruments are not used equally or uniformly throughout the region. Many transition countries, especially some in the CIS, have not fully developed their use of the range of instruments, either for lack of policy commitment or for lack of resources.
- There is a need to better exploit the benefits that improving energy efficiency brings to the environment, both at global level by mitigating climate change and at local level by reducing local pollutants. The potential is significant and improved energy efficiency can play a major role.
- It is necessary to better integrate energy efficiency into the full range of national and regional policies and programmes of global climate change measures, and in particular, for the countries concerned in the implementation of the flexible mechanisms of Emissions Trading, Joint Implementation and the Clean Development Mechanism.
- The continuing reform of energy prices and the removal of environmentally harmful subsidies should be encouraged in order to support energy efficiency and environmental policies. Appropriate energy price signals play a major role in encouraging consumers to undertake energy efficiency actions.
- There is good work being undertaken in the buildings sector, for district heating and cogeneration, and for appliances. The EU is giving a high priority to all three areas and a comprehensive set of measures is in place and is now being implemented.
- The transport sector remains a major concern in all countries covered by this review. It is a complex and growing sector, mostly dependent on fossil fuels and, thus, a sector where GHG emissions are increasing significantly.
- All countries need to ensure they have good monitoring and evaluation systems set up in order to regularly assess the progress being made in their energy efficiency policies and programmes.
- No country in the region can afford to be complacent. There is considerable scope for more action, even in the countries that have relatively strong policies and programmes. These countries are generally the first to admit they can and should do more.
- Energy efficiency cannot be improved in isolation and it requires governments to work together with a wide range of actors in all end-use sectors, with the energy supply industries and the financial sector.
- International cooperation is very important in promoting energy efficiency. The international community provides valuable policy momentum, the comparative analytical foundation, capacity development, technology development and financing. It also allows countries to learn from each other, as is the case in peer reviews for the Energy Charter. International cooperation can be regional (or even global) or sub-regional, and is still needed to support capacity-building in some of the countries that have been lagging behind.

ANNEXES

ANNEXES

ANNEX 1 – ENERGY EFFICIENCY POLICY MONITORING: STATUS OF ENERGY EFFICIENCY STRATEGIES

Albania	There is a draft Energy Strategy that includes energy efficiency. The draft strategy has not yet been approved by the Government.
Armenia	An energy efficiency strategy was originally approved in 1996; however, the Government plans to prepare a new "National Strategy on Energy Efficiency, Renewable Energy and Environmental Protection." The Government wants this strategy to be the legislative basis for energy efficiency programmes. The main policies, which are formulated in a 2004 law, are to: • strengthen the economic and energy independence of Armenia; • enhance the reliability of the Armenian energy system; • create new goods and services to facilitate energy saving and promote renewables; and • reduce man-made impacts on the environment and human health.
Australia	Recognising that significant benefits can be achieved through improvements in energy efficiency, in August 2004 Ministerial Council on Energy (MCE) endorsed the National Framework for Energy Efficiency (NFEE) and agreed to the implementation of a number of energy efficiency packages. Energy efficiency was given prominence in the 2004 energy White Paper. Energy efficiency is a major component of the national climate change strategy.
Austria	The Energy Action Programme was created in 1993. Goals were re-affirmed in the 1996 Energy Report. An agreement between the Federal Government and the Länder, came into force on 15 June 1995. Such an agreement was necessary to ensure a common approach because the Länder are responsible for energy efficiency measures. The constitutional basis for agreements of this type (between the Federal and the Länder levels) is Article 15a of the Federal Constitution.
Azerbaijan	The principles of national energy efficiency policy are set out in the 1996 Law "On the Use of Energy Resources."
Belarus	The major strategic tasks of the 2001-2005 Republican Energy Saving Programme are: • achieving GDP energy intensity at the level of industrialised countries by 2015; • ensuring the planned GDP growth rate till 2005 without an increase in energy consumption.

Belgium	In Belgium, energy and environmental policies are discussed in the broad context of sustainable development. The Sustainable Development law of 1997 obliges the government to prepare a Federal Plan for Sustainable Development every four years. The first such plan (for 2000-2004) was adopted by the federal government on 20 July 2000. It defines federal policies concerning production and consumption, poverty, agriculture, the marine environment, bio-diversity, energy, transportation, ozone and climate change. Energy efficiency policies are primarily the responsibility of the regions.
Bosnia and Herzegovina	The Energy Strategy of Bosnia and Herzegovina is being prepared under the current Europe Aid Project CARDS 2005. The first draft of the Energy Strategy of Bosnia and Herzegovina will be available in October 2007. Among other topics, it will also cover energy efficiency improvement.
Bulgaria	The National Strategy for the development of energy and energy efficiency policies by the year 2010 was adopted by the Bulgarian Parliament in 1998.
Canada	Canada's energy efficiency strategy is a major component of the current National Climate Change Strategy. The Federal Energy Efficiency and Alternative Energy Programme was launched in 1991.
Croatia	The principal objectives of the energy policy of Croatia are stated in the Energy Sector Development Strategy, which was adopted by the Parliament in March 2002 for the period of 10 years. The objectives are: (i) increased energy efficiency, (ii) security of energy supply, (iii) diversification of energy and energy sources, (iv) use of renewable energy sources, (v) realistic and market-related energy prices and the development of an energy market and entrepreneurship (vi) environment protection. The Environment Protection and Energy Efficiency Fund was established in 2003 for the purpose of financing the preparation, implementation and development of programmes, projects and similar activities in the field of preservation, sustainable use and protection of the environment, as well as in the areas of energy efficiency and use of renewable energy sources.
Cyprus	Energy efficiency is a major component of the Cypriot energy policy. The main objective is the reduction in energy consumption in all sectors.

Czech Republic	The energy efficiency policy is outlined in the National Energy Policy which was approved in 2000. The Energy Management Act sets out the obligation for the government to formulate the state's energy policy and to prepare the National Programme for Energy Efficiency and the Use of Renewable and Secondary Energy Sources.
Denmark	In September 2005 the Danish government launched an Action Plan for Renewed Energy Saving Measures. According to this plan energy distribution companies are committed to initiate energy savings among end users of minimum 7.5 PJ in 2006-2013. Presently negotiations are going on for a new National Energy Strategy that could tighten the targets. Over the years, Denmark has set out its energy efficiency objectives. These include: ensuring cost-effectiveness based on socio-economic calculations; being part of a cost-effective climate strategy; reducing energy costs to consumers; focusing on market-based instruments; avoiding new taxes or subsidies from the state; and focusing on EU initiatives.
Estonia	In 2004, the Government proposed a new Long-term Public Fuel and Energy Sector Development Plan. It was approved by the Parliament in December 2004. In the strategy, new targets for the energy efficiency policy were set and the Parliament urged the MoEAC to prepare a revised Energy Efficiency Target Programme. Due to the adoption in April 2006 of the European energy services Directive, which includes a set of special provisions with regard to energy efficiency strategies, the preparation of the new Estonian Energy Efficiency Target Programme is still in the start-up phase.
Finland	An Energy Efficiency Action Plan, drawn up in 2002, is included in the National Climate Programme. Priority activities to promote energy efficiency are: • Further development of building codes and other normative measures. • Development and wider use of voluntary agreements. • Further development and promotion of energy audit activities. • Targeted information activities. • Research, development, demonstration and dissemination of new technologies.
France	In December 2000, a new national energy efficiency plan was announced. Its goal is to reduce GHG emissions, reduce consumers' energy bills and develop renewable energy.

Georgia	To date, the emphasis on energy efficiency in Georgia has almost entirely been at the generation and transmission end of the fuel cycle, with little activity at the consumer end. The Ministry of Energy has some proposals concerning energy efficiency measures, but they have not been formally adopted by the Government or the Parliament. Following the Georgia Electricity and Natural Gas Law (adopted in 1999), the State Programme on Energy Efficiency Improvement is being prepared.
Germany	The coalition agreement adopted on 11 November 2005 comprises essential guidelines for the energy efficiency policy of the German federal government. The following objectives are mentioned: • To steadily increase the energy efficiency of the national economy with the objective of doubling energy productivity by the year 2020 compared with 1990; • To increase the funding of the CO_2 Building Modernisation Programme to at least 1.5 billion Euros per year, to significantly improve its efficiency and attractiveness (for example by switching to investment grants and tax relief measures and by including rental accommodation in the Programme), and also to introduce energy passports for buildings. The goal is to increase the energy efficiency of 5% of existing buildings built before 1978 every year; • To promote the modernisation of existing power plants and the expansion of decentralised power plants and highly efficient combined heat and power plants; • To review the funding criteria of the Heat-Power Cogeneration Act (KWK-Gesetz) on the basis of the monitoring report to be submitted in a timely manner; • To support the European initiatives to improve energy efficiency and work towards a European top-runner programme; • To continue and intensify the dena (dena – German Energy Agency) initiatives for energy conservation in the areas of buildings, electricity use (for example, stand-by) and traffic.
Greece	Energy efficiency is promoted through the Global Action Plan, entitled Energy 2001, and the energy conservation sub-programme of the National Environmental and Energy Programme submitted to and approved by the European Union. Energy 2001, which came into force in 1998, is the national action plan for energy conservation in the building sector.
Hungary	In October 1999, the Government act [1107/1999(X.8)] was approved, concerning the energy saving and energy efficiency strategy until 2010. It set a target limiting energy consumption growth to 1.5% p.a., assuming GDP grows at 5% p.a.

Iceland	There is no specific energy efficiency policy in Iceland. The government aims to reorganise the energy sector by introducing increased competition in order to improve efficiency and bring down energy prices.
Ireland	The Irish Government's energy policy goals are: • To ensure the development of competitive, efficient and properly regulated energy markets, which provide customers with a choice of energy services and support sustainable economic growth • The protection of security of energy supply • Ensuring that energy supply and use are environmentally sustainable. To achieve these goals, the Department of Communications, Marine and Natural Resources, which is responsible for energy policy, set out in its Statement of Strategy 2003-2005 six strategic objectives, of which one is to ensure that the Energy Sector meets the environmental obligations associated with its energy production and use, and contributes towards sustainable development.
Italy	The 1988 National Energy Plan (NEP'88) includes the improvement of energy efficiency and conservation as a primary objective of the general energy policy. CIPE Deliberation 137/98 published in February 1999 provides guidelines and actions for containment and reductions of GHG emissions. It includes increased energy efficiency in the productive sectors and among consumers.
Japan	The government started to review the national strategy for the mid- and long-term energy and environment policy. In December 2003, the Advisory Committee for Natural Resources and Energy to METI launched the first discussion on the next long-term Energy Supply and Demand Outlook for the first time since 2001. In parallel with these discussions, it is also planned to start a joint session between the Industrial Structure Council and the Advisory Committee for Natural Resources and Energy to METI in order to review the National Strategy combined with energy, environment and industrial policy. Relevant reports have been produced, and an interim report on the long-term energy supply and demand outlook to the year 2030 was published in October 2004. Within Japan's National Energy Strategy released in May 2006, the Energy Conservation Top-runner Plan reinforces the national strategy to reduce petroleum consumption. Setting a target to improve energy efficiency by 30% by the year 2030 compared to 2006, the Japanese government pledges to realise a state-of-the-art energy supply/demand structure within a market of high prices that the government expects to endure for the medium to long-term.

Kazakhstan	In 1996 the Special State Programme of Energy Saving was previewed in the Special Resolution of the Government (N 474 of 19.04.96). There is also an energy saving component in the "Hydrocarbon Initiative" of 1997.
Kyrgyzstan	The Law on Energy Savings, adopted in 1998, provides the legal basis for the introduction of effective energy savings measures in all sectors. The revised National Energy Programme, soon to be approved by the Government, takes into account energy efficiency measures and the extended use of local, renewable and secondary energy sources.
Latvia	The latest version of the National Energy Efficiency Strategy was approved in May 2004. Energy efficiency is seen as a priority in the national energy policy. The National Energy Efficiency Strategy gives an assessment of the current situation in Latvia with energy efficiency, including a general view on the impact of energy use on the environment. The National Energy Efficiency Strategy defines achievable objectives. Institutional, economic and political measures are included in the Strategy.
Liechten-stein	The energy efficiency law was passed in 1996 to promote efficient and environmentally-friendly use of energy.
Lithuania	The National Energy Efficiency Programme was approved in October 2001. The aim of the Programme is to facilitate more efficient use of energy resources and promote energy efficiency, to reduce the adverse impact of the energy sector on the environment as well as to harmonise measures on efficient use of energy resources and energy with the requirements of the relevant EU directives and other international documents. The National Energy Efficiency Programme was revised and updated. The updated version and its implementation measures for the period 2006-2010 were approved in 2006.
Luxembourg	The government presented the "National Strategy to reduce GHG emissions" in May 2000. The domestic programme focuses on six main issues including: the progressive introduction of an ecotax system in the field of energy, energy efficiency in energy production, and energy savings in the building sector. The National Plan for Sustainable Development, finalised in 1998, lays out a strategy for sustainable development in the different economic areas of Luxembourg. The Plan sets as an objective a 20% reduction in energy intensity between 1993 and 2010. Many of the measures relate to energy efficiency.

Malta	There is no specific energy efficiency policy in Malta. Energy efficiency is considered as one of the horizontal measures within the National Energy Policy. The main objective behind energy efficiency policies is environment protection. Security of supply and competitiveness constitute additional objectives.
Moldova	Energy efficiency is a high-priority issue in the Republic of Moldova. Strategic policy goals for energy conservation are set in the most important strategic documents of the Government of Moldova: the National Sustainable Development Strategy, the Economic Development Strategy, the Energy Strategy, and the Governmental Programme of Activities for the period 2002-2005. The Energy Strategy now goes to 2010; the National Energy Conservation Programme covers the period between 2003 and 2010.
Mongolia	The Government of Mongolia has developed the "Mongolia Sustainable Energy Sector Development Strategy Plan (2002-2010)". It reflects two major goals set in the Government agenda, namely economic growth and reducing poverty. The main principles are: financial stability, restructuring, capacity building, energy access and affordability, and energy efficiency. Mongolia's short-term policy objective in terms of developing energy efficiency is to adopt legislation to promote energy conservation and energy efficiency. The Government submitted the Draft Law on Fuel and Energy Conservation to the Great Khural (Parliament) in April 2003.
Netherlands	The Fourth National Environmental Policy Plan published by the Dutch government in June 2001 shows ambitious targets for emission reductions for the year 2030, including a CO_2 emissions reductions target of 40% to 60%. These targets are meant to start the transition towards a sustainable, carbon-poor energy system. Most of these reductions should come from improved energy efficiency, renewables and clean fossil fuels. Nuclear energy, structural changes in the economy and changes in consumption patterns can also make a contribution. The Plan claims that targets like these are achievable and costs are reasonable: 1 to 2.5% of GDP. In July 2005, the ministry of Economic Affairs (EZ) issued a White Paper, the Energy Report 2005, giving a high priority to energy conservation. The Report included the following targets: - In 2008, a yearly energy-efficiency improvement of 1.2%; - In 2012, a yearly energy-efficiency improvement of 1.3%. The Parliament responded that these figures were not ambitious enough, suggesting the targets of 1.5% in 2008 and 2.0% in 2012.

Norway	In March 1999, a White Paper on energy was submitted to the Parliament. It supports the Government's environmental policy and emphasises the need to reduce energy needs. The Government is looking at a package of measures that would total up to NOK 5 billion over a ten-year period.
Poland	The document entitled "Assumptions of Poland's Energy Policy until the year 2020" was prepared by the Ministry of Economy and approved by the Council of Ministers in February 2000.
Portugal	For the period 2000-2006, the Operational Economy Programme (POE) is in force and includes measures regarding the improvement of domestic energy potential and the rationalisation of energy consumption. In May 2001, the Government approved the "Strategy for Climate Change" under which a national programme for climate change should be established. In September 2001, the Government also approved a major programme called "E4 Programme, Energy Efficiency and Domestic Sources of Energy". In November 2004, the Government adopted an Action Programme to Reduce Oil Dependence in order to reduce the national economy's energy intensity by up to 20%, and to reduce the country's oil dependence by 2010.
Romania	The National Strategy for Energy Efficiency, which is the most important document concerning the energy efficiency policy in Romania, was approved by the Government in 2004, and the Action Plan derived from this strategy is in the process of implementation.
Russian Federation	Improved energy efficiency is a major component of the 2003 Energy Strategy, which calls for the reduction of per unit costs of energy production and use through the streamlining of consumption, use of energy saving technologies and equipment, reduction of losses during production, processing, transportation, and sale of the fuel and energy products. The energy efficiency policy of the Russian Federation has been developed within the Energy Strategy of Russia to 2020, as approved by the Government Decision № 1234-r of August 28, 2003. The Strategy views energy efficiency as the vital strategic avenue for long-term state energy policies. Energy cost minimisation, bett er competitiveness, a balanced energy demand, and lower environment pollution represent the main motives for the energy saving policy. The 2005 "Comprehensive Action Plan to implement the Kyoto Protocol in the Russian Federation" uses the targets of the Energy Strategy of Russia to 2020 and the Federal Programme "Energy-saving Economy" for 2002-2005 and up to 2010. There is a draft Federal Programme "Energy-Saving Economy" for 2006-2010.

Slovak Republic	In March 2007, the Economy Ministry unveiled plans to boost energy efficiency, implementing the EU's 2006 Directive on end-use energy efficiency. The plan targets a 9% reduction in energy consumption compared with business as usual by 2017, in line with the directive. All end-use sectors are targeted. There is no specific policy for energy efficiency in the Slovak Republic, but energy efficiency is part of several strategic documents and sector policies. Once the energy efficiency concept is defined, an energy efficiency action plan will follow. Energy efficiency is included in the State environment policy, the National strategy for sustainable development, transport policy and energy policy. The national energy policy was approved by Government Decree in January 2006. Part of the document is dedicated to reducing energy intensity and increasing energy efficiency.
Slovenia	The Slovenian Strategy for energy use and supply was adopted on January 11, 1996. A new energy act of September 16, 1999 sets out the legal, regulatory and institutional framework for the power and gas sector. It also includes provisions on energy efficiency, giving specific roles to the state and other actors, and presenting a legal basis for secondary legislation, concerning subjects like labelling and minimum efficiency standards. The strategy for energy efficiency calls for overall energy efficiency improvements of 2% p.a. over the next 10-15 years. The National Energy Programme (NEP) was adopted by the Parliament in 2004. The NEP reflects ambitious Slovenian targets in the field of greenhouse gas emissions reduction by 8% up to 2010. For the period from 2000 to 2015, the NEP envisages a decrease of 30% in energy intensity, i.e., by 2.3% on an annual basis, in the context of GDP growth of 60%. The NEP defines three main goals: • security of energy supply; • competition in energy supply; and • protection of the environment.
Spain	In 2005, the Spanish Cabinet approved the Energy Efficiency and Energy Saving Plan 2005-2007, which targets the industry, transport, agriculture and public services in aiming to reduce domestic energy requirements by the equivalent of 12 million tonnes of oil each year. The three-year plan aims to cut Spanish energy use by 8.5% by 2008, thus reducing total carbon dioxide emissions by 32.5 Mt. The plan centres on a 0.8% levy on consumers' electricity bills to finance the replacement of 2 million low-efficiency domestic appliances and the creation of green transport schemes for large workplaces. The plan also stipulates energy audits in several industrial sectors and improved building insulation. In 2006, the Spanish government published 22 strategic priorities, organised by sector.

Sweden	The 1997 Bill on Sustainable Energy Supply placed a strong emphasis on energy efficiency. There is no comprehensive White Paper on energy efficiency but various government bills contain policy information. The most important ones are: the Government's Climate Policy Bill, approved by the Parliament in March 2002, and the Energy Bill adopted by the Parliament in 2002, "Cooperation for a reliable, efficient and environment-friendly energy supply." On 1 January 2005, the Programme for Improving Energy Efficiency Act (2004:1196) came into force. The programme is intended to increase energy efficiency and create opportunities for tax exemption. It gives energy-intensive companies in the manufacturing industry, which are subject to the tax, the opportunity of being granted tax exemption on their electricity consumption if they take action to improve their energy efficiency. The government has, therefore, adopted a programme of improving energy efficiency in energy-intensive companies (PFE), with the "carrot" of reduced taxation. Participation in the programme is voluntary, and is open to energy-intensive manufacturing companies that meet certain criteria. Targets proposed by the National Commission on Oil Independence in its report in 2006 include improvements in overall energy efficiency of at least 20% to 2020, 40-50% cuts in the use of petrol and diesel in road transport, a 25-40% reduction in oil use in the industry, and a complete phase-out of oil used in the heating of residential and commercial buildings.
Switzerland	The Swiss Energy Action Programme, launched in January 2001, replaced the Energy 2000 Action Plan which came into effect in 1991. The Energy 2000 Action Plan gave high priority to energy efficiency and the new programme has continued with that emphasis. More importance is given to incentives and regulations to strengthen the voluntary measures compared to the Energy 2000 Action Plan.
Tajikistan	Improving the efficiency of operation of the fuel and energy complex is one of the principal aims of the state energy policy.
Turkey	There is no specific energy efficiency strategy in Turkey, but the objectives are integrated into national five-year plans.
Turkmenistan	There is no energy efficiency strategy/policy in Turkmenistan to date.

The Former Yugoslav Republic of Macedonia	In 1999, the Government adopted a Programme on efficient energy use in the FYROM until 2020. The preparation of this programme was also a legal obligation resulting from the 1997 Energy Law. The Programme determines many measures on increasing energy efficiency, which include: the development of an Energy Efficiency Strategy of the Republic of Macedonia until 2020; legislation and other incentive measures; the establishment of a fund for financial support; investment projects development and implementation; preparation of regulations, standards and other acts; information and educational activities; preparation of publications and brochures; international activities. The Energy Efficiency Strategy was prepared in the beginning of 2004, upon an initiative of the Ministry of Economy and with USAID financial support. The Strategy was adopted by the Government in October 2004. The National Energy Efficiency Programme 2000 was adopted by the Government in 1998. The programme calls for a reduction in energy consumption of 8% between 1998 and 2000.
Ukraine	On the basis of the National Energy Programme (1996), a comprehensive State Energy Saving Programme was prepared in 1996 and adopted in 1997. In view of the difficult economic situation, amendments to the Programme were developed in 1996-1999, and additional measures seeking to introduce energy saving technologies on a mass scale were approved by Cabinet of Ministers Decree No. 1040 of June 27, 2000, introducing the Urgent Actions to Implement the Ukrainian Comprehensive State Energy Saving Programme. The government is currently planning a new programme for 2007-2020.
United Kingdom	The energy efficiency action plan of 2004 sets out how the government aims to cut carbon emissions by an extra 12 million tonnes through energy efficiency over the next six years.
Uzbekistan	The ongoing Programme for Energy Conservation in the Republic of Uzbekistan in the Years Until 2010 has been prepared in accordance with Article 12 of the Uzbek Law "On Rational Energy Uses" and Cabinet of Ministers Resolution No. 517 dated December 29, 2000, with due regard for the latter's decisions of February 14, 2002, and with the participation of national ministries and agencies, associations, unions, and organisations, as well as the Council of Ministers of the constituent Republic of Karakalpakistan, regional hokimiyat administrations, and the Tashkent city council.

ANNEX 2 – ENERGY EFFICIENCY POLICY MONITORING: STATUS OF ENERGY EFFICIENCY LAWS

Albania	Energy efficiency will be part of the energy law which is in draft form and is not yet approved.
Armenia	The intent of the Energy Saving and Renewables Law adopted in 2004 is to formulate and ratify the government policy framework for energy saving activities and advancement of renewables with a view to: • strengthen the economic and energy independence of Armenia; • enhance the reliability of the Armenian energy system; • create new goods and services to facilitate energy saving and promote renewables; and • reduce man-made impacts on the environment and human health.
Australia	There is no specific energy efficiency law.
Austria	There is no overall energy efficiency law but there are many legal regulations with relevance to energy efficiency both at the Federal and the Länder levels. In order to ensure a common approach in those areas which fall under the responsibility of the Länder (i.e., building codes, inspection of boilers), an agreement on energy conservation was concluded between the Federal Government and the Länder. Much of the legal foundation is based on transposing EU Directives on energy efficiency into national law.
Azerbaijan	The Law on Energy (adopted in 1998) has the objective of ensuring increased energy efficiency throughout the energy cycle. The law "On the Use of Energy Resources" was adopted in 1996 to promote energy saving, it establishes the foundations of state regulation in the field of energy use.
Belarus	The Law on Energy Conservation was adopted in 1998. It is a framework law providing for policies and programmes to be supported.
Belgium	Much is achieved through Federal/regional agreements and various regional measures. Much of the legal foundation is based on transposing EU Directives on energy efficiency into national law.
Bosnia and Herzegovina	There is no energy efficiency law. Since Bosnia and Herzegovina is in the process of association to the EU, there are ongoing preparations for harmonising the local legislation with the EU Directives, which shall also include the Directives for energy efficiency.

Bulgaria	Energy and Energy Efficiency Act, adopted in 1999, implements the regulation of energy efficiency and lays down the fundamentals for the legal regulation of the state policy on energy efficiency.
Canada	The Energy Efficiency Act was passed in 1992. The act regulates energy performance levels of energy-using products that are imported or shipped between Provinces, energy labelling of these products, and collection of statistics and information on energy use and alternative energy.
Croatia	There is no specific energy efficiency law. The Energy Law (2001, 2004) includes provisions for energy efficiency and the use of renewables. The Environment Protection Law (1994) states that energy is to be used rationally. The Ordinance on the labelling of energy efficiency of household appliances (2005) fully transposes the energy efficiency labelling Directives. The part of Directive 2002/91/EC related to minimum requirements for energy performance of new buildings has been transposed through the Building Act (2003, 2004) and the corresponding subordinate legislation – Technical Regulations on Thermal Energy Savings and Thermal Protection in Buildings (2005).
Cyprus	There is no specific energy efficiency law. Much of the legal foundation is based on transposing EU Directives on energy efficiency into national law.
Czech Republic	The use of energy is governed by the Energy Management Act (Act No. 406/2000) that came into force on January 1, 2001. Much of the legal foundation is based on transposing EU Directives on energy efficiency into national law.
Denmark	An Energy Conservation Act (Act No. 450), approved by the Parliament in May 2000, determines the overall framework for coordination and the priority given to savings initiatives, both centralised and decentralised. The new Act also contains regulations concerning the appointment of a local energy conservation committee, which should be involved in coordinating and securing efficiency in the work of various local players to save energy, including supporting local Agenda 21 work. Much of the legal foundation is based on transposing EU Directives on energy efficiency into national law.

Estonia	There is no overall energy efficiency law. The Energy Efficiency of Equipment Act establishes requirements for the consumption and labelling of certain appliances. New regulations to achieve compliance with EU requirements have been adopted.
Finland	There is no specific overall energy conservation law. Much of the legal foundation is based on transposing EU Directives on energy efficiency into national law.
France	Law 96-1236 of 30 December 1996 on Air and Rational Use of Energy was adopted to replace the existing legislation on energy efficiency. In May 2006, the French government adopted a decree targeting 54 terawatt hours (TWh) of energy savings over three years, equivalent to 3.6% of national consumption. All suppliers of electricity, gas or heating oil will be required to meet a specific target based on the amount of energy they produce. Much of the legal foundation is based on transposing EU Directives on energy efficiency into national law.
Germany	There is no specific overall energy conservation law, but new federal laws planned or adopted on cogeneration and the Energy Conservation Ordinance are to have the low-energy-house standard as the norm. Much of the legal foundation is based on transposing EU Directives on energy efficiency into national law.
Greece	There is a general energy efficiency law from 1975 that is the framework law for undertaking energy efficiency measures. There are also other laws related to incentives, planning, etc. For example, the Law 3299/2004 provides subsidies to the industrial and tertiary sectors for energy saving as well as for creating a grant programme for energy efficiency.
Hungary	There is no dedicated energy efficiency law, but in the energy industry legislation several paragraphs mention the necessity of energy saving. Much of the legal foundation is based on transposing EU Directives on energy efficiency into national law. In October 1999, the Government act [1107/1999(X.8)] was approved concerning the energy saving and energy efficiency strategy until 2010. It sets a target limiting energy consumption growth to 1.5% p.a., assuming GDP grows 5% p.a.

Iceland	There is no energy efficiency law, but in the law regarding subsidies for house heating there is a paragraph about energy efficiency, stating that every year the National Energy Authority shall make a proposal to the Ministry of Industry on energy efficiency projects with the aim to reduce the need for subsidies for house heating. It is allowed to use the amount equal to 1% of the annual subsidies for such projects.
Ireland	There is no energy efficiency law. However, other legislation is relevant: The Electricity Regulation Act 1999; The Sustainable Energy Act 2002; EU Integrated Pollution Prevention Control Directive; Part L of the Building Regulations; EU CHP Directive; and the EU Energy Performance in Building Directive.
Italy	The basic law on energy efficiency is Law No. 10/1991, entitled "Regulations for the implementation of the National Energy Plan with regard to the rational use of energy, energy savings and the development of renewable energy sources". It is a framework law to introduce regulations aimed at the efficient use of energy sources in all end-use sectors including specifically the reduction of energy consumption in production processes and in the building sector, especially for heating plants. The law provides for tax relief and the payment by local authorities of incentives to support the adoption of the most efficient technological solutions. Much of the legal foundation is based on transposing EU Directives on energy efficiency into national law.
Japan	The Energy Conservation Law was revised in June 1998.
Kazakhstan	The Law on Energy Saving in the Republic of Kazakhstan came into force in December 1997.
Kyrgyzstan	A law on 'Energy Saving' was adopted by the Parliament in 1998. The law introduces administrative, organisational and economic elements supporting energy efficiency.
Latvia	There is no energy efficiency law in Latvia, per se. The Law on Energy was approved in 1998 and it includes a chapter (10) on energy efficiency. The last amendments in the Law on Energy were made in 2005. There are laws concerning energy performance standards in buildings, appliances and other areas covered under EU requirements, including labelling.
Liechtenstein	There is no energy efficiency law in Liechtenstein. However, the legal foundation for the goal of conserving energy was set within the energy regulations in 1993 and expanded in 1996.

Lithuania	The Republic of Lithuania Law on Energy of 16 May 2002 has set forth that the main tasks of the state institutions, which manage the energy sector, regulate and control the energy sector activities, are to create preconditions for efficient energy sector activities, to promote efficient use of energy and energy resources as well as consumption of local and renewable energy resources. Funds from the state budget are allocated each year for the implementation of these tasks. The draft Energy Conservation Law (hereinafter – the draft Law) was prepared in 2001 implementing the measures of the Government of the Republic of Lithuania Programme and the provisions of the National Energy Strategy. The Government of the Republic of Lithuania basically approved the draft Law and submitted it for consideration to the Seimas (the parliament). The Seimas voted to integrate the main provisions of the draft Law into the draft Law on Energy, which was prepared at that time. The main provisions of the draft Energy Conservation Law were transposed into the Law on Energy, which was adopted by the Seimas in 2002. Much of the legal foundation is based on transposing EU Directives on energy efficiency into national law.
Luxembourg	The parliament adopted the general Energy Efficiency Law on August 5, 1993. The law authorises the implementation of several energy efficiency measures. Much of the legal foundation is based on transposing EU Directives on energy efficiency into national law.
Malta	The legal foundation is based on transposing EU Directives on energy efficiency into national law.
Moldova	The Law on Energy Conservation was passed in December 2000. The Law aimed at establishing the main principles of and conditions for the organisation and regulation of activities in the sphere of energy conservation and efficient use of energy resources in the process of extraction, production, processing, preservation, transportation, distribution and consumption. The Law also considers the use of renewable sources of energy. In accordance to the Law, the Ministry of Energy developed the National Energy Conservation Programme 2003-2010.
Mongolia	The Energy Law was enacted in 2001. The law is based on economic principles, commercial relationships and on rights and obligations for both the industry and the consumers.

Netherlands	There is no specific overall energy conservation law. Much of the legal foundation is based on transposing EU Directives on energy efficiency into national law.
Norway	There is no specific overall energy conservation law, but one article from the 1991 Energy Law covers energy efficiency. The provisions of the Energy Act, the Planning and Building Act, labelling requirements and standards for electrical equipment represent some of the legal framework having an influence on energy consumption, and on how energy is used.
Poland	The Energy Law of 10 April 1997 creates conditions to provide sustainable development of Poland. Act of 18 December 1998 on Support for Thermo-Modernisation Investment in Buildings created the Thermomodernisation Fund. Much of the legal foundation is based on transposing EU Directives on energy efficiency into national law.
Portugal	There is no specific overall energy conservation law. There is the RGCE – "Management Regulation for Energy Consumption" (Decree Law n.º 58/82 of February 1982) focusing on energy-intensive industries, which is currently being updated. Much of the legal foundation is based on transposing EU Directives on energy efficiency into national law.
Romania	The Law no. 199/2000 concerning the Efficient Use of Energy (including its subsequent revisions) establishes the national policy for the efficient use of energy as an integral part of the energy policy of the state, based on the principles of a competitive energy market, environment protection and cooperation between consumers, producers, energy suppliers and public authorities. The main objective of the policy is to increase the efficiency of energy use in the whole chain of production, conversion, transportation, distribution and final consumption of energy.
Russian Federation	The Federal Law on Energy Saving of 1996 and various regional energy conservation laws were approved. The 1996 law divides the responsibility between the federal and regional governments. To support the Federal law on Energy Saving many subjects of the Russian Federation adopted regional laws on energy efficiency.
Slovak Republic	There is no specific law on energy efficiency. Much of the legal foundation is based on transposing EU Directives on energy efficiency into national law.

Slovenia	There is no specific energy efficiency law. The Energy Act of 1999 amended in 2004 and 2006 sets out the legal, regulatory and institutional framework of the power, gas and heat sector. It also has provisions on energy efficiency, giving a role to the state and other actors in promoting energy efficiency and presenting a legal basis for secondary legislation for energy performance of buildings, and labelling and minimum efficiency standards for products.
Spain	There is no specific overall energy conservation law.
Sweden	There is no specific energy efficiency law. On 1 January 2005, the Programme for Improving Energy Efficiency Act (2004:1196) came into force. The programme is intended to increase energy efficiency and create opportunities for tax exemption. It gives energy-intensive companies in the manufacturing industry, which are subject to the tax, the opportunity of being granted tax exemption on their electricity consumption if they take action to improve their energy efficiency. The government has, therefore, adopted a programme of improving energy efficiency in energy-intensive companies (PFE), with the "carrot" of reduced taxation. Participation in the programme is voluntary, and is open to energy-intensive manufacturing companies which meet certain criteria.
Switzerland	A new Federal Energy Law was adopted by the parliament in 1999. The law includes measures relating to: regulations on fuel consumption of vehicles, cantonal legislation in the building sector, financial incentives for energy efficiency, guidelines for the energy supply industry. The Energy Law enshrines the 'subsidiarity' principle, according to which voluntary measures and/or market-based mechanisms are to be introduced only if voluntary measures by the private sector fail. One of the lessons learned is that voluntary measures have proven insufficient. The Energy Law also spells out the remits of the federal state and the cantons.
Tajikistan	The Energy saving law of 1996 provides the basis for the energy saving policy.

The Former Yugoslav Republic of Macedonia	The FYROM has no specific Energy Efficiency Law, but energy efficiency is included in a special chapter in the new Energy Law adopted in May 2006. In the chapter "Energy Efficiency" the national policy and activities for the improvement of energy efficiency are described. The Energy Law contains provisions on the development of a Strategy for improving energy efficiency over a period of ten years and a Programme for the implementation of the Strategy.
Turkey	In March 2007, a new energy conservation law was adopted by the parliament, after more than a decade of discussions of the draft. When enacted, this Energy Efficiency Law will introduce in the building sector the obligation of energy management for all large buildings (over 20,000 m^2) and for public buildings.
Turkmenistan	There is no specific law on energy efficiency.
Ukraine	The Law on Energy Conservation was adopted in 1994. This law defines the institutional, regulatory and economic mechanisms for energy conservation. In 2005, the law was amended to add provisions for energy audits and new definitions of energy-efficient goods, technologies, equipment and projects. Laws on CHP and Waste Energy Potential, and the Law on Heat Supply were also adopted in 2005.
United Kingdom	There is no overall energy efficiency law. Much of the legal foundation is based on transposing EU Directives on energy efficiency into national law. Energy saving policies and measures were set out in a 2004 Energy Efficiency Action Plan, a 2006 Climate Change Programme, and in the 2007 Energy White Paper and National Energy Efficiency Action Plan, with the aim to continue to stimulate energy efficiency in businesses, the public sector and households.
Uzbekistan	The Law on Rational Use of Energy was adopted in 1998. The framework law covers efficiency of both energy supply and demand, and comprises articles related to the definition and application of energy efficiency standards, energy certification, metrology and monitoring, energy audits and review, under energy efficiency criteria for new projects. According to the law, the policy of energy saving is implemented on the basis of realising specific programmes.

ANNEX 3 – ENERGY EFFICIENCY POLICY MONITORING: STATUS OF ENERGY EFFICIENCY TARGETS

Albania	No quantitative target for energy efficiency, but target for GHG emissions.
Armenia	A decree that has been submitted to the Prime Minister for approval provides that a National Energy Saving Programme which is indispensable for Armenia will be developed within two years to specify and, inter alia, quantify the key energy saving targets for both the energy industry and other economic sectors.
Australia	No quantitative target for energy efficiency, but target for GHG emissions.
Austria	Under the EU's Energy End-use Efficiency and Energy Services Directive, member states must achieve a minimum annual energy savings target of 9% by the ninth year in the period from 2008 to 2016.
Azerbaijan	No quantitative target for energy efficiency, but target for GHG emissions.
Belarus	The strategic task of energy efficiency activities in the period until 2020 is the reduction of energy intensity of the Gross Domestic Product (GDP) in the periods of: 2001-2005 – by 20-24% as compared to 2000; 2006-2010 – by 15-20% as compared to 2005; 2011-2015 – by 10-15% as compared to 2010; 2016-2020 – by 10-20% as compared to 2015.
Belgium	A priority objective is the reduction of energy consumption by 7.5% in 2010 compared to 1990. Under the EU's Energy End-use Efficiency and Energy Services Directive, member states must achieve a minimum annual energy savings target of 9% by the ninth year in the period from 2008 to 2016.
Bosnia and Herzegovina	No quantitative target for energy efficiency.
Bulgaria	Under the EU's Energy End-use Efficiency and Energy Services Directive, member states must achieve a minimum annual energy savings target of 9% by the ninth year in the period from 2008 to 2016.
Canada	No quantitative target for energy efficiency, but target for GHG emissions.

Croatia	No quantitative target for energy efficiency, but target for GHG emissions.
Cyprus	Under the EU's Energy End-use Efficiency and Energy Services Directive, member states must achieve a minimum annual energy savings target of 9% by the ninth year in the period from 2008 to 2016.
Czech Republic	Under the EU's Energy End-use Efficiency and Energy Services Directive, member states must achieve a minimum annual energy savings target of 9% by the ninth year in the period from 2008 to 2016.
Denmark	In September 2005 the Danish government launched an Action Plan for Renewed Energy Saving Measures. According to this plan energy distribution companies are committed to initiate energy savings among end users of minimum 7.5 PJ in 2006-2013. Presently negotiations are going on for a new National Energy Strategy that could tighten the targets. There was a 20% improvement in energy intensity between 1994 and 2005. The Kyoto commitment is to reduce GHG emissions by 21% in the first budget period 2008-2012, compared to 1990. Under the EU's Energy End-use Efficiency and Energy Services Directive, member states must achieve a minimum annual energy savings target of 9% by the ninth year in the period from 2008 to 2016.
Estonia	As the energy services directive was finalised in April 2006, and it includes a set of special provisions with regards of the energy efficiency strategies, the preparations of the new Energy Efficiency Target Programme are still in start-up phase. Under the EU's Energy End-use Efficiency and Energy Services Directive, member states must achieve a minimum annual energy savings target of 9% by the ninth year in the period from 2008 to 2016.
Finland	The energy efficiency target in Finland is to bring down total energy consumption by 4 to 5%, which corresponds to a reduction of about 1.5 Mtoe in 2010 compared to a situation in which new energy efficiency activities would not be implemented. CO_2 emissions would be reduced by around 4 million tonnes. The energy efficiency targets for the end-use sectors in 2010 are: industry 3%, transport 6%, heating of buildings 9%, electricity for residences 2% and electricity for services 3%. Under the EU's Energy End-use Efficiency and Energy Services Directive, member states must achieve a minimum annual energy savings target of 9% by the ninth year in the period from 2008 to 2016.

France	Under the EU's Energy End-use Efficiency and Energy Services Directive, member states must achieve a minimum annual energy savings target of 9% by the ninth year in the period from 2008 to 2016.
Georgia	Programme is being prepared but no targets to date.
Germany	Under the EU's Energy End-use Efficiency and Energy Services Directive, member states must achieve a minimum annual energy savings target of 9% by the ninth year in the period from 2008 to 2016.
Greece	Under the EU's Energy End-use Efficiency and Energy Services Directive, member states must achieve a minimum annual energy savings target of 9% by the ninth year in the period from 2008 to 2016.
Hungary	Increase energy efficiency by 3.5% per year; achieve energy savings at end of 2010 of 75 PJ per year. No quantitative target for energy efficiency, but target for GHG emissions. Under the EU's Energy End-use Efficiency and Energy Services Directive, member states must achieve a minimum annual energy savings target of 9% by the ninth year in the period from 2008 to 2016.
Iceland	No quantitative target for energy efficiency. Greenhouse gases in Iceland, under the Kyoto Protocol, are not to increase by more than 10% from the year 1990 to the annual average in the period 2008-2012.
Ireland	Under the EU's Energy End-use Efficiency and Energy Services Directive, member states must achieve a minimum annual energy savings target of 9% by the ninth year in the period from 2008 to 2016.
Italy	Under the EU's Energy End-use Efficiency and Energy Services Directive, member states must achieve a minimum annual energy savings target of 9% by the ninth year in the period from 2008 to 2016.
Japan	No quantitative target for energy efficiency, but target for GHG emissions.
Kazakhstan	Various objectives but no specific quantified target.
Kyrgyzstan	No quantitative target for energy efficiency.

Latvia	The objective of the strategy is to achieve a 25% decrease of the primary energy consumption per gross national product unit by 2010, reaching the average level in OECD in 1997. The objective set in the National Energy Efficiency Strategy to achieve a 25% decrease of the primary energy consumption per gross national product unit by 2010, reaching the average level in OECD in 1997, is still valid. Under the EU's Energy End-use Efficiency and Energy Services Directive, member states must achieve a minimum annual energy savings target of 9% by the ninth year in the period from 2008 to 2016.
Liechtenstein	No quantitative target for energy efficiency.
Lithuania	Under the EU's Energy End-use Efficiency and Energy Services Directive, member states must achieve a minimum annual energy savings target of 9% by the ninth year in the period from 2008 to 2016.
Luxembourg	Under the EU's Energy End-use Efficiency and Energy Services Directive, member states must achieve a minimum annual energy savings target of 9% by the ninth year in the period from 2008 to 2016.
Malta	No quantitative target for energy efficiency, but target for GHG emissions. Under the EU's Energy End-use Efficiency and Energy Services Directive, member states must achieve a minimum annual energy savings target of 9% by the ninth year in the period from 2008 to 2016.
Moldova	The National Energy Conservation Programme has quantitative target for energy efficiency of an annual reduction by 2% of the energy intensity up to year 2010 on average. Expected benefit – savings of energy resources annually up to $12 million.
Mongolia	No specific quantifiable targets other than for quantifiable targets to reduce technical and non-technical losses by 40-50% in the provinces and to decrease them two times in Ulaanbaatar. Now the losses are 20-40% in the provinces and 30% in Ulaanbaatar.
Netherlands	Action Programme calls for increasing the energy conservation from 1.6% to 2% improvements per annum. Under the EU's Energy End-use Efficiency and Energy Services Directive, member states must achieve a minimum annual energy savings target of 9% by the ninth year in the period from 2008 to 2016.

Norway	One of the Government's targets is to reduce the use of mineral oils for heating by 25% in the first commitment period under the Kyoto Protocol (2008-2012) compared with the average for the period 1996-2000.
Poland	The draft environmental policy calls for lowering energy intensity in industry by 50% until 2008-2012 from 1990 base. Under the EU's Energy End-use Efficiency and Energy Services Directive, member states must achieve a minimum annual energy savings target of 9% by the ninth year in the period from 2008 to 2016.
Portugal	There is a target for energy intensive industrial plants to reduce their specific energy consumption by 1% per year. Under the EU's Energy End-use Efficiency and Energy Services Directive, member states must achieve a minimum annual energy savings target of 9% by the ninth year in the period from 2008 to 2016.
Romania	The targets of the energy efficiency policy have been determined by accepting, as single hypothesis for the GDP growth, an average annual rate of 5.4% (basic scenario) and a decrease of 40% of the primary energy intensity in the period 2004-2015. Under the EU's Energy End-use Efficiency and Energy Services Directive, member states must achieve a minimum annual energy savings target of 9% by the ninth year in the period from 2008 to 2016.
Russian Federation	In accordance with the Energy Strategy to 2020, the specific energy intensity of the Russian economy should be reduced by 2020 (as compared with 2000) by half, including by 15% in 2005. The actual specific energy intensity was reduced in the five years though 2005 by 21%. There is a target for GHG emissions under the Kyoto Protocol.
Slovak Republic	Under the EU's Energy End-use Efficiency and Energy Services Directive, member states must achieve a minimum annual energy savings target of 9% by the ninth year in the period from 2008 to 2016.

Slovenia	According to the NEP, the target is to increase energy efficiency by 10% in a period 2004-2101 in all energy consumption sectors, and in particular by 15% in the public sector, which should serve as an example to other sectors. Beside that the target is also to double electricity production from cogeneration. Under the EU's Energy End-use Efficiency and Energy Services Directive, member states must achieve a minimum annual energy savings target of 9% by the ninth year in the period from 2008 to 2016.
Spain	The target was to reduce final energy demand by 7.6% in 2000 compared to 1991. Under the EU's Energy End-use Efficiency and Energy Services Directive, member states must achieve a minimum annual energy savings target of 9% by the ninth year in the period from 2008 to 2016.
Sweden	Targets proposed by the National Commission on Oil Independence in its report in 2006 include improvements in overall energy efficiency of at least 20% to 2020, 40-50% cuts in the use of petrol and diesel in road transport, 25-40% less oil in industry, and a complete phase-out of oil used in the heating of residential and commercial buildings. Under the EU's Energy End-use Efficiency and Energy Services Directive, member states must achieve a minimum annual energy savings target of 9% by the ninth year in the period from 2008 to 2016.
Switzerland	There are no energy efficiency targets per say, that compare to the new ones in the EU under the Energy Services Directive. The only legally binding target is derived from the Kyoto Protocol target, a 10% reduction in CO_2 emissions. For the period of 2001 to 2010, the following targets have been specified: A reduction of consumption of fossil fuels and of CO_2 emissions by 10%; the increase of the consumption of electricity should not exceed 5%; the share of hydro-based electricity generation should not decrease – despite the liberalisation in the electricity market; the contribution of renewable energies should increase by 0.5 TWh (i.e., a 1% increase of the share) with regard to electricity generation, and by 3 TWh (a 3% increase of the share) with regard to the heat production, respectively.
Tajikistan	No quantitative target for energy efficiency, but target for GHG emissions.

The Former Yugoslav Republic of Macedonia	The energy programmes suggested by the Energy Efficiency Strategy are estimated under high, medium, and low penetration scenarios. The actual penetration levels will reflect factors including energy pricing and billing practices (e.g., higher energy prices and increased use of consumption-based billing should produce higher penetration rates); marketing of the programmes; and other energy policy and programme administration considerations including public education and training of specialists.
Turkey	No quantitative target for energy efficiency, but target for GHG emissions.
Turkmenistan	No quantitative target for energy efficiency, but target for GHG emissions.
Ukraine	There was a target to achieve fuel and energy resource savings at the level of 33 Mtoe during 1996-1999, including 6.5 Mtoe in 1999. This target was not achieved. By the end of 2010 versus 2000, the plan is to reduce annual energy consumption by 50-60 Mtoe, or approximately by 40-45% of the 2000 primary energy resource consumption level. There is a target for GHG emissions.
United Kingdom	Under the EU's Energy End-use Efficiency and Energy Services Directive, member states must achieve a minimum annual energy savings target of 9% by the ninth year in the period from 2008 to 2016. The 2007 National Energy Efficiency Action Plan includes an expectation that this target will be exceeded, with delivery of 272.7 TWh in savings by the end of 2016 – equivalent to a saving of 18% over the target period.
United States	No quantitative target for energy efficiency.
Uzbekistan	Under the National Energy Conservation Programme, average annual savings of fuel and power resources in the whole of Uzbekistan are expected to total 11.08 million tonnes of oil equivalent (Mtoe) subject to capital inputs of US $4.06 billion.

ANNEX 4 – ENERGY EFFICIENCY POLICY MONITORING: STATUS OF ENERGY EFFICIENCY ORGANISATIONS/AGENCIES

Albania	The National Agency of Energy of Albania (NAE) was created in May 1998. The Agency has been established on the basis of a Decision of the Council of Ministers, which outlined the transfer of responsibility for technical and administrative functions from existing institutions to the new Energy Agency. The National Agency of Energy was created by merging the National Committee and the Executive Household Energy Agency.
Armenia	By its Decree No. 55-H of January 25, 2005, the Armenian Government designated the Energy Ministry as the government authority in charge of energy efficiency policy implementation.
Australia	The Department of Industry, Science and Resources is responsible for energy policy at the federal level. State governments have responsibilities that impact energy efficiency. The Australian Greenhouse Office (AGO) deals with many energy efficiency issues.
Austria	The Federal Ministry of Economic Affairs and Labour is responsible for energy matters at the federal level. Its counterparts at the Länder level are corresponding units of the administrations of the Länder Governments. EVA – The Austrian Energy Agency – is the national implementation agency. In addition there are energy agencies or comparable organisations in most Länder.
Azerbaijan	The Department of Fuel and Energy Industry within the Ministry of Economy is responsible for implementing energy efficiency measures. The Energy Saving and Management Centre, created in 1999, is the executive agency under the Ministry.
Belarus	Belenergo is responsible for energy conservation.
Belgium	The Federal government's role is to coordinate Agencies in the regions through CONCERE. The Federal responsibility lies with the Ministry of Economic Affairs and the Federal Administration for Energy.
Bosnia and Herzegovina	The State of Bosnia and Herzegovina consist of two entities. The energy sector in Bosnia and Herzegovina is not integrated at the state level. The Ministry of Foreign Trade and Economic Relations is responsible for the creation of energy policy, coordination of entities and international relations in the energy sector. Entity governments through their Energy Ministries have the responsibility for other issues in the energy sector including energy efficiency.

Bulgaria	The State Energy Efficiency Agency (SEEA) has been made the state authority for the elaboration and conducting of state policy for rational use of energy resources and renewables (RES).
Canada	The Office of Energy Efficiency is a branch within the Department of Natural Resources Canada, the ministry responsible for energy. Established in April 1998 as part of Natural Resources Canada, the OEE's mandate is to renew, strengthen and expand Canada's commitment to energy conservation and energy efficiency. The OEE originated out of Canada's commitment to reduce greenhouse gas emissions by 6% below 1990 levels over the period between 2008 and 2012, as agreed under the Kyoto Protocol.
Croatia	The Ministry of Economy, Labour and Entrepreneurship is responsible for energy efficiency, although a number of other ministries are also involved. The "Hrvoje Požar" energy institute has been appointed by the Government as the national body for carrying out national energy programmes. Croatia works closely with the GEF, World Bank and UNDP in developing and implementing projects.
Cyprus	The Ministry of Commerce, Industry and Tourism is responsible for energy policy. The Applied Energy Centre (AEC) within the Ministry promotes energy efficiency and renewables. The Cyprus Organisation for Standards and Control of Quality is also involved in preparing the Cyprus Standards in Thermal Insulation and their use in the domestic sector. The Cyprus Institute of Energy is heavily involved in the harmonisation process for accession to the EU.
Czech Republic	The Ministry of Industry and Trade and the Ministry of Environment are responsible for the fulfilment of the National Programme targets of efficient energy use and the increase of renewable and secondary energy sources. Within the Ministry of Industry and Trade is the Czech Energy Agency which is entrusted with the preparation, declaration and execution of government programmes.
Denmark	The Ministry of Economy and Business Affairs is responsible for energy efficiency. The Danish Energy Authority, within the Ministry, is the executive agency for energy matters, including energy efficiency.

Estonia	The Energy Department within the Ministry of Economic Affairs and Communication is responsible for energy efficiency. Different options to improve the implementation of energy efficiency policy have been investigated in Estonia. The MoEAC agrees that a separate organisation with its own budget and management could simplify the coordination of work and improve the visibility of energy efficiency policy achievements, but it might also create additional administrative costs. An alternative solution would be to integrate energy efficiency policies into the work of existing agencies.
Finland	The Ministry of Trade and Industry (MTI) is responsible for the energy efficiency policy. The Ministry also has specific implementing functions in the areas where there is no other suitable agency available. MOTIVA, the Information Centre for Energy Efficiency, was created to implement energy efficiency programmes. It is an independent non-profit agency.
France	The responsibility for energy efficiency lies with the Ministry of Economy, Finance and Industry. The Executive agency is ADEME (The Agency for the Environment and Energy Management).
Georgia	The Ministry of Energy and its Department of Energy Policy and International Relations are responsible for the development of energy efficiency policies and legislation. The main actor in energy efficiency is the Energy Efficiency Centre that was set up through the EU's TACIS project in 1999, which also gained support from the Norwegian government. While it resides within the building of the Ministry of Energy, it is independent.
Germany	At the Federal level the responsibility for energy efficiency is with the Ministry of Economics and Labour. A new national energy agency, the Deutsche Energie-Agentur (dena) was established in 2000, and is the competence centre for energy efficiency and renewable energies. Many Länder (states) have regional agencies. Dena is creating a network information system, working closely with energy agencies in federal states or municipalities and other similar agencies.

Greece	The responsibility for energy efficiency is with the Ministry of Development and its Energy Department. The Ministries of Transport and of Environment, Physical Planning and Public Works are also strongly involved in energy efficiency matters. The Centre for Renewable Energy Sources (CRES), a research organisation under the auspices of the Ministry of Development, plays an important role as the national energy centre in providing consultancy to the government on energy efficiency and RES issues, in implementing energy efficiency programmes and in collecting data related to energy.
Hungary	The Ministry of Economic Affairs is responsible for overall energy policy, including energy efficiency. The Energy Centre, which was created in 2000 out of two energy agencies (the Energy Information Agency and the EU-Hungarian Energy Centre), was formally appointed as the national coordinator for energy efficiency programmes in Hungary. The National Energy Efficiency Programme is coordinated by the Interministerial Energy Efficiency Steering Committee.
Iceland	The Ministries of Industry and Commerce (which are, according to law, two ministries under one Minister) have the overall responsibility for energy-related topics. An energy agency, Orkusetur, funded by the EU, was established in 2005. The Special Committee was established in 1995 by the Ministry of Industry and Commerce to promote energy efficiency in residential heating.
Ireland	There are three main bodies responsible for the formulation and implementation of government energy policy: the Department of Communications, Marine and Natural Resources (DCMNR); the independent Commission for Energy Regulation (CER) and Sustainable Energy Ireland (SEI), which advise the government on energy and sustainability issues and deliver relevant R&D programmes.
Italy	The Ministry of Industry, Trade and Handicraft (MICA) is the main body responsible for energy efficiency matters. The National Agency for New Technology, Energy and the Environment (ENEA) is responsible for the research and dissemination of new technologies covering energy efficiency, renewables and environmental technology.
Japan	The responsibility for energy efficiency rests with the Ministry of Trade and Industry. The main agency is the Japan Energy Conservation Centre.

Kazakhstan	The Ministry of Energy, Industry and Trade is responsible for implementing the state energy saving policy.
Kyrgyzstan	The Ministry of Foreign Trade and Industry is responsible for energy efficiency implementation. The State Energy Agency is involved in the implementation of energy efficiency measures and programmes.
Latvia	The Ministry of Economy with its Energy, Building and Dwelling Departments is involved in energy efficiency policy of Latvia. The Investment and Development Agency of Latvia and the Housing Agency are under the supervision of the Ministry of Economy and both agencies are dealing with energy efficiency issues. The Energy Division of the Public Sector Development Department of the Investment and Development Agency of Latvia acts as the National Energy Agency. The Housing agency coordinates energy efficiency policy in the housing sector. The Public Utilities Commission sets up tariffs in sectors under state regulation. The Energy Inspectorate performs energy efficiency controls, according to the Energy Law. The Department of Climate Change and Renewable Energy of the Ministry of Environment and the Environmental Investment Fund supervised by this ministry are also involved in energy efficiency issues, and so is the Ministry of Transport.
Liechtenstein	The Ministry for National Economy is responsible for energy policy and programmes. The Ministries of Transport, Environment and Public Construction are also involved.
Lithuania	The Lithuanian Energy Agency within the Ministry of Economy is responsible for energy efficiency. Various other agencies develop and implement various programmes.
Luxembourg	The National Energy Council is the advisory body on energy issues. The executive agency is the Energy Agency, which is a company under private law whose shareholders are the government and two electricity companies.
Malta	The ministry responsible for energy efficiency policy is the Ministry for Resources and Infrastructure. There are many government bodies responsible for various aspects of energy and energy efficiency. These include the Malta Resources Authority that was established in 2001 to regulate, monitor and keep under review all practices, operations and activities related to energy.

Moldova	Since 2002, the Ministry of Energy is responsible for the overall coordination of energy efficiency activities. It is responsible for the development and implementation of the Law on Energy Conservation and the energy conservation programme and has the authority to engage other ministries and agencies in this process. The National Agency for Energy Conservation was created in January 1995, as a state enterprise under the Ministry of Energy. In November 2002, the government changed the status of the National Agency for Energy Conservation from a state company into a government authority and made it responsible, inter alia, for the administration of the National Fund for Energy Conservation. Other bodies involved in the implementation of energy efficiency measures include the Moldovan Research and Development Association, the Union of Power Engineers of Moldova and the Union of Energy Consumers.
Mongolia	The Ministry of Infrastructure is responsible for energy policy. The Ministry of Finance and Economy, Ministry of Agriculture and Industry, Ministry of Environment and several main agencies are involved in energy efficiency policies.
Netherlands	The Ministry of Economic Affairs is responsible for the energy efficiency policy. The executive agency is SenterNovem which is an agency of the Ministry.
Norway	The responsibility for energy efficiency lies with the Ministry of Petroleum and Energy. The Norwegian Water Resources and Energy Administration (NVE) is responsible for the administration in the field of energy efficiency. There are regional energy efficiency centres. In 2001, the government created a new central agency, ENOVA, responsible for implementing energy efficiency policies and programmes. Enova SF became operational on January 1, 2002. It is a public enterprise owned by the Royal Norwegian Ministry of Petroleum and Energy. Its main mission is to contribute to environmentally-sound and rational use and production of energy, relying on financial instruments and incentives to stimulate market actors and mechanisms to achieve national energy policy goals.
Poland	Many ministries are involved in the energy efficiency policy, including the Ministry of Economy. The Polish National Energy Conservation Agency (KAPE) is responsible for developing the national and sectoral energy efficiency policies. There are also regional agencies.

Portugal	The responsibility for energy efficiency is with the Directorate General of Energy of the Ministry of Economy. AGENE is the executive agency.
Romania	According to the Law on the Efficient Use of Energy, the Romanian Agency for Energy Conservation (ARCE) is the specialised body at national level in the field of energy efficiency, with a legal personality, functional, organisational and financial autonomy, under the subordination of the Ministry of Economy and Commerce.
Russian Federation	At the federal level, the major part of activities to improve energy efficiency in Russia is implemented by the Ministry of Industry and Energy together with the Ministry of Economic Development and Trade, the Federal Energy Agency, the State Agency for Technical Regulation and Metrology. Most regional entities have ministries or organisations responsible for energy efficiency.
Slovak Republic	The Ministry of Economy is responsible for the energy efficiency policy. The Slovak Energy Agency, formed in 1999, is the only national agency dealing with energy efficiency. Other ministries (e.g., the Ministries for Construction and Regional Development, Environment or Transport) have specific responsibilities related to energy efficiency.
Slovenia	Since 2005, the responsibilities for energy have been divided between two ministries. The Directorate for Energy within the Ministry of Economy is responsible for general energy policy and energy supply, including production of electricity with the use of renewables. The Directorate for European Affairs and Investments within the Ministry of Environment and Spatial Planning (MOP) is responsible for end-use energy efficiency and production of heat with the use of renewables. The MOP coordinates its energy efficiency activities with other ministries, such as the Ministry of Health, the Ministry of Education and Sport, the Ministry of Higher Education, Science and Technology, the Ministry of Transport, and the Governmental Office for Local Self-government and Regional Policy. For the implementation of energy efficiency policy, besides the Department for Energy Efficiency and Renewable Energy within the Directorate for European Affairs and Investments, there is also an Environmental Fund.
Spain	The responsibility for energy efficiency is with the Ministry of Industry and Energy. IDAE is the executive agency. There are also provincial agencies.

Sweden	The Ministry of Industry, Employment and Transport had the responsibility for energy efficiency policy until 2005, when the new Ministry of Sustainable Development took over. The executive agency is the Swedish Energy Agency, STEM. STEM is responsible for the implementation of energy efficiency policy programmes and measures in the residential, services and industry sectors. The Energy Agency shares responsibility with the Swedish Environment Protection Agency on climate-related programmes, particularly the implementation of the European Emissions Trading Scheme.
Switzerland	The Federal Department for Transport, Communication and Energy (DETEC) is the leading ministry for energy policy. Within the Department, the Federal Office of Energy (SFOE) is responsible for implementing energy efficiency policies and running the SwissEnergy Programme. There are other agencies involved in the implementation, including the Energy Agency of Swiss Economy, the Agency for Renewable Energy and Energy Efficiency, the Energy Agency for Electric Appliances and the Swiss Agency for Energy Efficiency.
Tajikistan	Energy policy is the responsibility of the Ministry of Energy.
The Former Yugoslav Republic of Macedonia	The Ministry of Economy (the Energy Department) is responsible for all issues in the field of energy, including energy efficiency. In July 2005, the Law on Founding the Energy Agency of the Republic of Macedonia was adopted. The founding of the Energy Agency is already in process. The Agency will be independent in its work, and financially accountable to the Ministry of Economy. The defined role of the Agency is to initiate, coordinate, study and prepare appropriate documents, together with domestic and foreign specialised companies and experts, and to suggest concrete solutions and activities to the government, through the Ministry of Economy.
Turkey	The Department of Natural Resources and Energy is responsible for energy efficiency. The General Directorate of Electric Power Resources Survey and Development Administration (EIEI) is responsible for energy efficiency implementation and includes the National Energy Conservation Centre.
Turkmenistan	The responsibility for energy efficiency is with the Ministry of Energy and Industry.

Ukraine	The Ministry of Fuel and Energy is responsible for the energy efficiency policy. The new National Agency of Ukraine on Efficient Energy Use was approved in December 2005 and began its work in early 2006. It reports to the Cabinet of Ministers and is a government body with a special status.
United Kingdom	The Department for Environment, Food and Rural Affairs (DEFRA) has overall responsibility for the energy efficiency policy and provides funding to two organisations to promote energy efficiency. The Energy Saving Trust works to promote, through partnership, the sustainable and efficient use of energy in the domestic and small business sectors, spreading the message of energy efficiency through advertising programmes, a network of advice centres and the endorsement of energy efficient products. The EST also receives support from the Scottish Executive. The Carbon Trust, which was set up in April 2001, supports businesses and the public sector in the taking up of existing, new and emerging low-carbon technologies and measures. Northern Ireland and Scotland have separate arrangements for energy efficiency responsibilities.
United States	The Office of Energy Efficiency and Renewable Energy is within the Department of Energy. Many States have offices responsible for energy efficiency.
Uzbekistan	The Department for Fuel and Power Sector Development under the Uzbek Cabinet of Ministers develops national energy efficiency strategies. The Ministry of Economy is responsible for implementing energy efficiency policies and supervising the fulfilment of related programmes. The Uzneftegazinspektsia and Uzenergonadzor state inspection services under the Cabinet of Ministers are likewise involved in the planning and implementation of energy efficiency programmes and measures to rationalise the use of oil products, gas, power, and heat; arrange and perform systematic reviews of energy efficiency in different economic sectors; undertake energy-related studies and due diligence checks of generators and users of electric and thermal energy; assist in the efforts to furnish favourable conditions for tapping renewable energy sources; and exercise control over the generation, distribution, and consumption of electricity and coal.

MAIN ACRONYMS

ACC4	Four accession countries: Bulgaria, Romania, Turkey and Croatia
CDM	Clean Development Mechanism, a flexible mechanism under the Kyoto Protocol
CEEC	Central and East European Countries
CIS	Commonwealth of Independent States (former Soviet Union, except for Baltic States)
CO_2	Carbon dioxide
EBRD	European Bank for Reconstruction and Development
EC	European Commission
ECS	Energy Charter Secretariat
EFTA	European Free Trade Association (Iceland, Norway, Switzerland and Liechtenstein)
EU	European Union
EU ETS	European Union Emissions Trading System
FSU	Former Soviet Union
GEF	Global Environment Facility
GHG	Greenhouse Gases
IEA	International Energy Agency
IFC	International Finance Corporation, part of World Bank Group
IFI	International Financial Institutions
JI	Joint Implementation, a flexible mechanism under the Kyoto Protocol
kWh	Kilowatt-hour
Mtoe	Million tonnes of oil equivalent
OECD	Organisation for Economic Co-operation and Development
OPET	Organisation for the Promotion of Energy Technologies
PCF	Protocol Carbon Fund
PEEREA	Protocol on Energy Efficiency and Related Environmental Aspects
toe	tonnes of oil equivalent
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNECE	United Nations Economic Commission for Europe
UNFCCC	United Nations Framework Convention on Climate Change
VAs	Voluntary Agreements
WB	World Bank

SELECTED BIBLIOGRAPHY

European Commission, Winning the Battle Against Global Climate Change, COM (2005)35 final, Brussels 9.2.2005

European Commission, Action Plan for Energy Efficiency: Realising the Potential, COM(2006)545, Brussels, October 19, 2006

Energy Charter Secretariat, Carbon Trading and Energy Efficiency, Brussels, 2005

Energy Charter Secretariat, Fiscal Policies for Improving Energy Efficiency: Taxation, Grants and Subsidies, Brussels, 2001

Energy Charter Secretariat, Financing Energy Efficiency, Application Manual, Brussels

Energy Charter Secretariat, Investing in Energy Efficiency, Removing the Barriers, Brussels, 2004

Energy Charter Secretariat, In-depth Review of Energy Efficiency Policies and Programmes of Georgia, Brussels, 2006

Energy Charter Secretariat, In-depth Review of Energy Efficiency Policies and Programmes of Denmark, Brussels, 2006

Energy Charter Secretariat, Putting a Price on Energy: International Pricing Mechanisms for Oil and Gas, Brussels, 2007

Energy Charter Secretariat, The Road Towards an Energy-Efficient Future, Report to the Ministerial Conference "Environment for Europe," Kiev, Ukraine 2003, Brussels, May 2003

EBRD, Energy Operations Policy, London, July 11, 2006

EBRD, Transition Report 2006, London, 2006

Government of the Netherlands, Second Memorandum on Energy Conservation, The Hague, December 1993

IEA, Energy Statistics Manual, OECD, Paris, 2005

IEA, Energy Technology Perspectives 2006, OECD, Paris, 2006

IEA, Light's Labour's Lost, Policies for Energy-efficient Lighting, OECD, Paris, 2006

IEA, Optimising Russian Natural Gas, Reform and Climate Policy, OECD, Paris, 2006

IEA, Fuel Efficiency of Passenger Cars, OECD, Paris, 1984

IEA, Things That Go Blip in the Night, OECD, Paris, 2001

IEA, Cool Appliances, Policy Strategies for Energy-Efficient Homes OECD, Paris, 2003

The Energy Conservation Centre, Japan Energy Conservation Handbook 2005/2006, Japan

IEA, Energy Security and Climate Policy, Assessing Interactions, OECD, Paris, 2007

IEA, Climate Change Policy Initiatives, OECD, Paris, 1992

IEA, World Energy Outlook 2006, OECD, Paris, 2006

IEA, Oil Crises and Climate Challenges, 30 Years of Energy Use in IEA Countries, OECD, Paris, 2004

Reinaud, J., Emissions trading and its possible impacts on investment decisions in the power sector. IEA information paper, Paris, 2003

Policy Developments and Challenges in
Delivering Energy Efficiency

Energy efficiency has never been as relevant as it is today. If the global potential for energy saving can be realised, this would have profound implications for energy security and for avoiding greenhouse gas emissions.

The main challenge for policymakers is how to deliver real, tangible improvements in energy efficiency, but this is a complex task. Our use of energy is part of the fabric of our daily lives and our economies, and our choices about energy depend on a host of factors, including available technologies and information, and the structure and operation of national markets. Changing the way that we use energy is not something that can be done overnight.

Yet this report demonstrates that delivering energy efficiency is possible, and examines in detail the ingredients that can contribute to successful development and implementation of energy efficiency policies and programmes. Drawing upon the experience of countries from Western Europe to Central Asia, along with examples from Japan, Australia and the United States, it provides an invaluable guide to recent developments, current policies and to the challenges that remain.

The analysis is drawn from the work conducted by the Energy Charter on the implementation of its multilateral Protocol on Energy Efficiency and Related Environmental Aspects (PEEREA), and was completed with cooperation from the European Bank for Reconstruction and Development and from Euroheat & Power.

In line with the request in the Ministerial Declaration adopted in Kiev in 2003, this report was presented to the 2007 Belgrade Ministerial Conference of the UNECE 'Environment for Europe' process.

Energy Charter Secretariat
with cooperation from
European Bank for Reconstruction and Development
Euroheat & Power
ISBN 978-905948-053-7