



European Bank
for Reconstruction and Development

Securing sustainable energy in transition economies



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Contents



02	Map of the transition countries
05	Foreword
07	Introduction
08	Electricity demand, energy intensity and the environment
10	Monitoring reform: the Index of Sustainable Energy
14	Towards a policy agenda for sustainable energy reform
16	Conclusion
17	Abbreviations

Transition countries





Central eastern Europe
and the Baltic states
Population (million)

Czech Republic	10.3
Estonia	1.3
Hungary	10.1
Latvia	2.3
Lithuania	3.4
Poland	38.1
Slovak Republic	5.4
Slovenia	2.0

South-eastern Europe
Population (million)

Albania	3.2
Bosnia and Herzegovina	3.8
Bulgaria	7.7
Croatia	4.4
FYR Macedonia	2.0
Montenegro	0.7
Romania	21.7
Serbia	9.9

Commonwealth of Independent
States and Mongolia
Population (million)

Armenia	3.2
Azerbaijan	8.4
Belarus	9.7
Georgia	4.5
Kazakhstan	15.4
Kyrgyz Republic	5.1
Moldova	3.4
Mongolia	2.7
Russia	142.2
Tajikistan	6.6
Turkmenistan	6.5
Ukraine	47.1
Uzbekistan	26.0



Foreword

by the EBRD's Chief Economist



As the transition economies in the EBRD region continue to develop and grow rapidly, they face a common challenge: securing a sustainable supply of energy and ensuring it is used efficiently, while limiting carbon emissions and protecting the environment.

The legacy of central planning, with artificially low energy prices that encouraged wasteful use together with inefficient infrastructure, has burdened the transition countries with a weak starting point on the path to sustainable energy. In some countries, much has been done to overcome this burden but others still lag well behind international standards for energy efficiency, development of renewable energy sources and policies to address climate change. This brochure introduces a new monitoring tool – the Index of Sustainable Energy (ISE) – that allows experts and policy-makers to benchmark individual countries' progress in each of these three areas.

The purpose of the ISE, like the EBRD transition indicators that we update each year in the *Transition report*, is to stimulate discussion of each country's existing policy framework and to promote reform. The ISE offers a means to assess how closely a country's policies, institutions and performance follow international best practice. The starting points for all countries differ, as do the incentives and opportunities to make rapid progress. By establishing a common yardstick, however, policy-makers and opinion leaders can ascertain progress in their own country and learn from the experience of others.

The key to sustainable energy is systemic change. Simply replacing old equipment with new is not enough. The effectiveness of specific projects or initiatives depends critically on the quality of institutions and the nature of market incentives. Systemic change requires new laws, regulations and institutions (such as energy efficiency agencies and renewable energy associations). It also requires the introduction of market incentives, such as cost-reflective tariffs, green certificates, carbon taxes and other instruments. This is the core of what the ISE attempts to measure.

For now, we have only a snapshot of how the transition countries stack up against each other in the various aspects of systemic change. But what this snapshot already reveals in terms of regional variation and specific challenges is interesting and we hope that it can guide the Bank's operations in various countries. Regulatory change is often brought about in the context of specific investments, and new projects test the implementation and enforcement of existing regulatory and supervisory arrangements.

In the years to come, as further data is gathered, enforcement of laws on the books is assessed and a time series of the ISE indicators is developed, we expect the ISE to play an even more instrumental role in shaping the response to the sustainable energy challenge in the transition region.

Erik Berglöv
Chief Economist of the EBRD
April 2008



Introduction



Economic growth in the transition countries of eastern Europe and the former Soviet Union has been robust since the beginning of this decade at around 6 per cent on average – the fastest of any region over this period, with the exception of developing economies in Asia. However, to maintain these high growth rates and continue the process of convergence with developed economies, the transition countries will find it increasingly important to ensure a long-term, secure, affordable and environmentally sound supply of energy.

The quest for sustainable energy is a major challenge for the transition region, from the most advanced countries that now have a place in the European Union to the early reformers in the former Soviet Union. Sustainable energy – that is, energy production, distribution and use that give future generations the same opportunity to access energy services as those enjoyed by the current generation – can only be achieved by integrating the modern policy goals of energy efficiency, promotion of renewable energy sources and the mitigation of environmental damage into the core business of the energy and other sectors. These basic ingredients will not only support long-term economic growth but also contribute to enhanced energy security: more efficient generation and energy use, combined with the further development of renewable sources, open the way for non-depletable, domestically available and diversified energy resources that are affordable and have a smaller environmental footprint. The Index of Sustainable Energy (ISE), introduced in this brochure, helps track progress in implementing the essential elements of sustainable energy.

The challenge of securing sustainable energy is shared across the entire transition region, but the starting points are by no means the same. The transition countries have widely varying natural resource endowments of domestic energy. Investment in exploration at new fields and in oil and gas transit has been insufficient in recent years, making it difficult for supplier countries to meet rising domestic and foreign demand.

In countries with limited domestic energy resources, concern is growing over long-term security of supply. Many are overly dependent on a few methods of generation – typically a combination of fossil fuels – and on imports. The energy-importing countries in the transition region are vulnerable to supply disruption as they depend on a combination of only four countries in the region with large oil and natural gas reserves – Azerbaijan, Kazakhstan, Russia and Turkmenistan – and have few import routes. The threat of power shortages and concerns over security of supply push some countries to exploit reserves of domestic coal, often very polluting lignite, to replace imported fuels such as natural gas for power generation.

Both supplier and recipient countries have developed an excessive reliance on fossil fuels that is not sustainable in the long run, due not only to their increasing scarcity and costs, but above all because of their profound environmental impact, including the damaging effect on the Earth's climate.

Large-scale hydropower plants and nuclear power have a smaller carbon footprint, but their sustainability is also in doubt. Poor water resource management in countries with very large hydropower stations has led to significant disruptions to natural ecosystems and caused social tensions. Where nuclear power accounts for the bulk of generation capacity (for example in Armenia and Lithuania), sustainability is threatened by the risk of accidents, the long-term costs of decommissioning reactors and the management of nuclear waste.

The challenges are varied across the transition region, but it is becoming increasingly evident that all countries will need to develop coherent policies to guarantee a steady supply of energy, to use energy efficiently and to minimise the impact of energy use on the environment.

Electricity demand, energy intensity and the environment

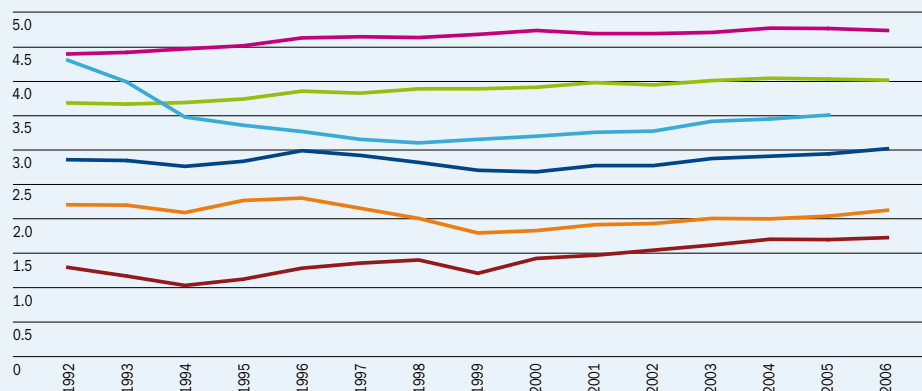


The early experience of transition, when there was excess capacity for energy production, is over. Demand for energy, mainly electricity, has been rising strongly for several years and will continue to do so as countries in the region keep growing (see Chart 1). In the long run, per capita consumption of electricity can be expected to converge with the levels similar to that of industrialised OECD (Organisation for Economic Co-operation and Development) countries.

However, as demand has continued to grow, as losses in conversion and transmission remain high and as investment in capacity has failed to keep pace, electricity shortages are looming in parts of the region, including south-eastern Europe (SEE), several regions of Russia and southern Kazakhstan. Lack of heating in houses, frequent power blackouts and rationing of gas in Central Asian countries (in particular in the Kyrgyz Republic, Tajikistan and Uzbekistan) during recent extremely cold winters have exposed the poor state of crumbling communist-era utilities and pipelines.

The legacy of central planning, with its absence of market signals, reliance on energy-intensive industry and, in some countries, abundance of energy resources, combined to make energy usage in the region wasteful and carbon-intensive. Although the recent trend in energy intensity shows that it takes a decreasing amount of energy to produce a unit of GDP, the gap between the early and advanced industrialised countries is still wide in places (see Chart 2). For example, countries in the Commonwealth of Independent States and Mongolia (CIS+M) have reduced their energy intensity by about one-third since 1994, from a very high level.

Chart 1
Per capita total primary energy consumption



Source: Enerdata, World Energy Database, December 2007

Notes: Primary energy consumption is measured in toe (tonnes of oil equivalent).

EU-15 includes the EU member states, before enlargement in May 2004. EU-8 includes "new" member states from central and eastern Europe, excluding Bulgaria and Romania. EU-2 includes Bulgaria and Romania, which joined in January 2007. SEE refers to the south-eastern European countries of the Western Balkans and Croatia. CIS+M refers to the countries of the Commonwealth of Independent States and Mongolia. OECD refers to the advanced industrialised economies of the Organisation for Economic Co-operation and Development. Regional aggregates are weighted averages of country data. Data for the CIS+M for 2006 is incomplete and so a regional average could not be calculated.

However, at purchasing power parities (PPP)¹ these countries still use more than three times as much energy to produce a unit of GDP as in western Europe, and almost 2.7 times more than the OECD average. At the high-intensity end in the CIS+M are the Central Asian countries, which are four to six times less energy efficient than the EU average. Countries in SEE have made smaller strides than those in the CIS+M in reducing energy intensity in the same period, but their starting point was closer to OECD countries. Finally, new EU member states have significantly decreased their energy intensity to a level that is still higher than the EU-15, but converging with the OECD average.

Of course, differences in energy intensity can only partly be explained by the varying levels of efficiency with which energy is produced and used. The intensity ratio is also determined by the level of GDP itself – low-income countries, for example, will usually have a higher energy-to-GDP ratio. Different intensities are also related to factors outside of government control, such as variations in climate – eastern Europe and central Asia with cold continental or arid climates need more energy irrespective of their level of economic activity. Different economic structures may also play a part: a country with a large primary manufacturing sector is going to use more energy than one that is mainly agrarian or service-oriented.

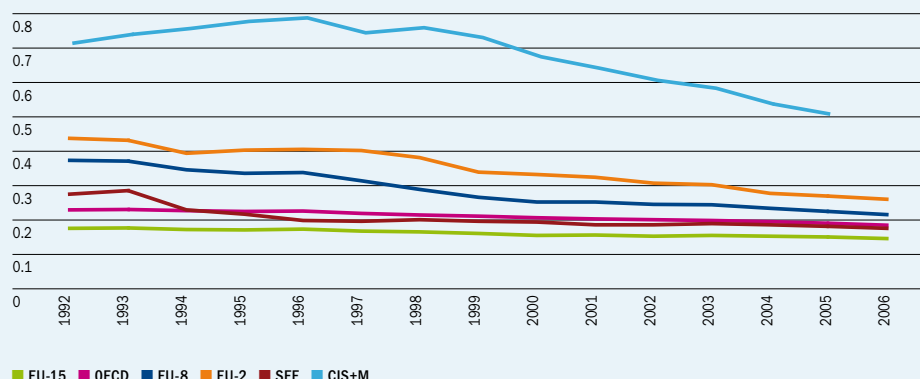
Reliable indicators of national energy efficiency (that is, energy intensity corrected for climate conditions and economic structures) are not yet available, yet some industry-specific indicators and other studies already suggest that even adjusted for colder weather and different economic structures, transition countries still have a long way to go towards improving energy efficiency to the standards of the mature market economies of western Europe.

Reducing energy intensity and increasing efficiency is only part of the challenge. With the growing reliance on fossil fuels to produce energy, the carbon intensity (emissions per unit of GDP at PPP) of industrial production is also a major concern. Of the countries in the transition region, Russia ranks as the third largest global emitter of carbon dioxide from the combustion of fossil fuels. Kazakhstan, Poland and Ukraine rank among the top 25 countries for global carbon emissions. Overall, the transition region accounts for about 12 per cent of global greenhouse emissions, with only 6.5 per cent of the global population and 6 per cent of global GDP, according to the latest available comparable data.² The good news is that due to the sharp fall in output following the collapse of communism and the subsequent restructuring towards more service-oriented economies, the transition region is the only part of the world that has significantly decreased carbon emissions since 1990, the UN Framework Convention on Climate Change (UNFCCC) base year.

Among all parties to the UNFCC, Kazakhstan, Ukraine and Uzbekistan rank as the three most carbon intensive.³ Of the world's 20 most carbon intensive economies, 13 are EBRD countries of operations.⁴ While carbon intensities of GDP are among the highest in the world, none of the countries ranks in the top 10 in terms of emissions per capita, although the Czech Republic, Kazakhstan and Russia are among the top 15 carbon polluters.⁵ As Chart 3 shows, there is significant scope to reduce the carbon footprint of the energy sector in the transition region, particularly in the CIS+M, both by reducing energy use per unit of output (moving downwards along the vertical axis) and by switching to low carbon energy sources (moving leftwards along the horizontal axis).

The shift to sustainable energy will be neither quick nor easy. Many countries still struggle to align their immediate energy needs to feed short-term growth with their long-term aim of a sustainable energy supply and broader economic development. Creating a

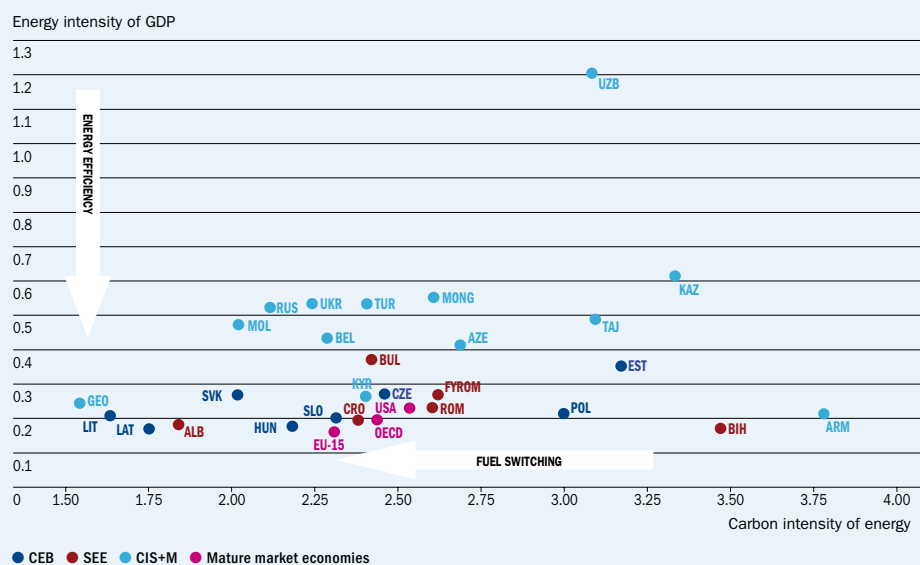
Chart 2
Total primary energy consumption per unit of GDP (PPP1995)



Source: Enerdata, World Energy Database, December 2007

Notes: Primary energy consumption is measured in ktoe (kilotonnes of oil equivalent). Regional aggregates are weighted averages of country data. See Chart 1 for a description of country groupings. Data for the CIS+M for 2006 is incomplete and so a regional average could not be calculated.

Chart 3
Carbon intensity versus energy intensity



Sources: Enerdata, World Energy Database, December 2007 and Energy Information Administration, International Energy Annual 2005

Notes: Energy intensity is total primary energy consumption (measured in ktoe (kilotonnes of oil equivalent)) per dollar of GDP (PPP1995). Carbon intensity is carbon dioxide emissions from the consumption and flaring of fossil fuels (measured in thousand metric tonnes of carbon dioxide) per dollar of GDP (PPP1995). Regional aggregates are weighted averages of country data.

sustainable energy infrastructure will require a root and branch overhaul of the centralised, energy-intensive production and consumption patterns inherited from the communist past. The move to sustainable energy will also require a new awareness and skills among policy-makers, project developers and financial institutions.

The transition to sustainable energy will not be possible with “business as usual” policies in the region. Major acceleration of investments in energy efficiency and new clean capacity may not materialise

unless changes are made in the policy framework to provide incentives to millions of dispersed market players: project owners and developers, suppliers of technology, financial institutions and energy users. The countries in the region differ greatly in this respect, ranging from some central and eastern European countries that have largely taken on the European Union's enabling conditions, to some countries in the CIS+M where little has changed since Soviet times, keeping long-term sustainability off the mainstream energy policy agendas.

Monitoring reform: the Index of Sustainable Energy



The ISE is a new tool that allows policy-makers to measure both the sustainability of current energy management practices and the potential for improvement. The ISE is a composite index of (i) institutions (ii) market incentives and (iii) outcomes in three areas relevant to the use of energy and its effect on the climate: energy efficiency (EE), renewable energy (RE) and climate change (CC). The index tracks institutions and outcomes related to sustainable energy.

For each of the three areas (EE, RE and CC), the ISE provides a snapshot of where each country stands in terms of institutions and incentives and the potential for further improvement in terms of sustainable energy outcomes. But the ISE is not an index of energy or power sector market reform and therefore does not assess the efficiency of the regulatory structures in the electricity and gas sectors, nor does it address the efficiency of energy enterprises and the fuel mix used in electricity generation.

The index scores range from 0.0 to 1.0. A value of 0.0 is the lowest in terms of sustainable energy (absence of institutions and market mechanisms coupled with the worst outcomes in terms of energy efficiency, renewable energy generation and carbon intensity), while a maximum score of 1.0 denotes an economy with strong sustainable energy institutions and market mechanisms that also ranks in the top 20 per cent in terms of sustainable energy outcomes.

Methodology

The basic structure of the indicator relies on three pillars (institutions, market incentives and outcomes) within each of the three components (EE, RE and CC). These pillars, described below in more detail, form the basis of a sustainable energy system. The three components are given equal weight in the scoring process and within each component the simple average of the score is calculated across the three pillars: institutions, market incentives and outcomes.

Institutions

This part of the indicator captures the development of key institutions that enable and foster sustainable energy investment. These institutions provide the incentives and constraints for suppliers and consumers to make energy investment and consumption choices. There are four main components of the institutional set-up.

■ **Laws.** The indicator tracks specific laws on the books related to energy efficiency and renewable energy, such as those that support renewable technologies, compel minimum standards in various areas of energy use, provide guidance for sectoral targets in terms of energy savings and provide incentives and penalties for achieving desirable targets.

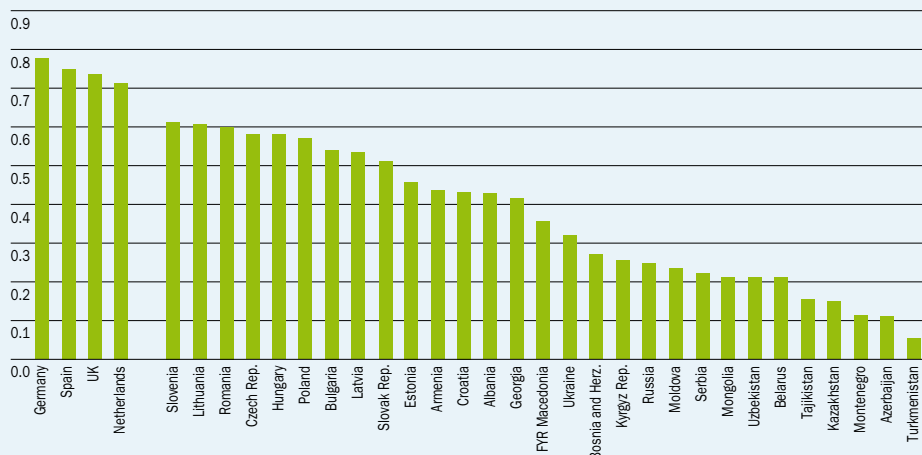
In terms of climate change, the indicator monitors the stage of institutional development in implementing the Kyoto Protocol. The indicator does not, at this stage, comprise an element of legal effectiveness or enforcement.

■ **Agencies.** Energy efficiency agencies or renewable energy associations can help an economy deliver sustainable energy investments. The indicator tracks whether such agencies exist and assesses their quality and functions. It distinguishes between autonomous entities and departments within governments. The quality of institutions is assessed through employment and through budget and project implementation capacity. Four functions are assessed: as an adviser to government, policy drafting, policy implementation and funding for projects.

■ **Policies.** In addition to laws that set the legal framework, specific policies on sustainable energy are also important. The indicator tracks the existence of such policies, how comprehensively they cover the spectrum of potential energy uses and their specific targets. For renewable energy, the indicator assesses the existence of specific sectoral regulations, such as renewables obligations, licensing for green generators and priority access to the grid. The existence of emissions targets and allocation plans are tracked under the climate change policies.

■ **Projects.** The indicator assesses project implementation capacity in the three areas (EE, RE and CC). The number of energy efficiency and renewables projects are recorded where possible, and expenditure data on such projects if data are available.

Chart 4
ISE scores across the transition region and relevant comparator countries



Source: EBRD

Notes: The ISE scores range from 0.0 to 1.0, with 0.0 representing a lack of institutions and market incentives to implement sustainable energy solutions coupled with poor energy outcomes (high carbon and energy intensity and no or little renewable energy). The data used for the index are the most recent available for each class of information: for institutions as of mid-2007, for energy use 2006 and carbon emissions 2004.

Market incentives

In the context of the region's transition to a market-based economy, the indicator tracks pricing and other mechanisms that encourage energy savings, renewable energy generation and reductions in greenhouse gas emissions.

■ **Energy pricing.** Charging end-users cost-reflective tariffs for energy use is a key driver of rational energy use. Electricity tariffs are used as a proxy for the country's energy pricing policy as they are normally the same across a country. While gas tariffs are also important (as gas is an important primary energy source), they are highly correlated with electricity tariffs and so electricity prices are a reasonably good proxy for incentives. Tariffs for heating are also relevant, but these are most often set locally with considerable variation within each country, and demand is often independent of tariffs (for example, in supply-driven district heating systems where users are charged normative fees regardless of actual consumption). The ISE distinguishes between energy-exporting and importing countries that face different break-even tariffs for electricity.

■ **Enforcement.** The indicator also assesses the effective enforcement of the pricing policies through the collection rates of electricity bills. In addition, transmission and distribution losses in the electricity system are also integrated to assess the wastage in the country's energy system.

■ **Renewables.** For renewable energy the focus is on the tariff support mechanism adopted by the country. The scoring ranks tradeable green certificate schemes as the most market-friendly mechanisms for renewable support, while feed-in tariffs systems receive partial credit. There are many countries that have no support for renewables.

■ **Carbon taxes or emissions trading mechanisms.** The existence of carbon taxes or market-based carbon finance mechanisms is assessed and scored. In the absence of a carbon tax, countries can accumulate points for implementing cap and trade mechanisms (prevalent in the European Union) or having effectively implemented Joint Implementation (JI) or Clean Development Mechanism (CDM) projects.⁶

Outcomes

Measures of sustainable energy outcomes are an indication of how well countries rank against each other, but more importantly they provide an indication of the room for improvement in each country. The technique adopted here is a comparison of each country with the world leaders. Therefore the key outcomes evaluated in this section are the ranking position of each country in terms of energy intensity of the economy compared with other countries in the world.

Three measures are used: the energy intensity of the economy (adjusted for PPP), the carbon intensity of the economy (adjusted for PPP) and the share of electricity generated from renewable resources.

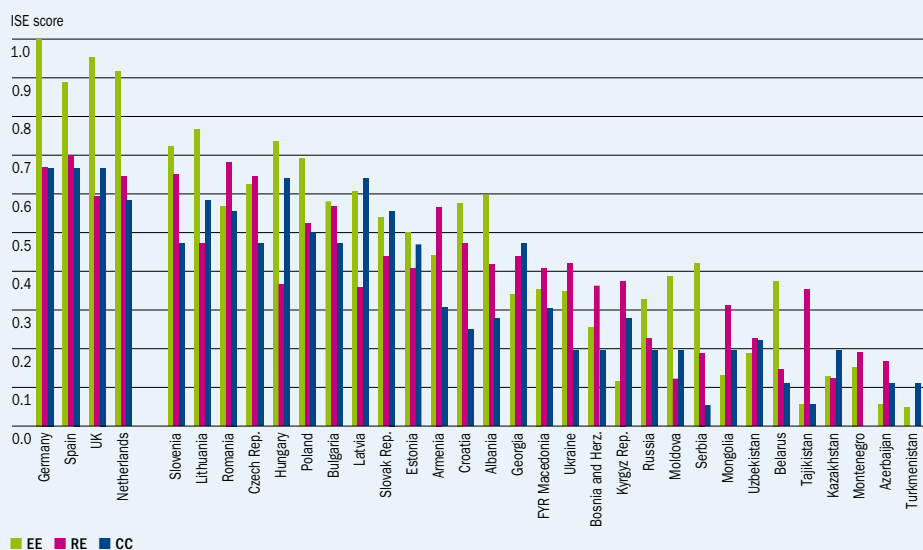
Two important caveats are noted: outcome measures do not correct for climate or economic structures and hydropower (including large-scale hydroelectric power plants) is included in the renewables generation, as data availability at this stage does not allow a distinction between renewable electricity from large hydropower plants and genuine renewable energy sources (RES).

ISE results

The ISE shows that there is considerable variation among countries in the transition region, but that all countries can improve on sustainable energy outcomes – if institutions are properly designed and create the appropriate incentives for individuals and organisations. Chart 4 shows the aggregate index scores for the 29 countries in transition and four comparator countries in western Europe. There is a wide variation in scores across the region. Nine of the 10 new EU member states score close to each other and are all above 0.5 (except Estonia). This compares with substantially higher scores for the western European counterparts, which score close to 0.8.

Some countries in south-eastern Europe, such as Croatia, score close to the group of new EU member states. The Western Balkans cluster together with some CIS+M states in the Caucasus. Most CIS+M countries, however, record a score of 0.3 or below. This is true for both energy-rich states (such as Azerbaijan, Kazakhstan, Russia and Turkmenistan) and the energy-importing Central Asian republics (such as the Kyrgyz Republic and Tajikistan).

Chart 5
Decomposition of the ISE into energy efficiency (EE), renewable energy (RE)
and climate change (CC)



Source: EBRD

Notes: The data used for the index are the most recent available for each class of information: for institutions as of mid-2007, for energy use 2006 and carbon emissions 2004.

Breaking the indicator down into its three components, as shown in Chart 5, sheds more light on the performance of each country.

■ In **energy efficiency**, the regional leaders are the new EU member states (especially Hungary, Lithuania, Poland and Slovenia), reflecting a better institutional set-up, good market incentive mechanisms and favourable outcomes (relatively low energy intensity).

At the other extreme, some countries have yet to implement basic institutions, continue to be very energy-intensive and lack basic incentives for energy savings, since effective tariffs charged to users remain very low. But the scope for improvement to catch up with the advanced market economies in western Europe is very large across the entire region.

■ In **renewable energy**, some transition countries are performing relatively well compared with advanced economies, but this is an area where all countries have much to do.

Among the leading countries in the region, the relatively high scores are generated either by a mix of reasonably good institutions and market incentives (such as green certificates) with good outcomes (as in Romania) or strong institutional and market incentive systems with a lower outcome indicator (as in the Czech Republic).⁷

In the poorly performing countries, the score is generally driven by the exploitation of hydro-resources in large plants, but the institutional set-up for renewables is absent and no market mechanisms have yet been introduced to foster the renewables industry.

■ Transition economies on average tend to score poorly on the **climate change** indicator, despite the fact that the new EU member states benefit from the institutional set-up of the Kyoto Protocol and the EU emissions trading scheme, which provide market-based mechanisms for emissions allocation. It is important to note, however, that a few countries (Hungary and Latvia) are on par with comparator countries in western Europe.

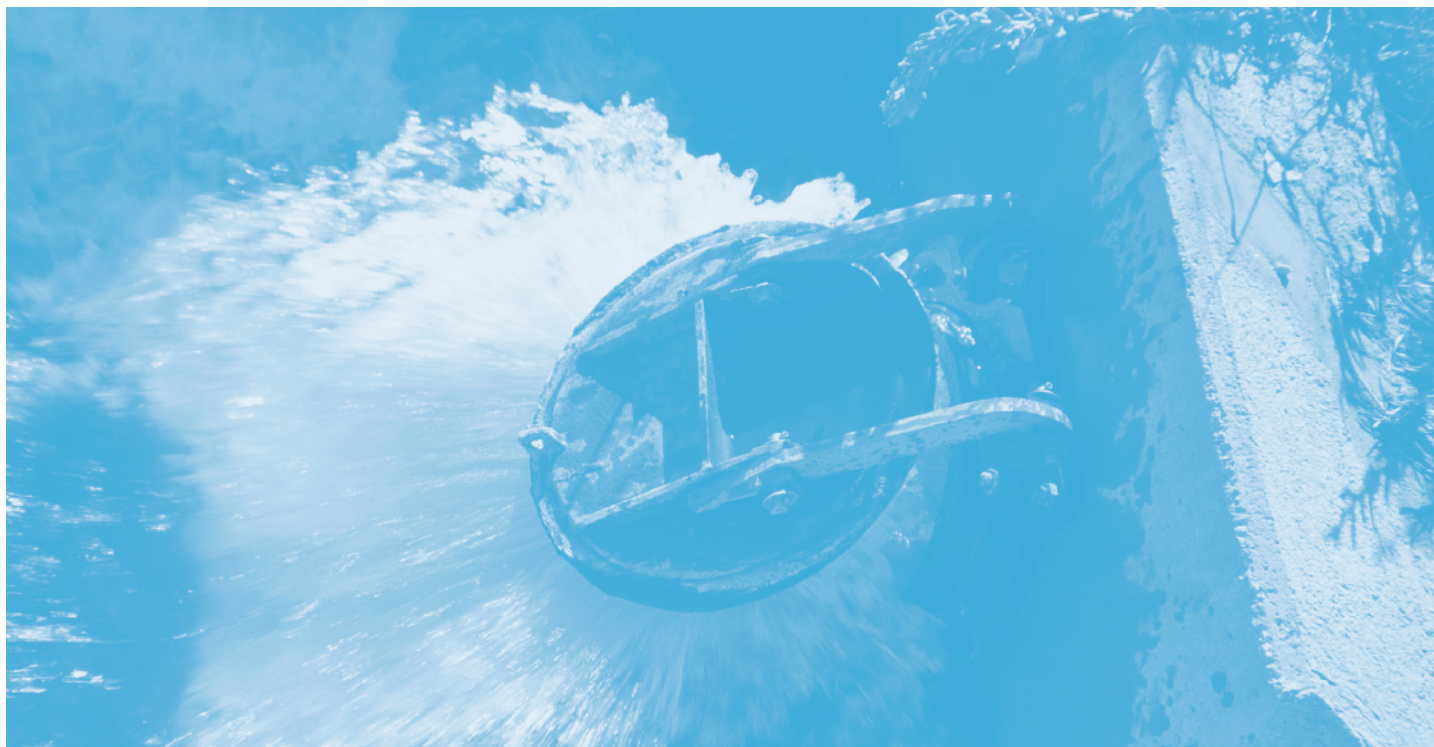
Outcome indicators (carbon intensity of GDP) are poor in the transition region, despite good hydropower resources and a reasonably high share of nuclear energy.

Institutions versus outcomes

The relationship between the institutional framework and energy outcomes is a complex one. The creation of a suitable institutional environment does not always lead immediately to improvements in outcomes. On the contrary, institutions, policies and incentives emerge and are effectively enforced only over time, while energy outcomes may respond slowly and with a lag.

Similarly, good outcomes as measured by the ISE may arise independently of the creation of sound institutions and policies, and they should not necessarily be seen as evidence that all is well in the energy sector more broadly. Some countries may have a high share of renewable energy resources in the energy balance due to their location (for example in mountainous areas abundant in rivers and with few large dams inherited from central planning), despite having done little to strengthen the institutional framework and still suffering from serious energy supply problems. In years to come, as an ISE time series is developed, it may become possible to investigate more systematically the relationship between institutions, policies and outcomes.

Nevertheless, even with a simple snapshot of each of the indicators, breaking the ISE down into institutional (institutions and market incentives) and outcome measures reveals a number of important findings (see Chart 6). First, the scale of the central planning legacy is substantial in terms of inefficient use of energy, leaving considerable scope for improving outcomes across the entire region. Secondly, it is clear that some countries in the region, particularly the new EU member states and a handful of others (for example Armenia, Moldova and Ukraine), have made substantial progress in establishing a supportive institutional framework and implementing effective price incentives to encourage sustainable energy outcomes. Nevertheless, substantive differences in outcomes compared with western European countries persist.

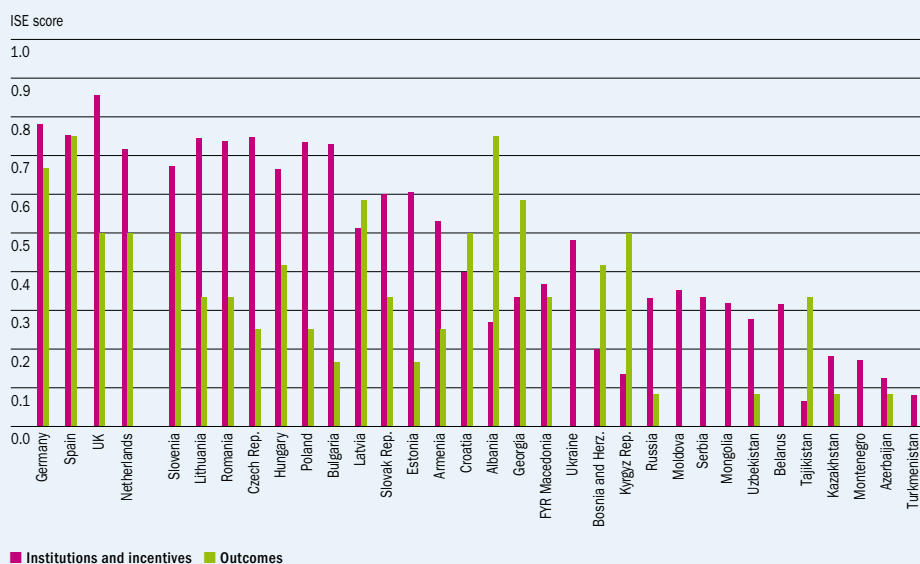


Thirdly, there is a group largely composed of countries in the Western Balkans and the CIS+M, where institutions and outcomes are substantially lagging behind – the initial task of setting up institutions and incentives is yet to be implemented, while the poor outcome measures reflect the legacy of the socialist economic model and its associated distortions in the energy sector.

Finally, there are a number of countries, such as Albania, Bosnia and Herzegovina, Georgia, the Kyrgyz Republic and Tajikistan, that score relatively well in terms of outcomes despite their less advanced institutional structure. The explanation is mainly related to two factors: (i) the large amount of renewable resources and the relative extensiveness of their use in large hydroelectric power plants (in Albania and Georgia, the share of electricity generated from renewable sources exceeds 80 per cent); and (ii) an economic structure with little energy-intensive industry.

High energy and carbon intensity across the transition region (including in the more advanced new EU member states), coupled with few or poorly exploited renewable resources, demonstrate that the scope for improving energy outcomes in the region remains vast.

Chart 6
Institutions and incentives versus outcomes



Source: EBRD

Notes: Some countries (such as Albania, Georgia and Tajikistan) have considerable renewable resources that are exploited in large hydroelectric power facilities, which reflects on outcome scores disproportionately. At this stage it is not possible to correct for this due to lack of disaggregated data availability. The data used for the index are the most recent available for each class of information: for institutions as of mid-2007, for energy use 2006 and carbon emissions 2004.

Towards a policy agenda for sustainable energy reform



The energy challenge facing countries in the region is complex, with many competing considerations, but the complexity should not mask a very urgent and straightforward message: long-term sustainability begins today and the time to act is now.

Substantial resource revenues in some countries and strong growth across the region are feeding an investment boom. Today's choices of technology and equipment will have a long-term effect on energy efficiency and carbon intensity, lending additional urgency to improvements in the institutions and market incentives affecting these decisions. Power plants and distribution networks are expensive to build and once built they last for 30-40 years. If action is not taken to change incentives now, the investments planned today could lock the energy infrastructure into carbon intensive and undiversified supply structures for generations.

The basic building blocks of a sustainable energy reform agenda include policies to strengthen markets, price signals and regulation. Distorted price signals, the absence of competitive energy markets and an uncertain regulatory regime will perpetuate the problem of under-investment. For too long, artificially low energy prices for end-users have stifled investment and the incentive to improve energy efficiency. Similarly, the more uncertain firms are about future regulations, the less willing they will be to invest for the long term, even if the current price signals are favourable.

In terms of strengthening energy markets there has been some notable progress in recent years. Gas and electricity markets are now fully or significantly liberalised in EU member states, with less progress made by Central Asia, Russia, Serbia and Ukraine. Customers are increasingly able to choose suppliers in a competitive market, exerting pressure on providers to improve the efficiency and quality of energy services. In both the electricity and gas sectors the competitive industry structures are developing in line with the unbundling of vertically integrated monopolies, encouraging private sector participation and investment. Investor confidence and consumer rights are becoming more harmonised by the emergence of modern independent regulatory agencies and system operators.

Sustainable energy pricing requires that all costs of supply, including long-term development costs, are covered by the prices paid by end-users. Affordability problems must be addressed to protect the poor and vulnerable users, but social protection measures should not undermine the cost recovery principle and incentives to use energy efficiently. Yet the socially optimal price of certain types of energy, such as fossil fuels, large-scale hydro and nuclear power, should be higher than the price that would emerge on fully competitive markets. This is because the generation of energy imposes not only costs on the producers but also environmental costs (externalities) on the entire economy, both locally and globally. These environmental costs will not be incorporated in the market price without regulatory intervention. These "hidden" environmental and social costs misguide market prices and render energy efficiency and renewable projects unduly uncompetitive.

Energy prices that reflect the full cost of production, including any environmental cost, create the incentives for energy users to be fully efficient and for producers to invest in sustainable energy infrastructure.

Setting the prices correctly will not immediately change entrenched behaviour. Market frictions, regulatory barriers and information gaps may slow adjustment of energy users and producers to increasing prices. Therefore price signals need to be enhanced by targeted policies that lower barriers to investment. Energy efficiency in developed economies is promoted primarily by information campaigns, support for research and development, dynamic energy performance requirements for products, buildings and services, support for project preparation and due diligence, special financing vehicles and investment support for demonstration projects. Most countries use various tax incentives to promote energy efficiency, and a few European countries are introducing more market-based support schemes, such as energy efficiency obligations, which are sometimes tradeable (white certificates).

Enabling frameworks for the deployment of renewable energy include guaranteed access to the distribution grid, guaranteed off-take prices (for example, feed-in tariffs), obligatory renewable quotas with tradeable certificates (green certificates), priority in transmission/distribution networks, investment support and streamlined location permits. Some policy measures require substantial institutional capacity for effective implementation. For example, green certificates are a market-friendly instrument, but they require substantial institutional capacity, liquid markets and long development periods. In the short term, feed-in tariffs represent a simple and effective instrument.⁸

As illustrated by the ISE, in central eastern Europe and the Baltic states (CEB) and some SEE countries, the EU accession process is motivating improvements in the institutional frameworks for investments in energy efficiency and renewable energy sources, but it will take several years before they can enjoy the full confidence of investors and financial institutions. Sustained efforts and risk-taking will be needed to demonstrate consistency of the support framework and stimulate fine-tuning and testing. In the CIS+M there is substantial uncertainty concerning the introduction of significant market-oriented reforms in the energy sector. Incentives to invest in more efficient energy generation and use, and in renewable energy may remain weaker, particularly in energy-exporting countries. Reforms of energy pricing and other shifts towards a more market-based approach are likely to drive progress in much-needed new investment, in energy efficiency and progress with the carbon agenda through interaction with global financial mechanisms linked to the Kyoto Protocol, such as JI/CDM and international emissions trading. However, the introduction of such reforms cannot be taken for granted.

A number of external factors may further influence the progress of reforms across the region. The prospect of membership of the European Union, as seen in the advanced transition countries, can contribute to the speed and extent of reform. The rising global prices of energy and supply disruptions from traditional suppliers have clearly put pressure on policy-makers in countries with limited resources to use energy more efficiently. International pressure is also building from the UNFCCC and Kyoto process as the rest of the world is paying increasing attention to the wasteful use of energy and carbon intensity in production in the transition region. As eligible transition countries to varying extents prepare themselves to trade in emission allowances, they realise that buyer countries are increasingly demanding that seller countries use the proceeds for climate change mitigation investments.



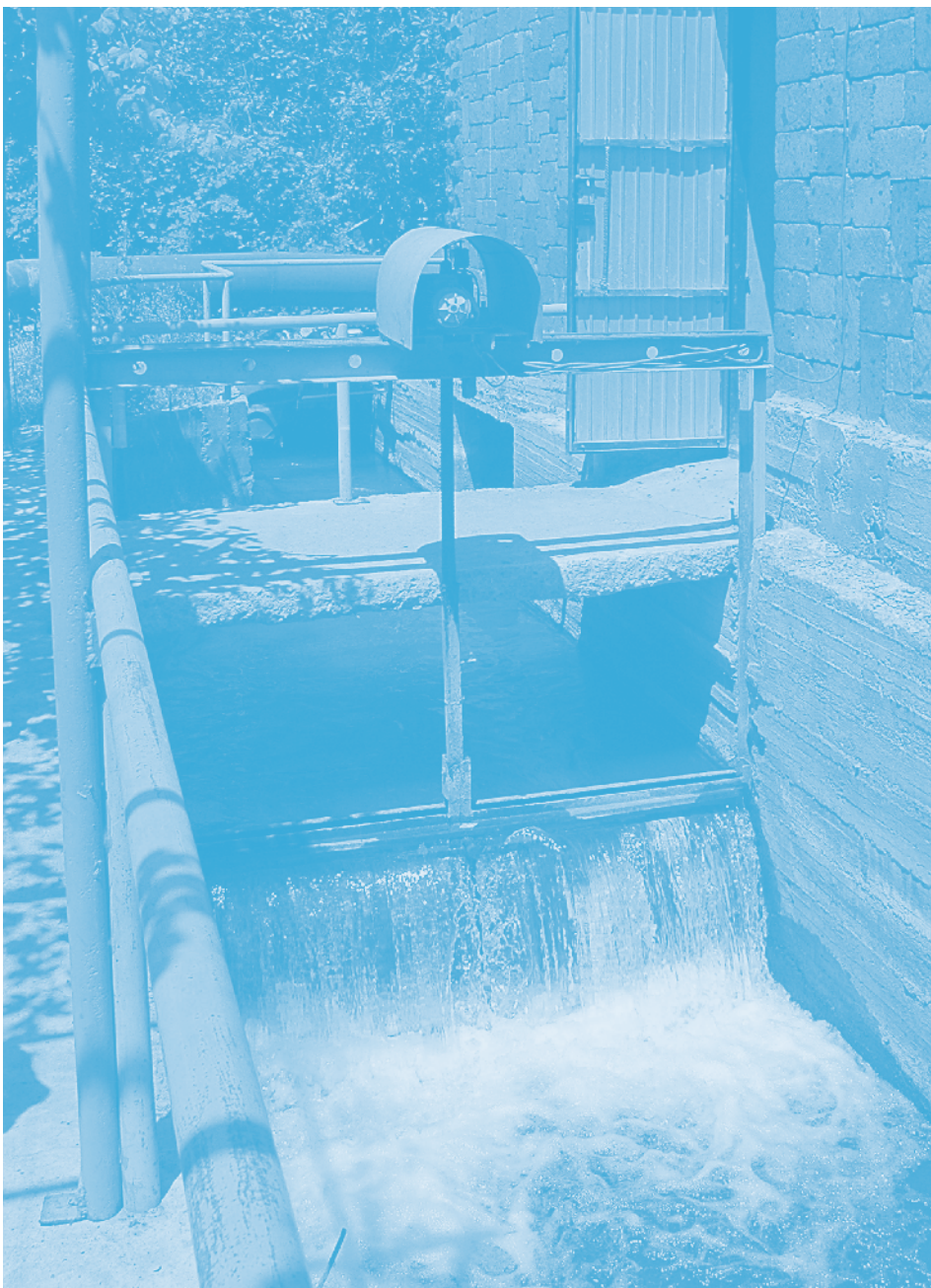
Conclusion



Achieving a secure, affordable and environmentally friendly supply of energy will require a combination of institutional reforms – to promote efficiency, support competition, ensure good governance and encourage private investment – in new, particularly renewable, capacity.

New technologies, management practices and new transmission and distribution systems will also need to be developed. Much of this will be influenced by, and carried out in, a context of continued economic and political transition and an international energy environment that is constantly changing.

The ISE can help policy-makers by providing a snapshot of developments in these complex and inter-related areas.



Endnotes

- ¹ Purchasing power parities are currency conversion rates based on differences in price levels, widely used to compare countries with different income levels.
- ² Data were collected in 2004 for the United Nations by the Carbon Dioxide Information Analysis Center (CDIAC), an organisation within the United States Department of Energy.
- ³ Ukraine is 16th if GDP is converted to PPP.
- ⁴ Energy Information Administration, International Energy Annual 2005 (GDP data at market exchange rates). In PPP terms, eight EBRD countries are in the top 20.
- ⁵ Source: CDIAC, see <http://cdiac.esd.ornl.gov/trends/emis/top2004.cap>
- ⁶ Joint Implementation and the Clean Development Mechanism are two flexible, project-based mechanisms for emissions reductions allowed under the Kyoto Protocol.
- ⁷ While the Czech Republic scores well on institutions and market incentives for renewables, its outcome indicator is comparatively low, as seen in Chart 6.
- ⁸ For this reason the ISE provides a higher score for market-friendly green certificates, but acknowledges that feed-in tariffs are a good way of kick-starting a renewable energy industry.

Abbreviations

CC	Climate change
CEB	Central eastern Europe and the Baltic states (see map on page 2)
CIS+M	Commonwealth of Independent States and Mongolia (see map on page 2)
EBRD	European Bank for Reconstruction and Development
EE	Energy efficiency
EU	European Union
EU-2	Bulgaria and Romania
EU-8	The eight former communist countries from eastern Europe that joined the EU in May 2004
EU-15	The 15 EU member states before enlargement in 2004
FYR Macedonia	Former Yugoslav Republic of Macedonia
GDP	Gross domestic product
ISE	Index of Sustainable Energy
JI/CDM	Joint Implementation/Clean Development Mechanism
OECD	Organisation for Economic Co-operation and Development
PPP	Purchasing power parity
RE	Renewable energy
RES	Renewable energy sources
SEE	South-eastern Europe (see map on page 2)
UNFCCC	UN Framework Convention on Climate Change

Photography Page

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