



Lights Out? The Outlook for Energy in Eastern Europe and Central Asia

Key Messages¹

- **The countries of Eastern Europe and Central Asia (ECA) could face an energy crunch within the next five to six years.**
- **The financial crisis has created some breathing room and a window of opportunity to mitigate the impact of the anticipated crisis. Mitigating actions are required both on the demand and supply side.**
- **Significant investments will be required (3% of cumulative GDP between 2010 and 2030) and the public sector alone won't be able to provide this level of investments.**
- **Countries need to take action now to create a climate that is attractive for investments in this sector.**

Introduction

On January 22, 2006, the district heating system in Alchevsk, a city of 120,000 people in southeastern Ukraine, collapsed. The winter was very cold, with temperatures dropping to -30 Celsius, and the collapse of the system, following a boiler failure, made the city rapidly dysfunctional. About 4,500 children and elderly had to be evacuated, leaving Alchevsk largely deserted until the spring. Subsequently, the entire district heating system had to be replaced. The incident illustrates the impact that a lack of energy supply can have on countries in ECA, and also highlights the region's vulnerability to failures of aging energy infrastructure.

It is very likely that an energy crunch could hit several countries in ECA in the next five or six years. Before the financial crisis of 2008, several electricity-importing

countries in the region had begun to experience difficulties with supply; however, the crisis has reduced demand and created some breathing room. It has also created a window of opportunity to take action to mitigate the impact of the anticipated energy crunch. But countries need to act now. Mitigating actions are required on both the supply side and the demand side and will require significant investments (about \$3.3 trillion in 2008 dollars over the next 20 years, or about 3% of cumulative GDP) if the region wants to meet all its anticipated energy needs. This level of investment cannot be provided by the public sector alone and measures will be required to create a climate that appeals to private sector investors.

Background to the Energy Crisis

Following the break-up of the Soviet Union, the countries of Central and Southeastern Europe (CSE) and the Commonwealth of Independent States (CIS) experienced six years of dramatic economic decline before a vigorous recovery, starting in 1999, enabled this region to become one of the most economically dynamic in the world. With the onset of the financial crisis in 2008, the region's economic performance went into reversal again and suffered significant decline.

This economic performance was closely reflected in the region's energy sector; the initial economic decline saw a sharp reduction in both the production and the consumption of energy. Primary energy production dropped steadily through 2000, to about 70% of its 1990 level, before increasing again to reach 99% (of the 1990 level) in 2008. Consumption fell off even more sharply, dropping to 70% of 1990 levels in 1999, before increasing again as economic activity resumed. But, given improvements in the level of energy intensity, it was still at only 80% of 1990 levels in 2008. This resulted in a steady growth in exports of primary energy (largely oil and gas), following an initial decline at the beginning of the transition period.

¹ The information provided in this Knowledge Brief is based on *Lights Out? The Outlook for Energy in Eastern Europe and Central Asia*, World Bank, 2010.

These trends suggest that the region should be amply endowed with energy supply. However, during the economic decline in the early part of the transition period, maintenance and upgrading of what had come to appear to be oversized infrastructure stock became an early investment casualty. Consequently, there was a steady deterioration in this stock of assets. Concerns about the impact of this deterioration were increasingly apparent right before the financial crisis hit.

The World Bank and the European Bank for Reconstruction and Development (EBRD) conduct a Business Environment and Enterprise Performance Survey in the region every three years. The last was conducted in 2008, right before the onset of the financial crisis. It showed that electricity is a major concern to businesses throughout the region (Table 1). In addition, it revealed a dramatic increase in concerns about electricity supply since the previous survey in 2005. In every country surveyed, the percentage of firms that considered electricity supply a problem rose.

Table 1: Percentage of Firms that Consider Electricity a Problem in Doing Business

Sub Region	BEEPS 2005	BEEPS 2008
ECA	17	47
EU-10 (Central Europe)	11	41
Southeastern Europe	26	48
CIS North	9	58
CIS South	21	51

Source: World Bank and EBRD 2008

Table 2: Average Annual Growth Projections for GDP, Electricity Consumption, and Primary Fuel Consumption in the Region, 2005-2030 Annual

GDP	4.4 Percent
Electricity Consumption	3.1 Percent
Primary Fuel Consumption	1.9 Percent

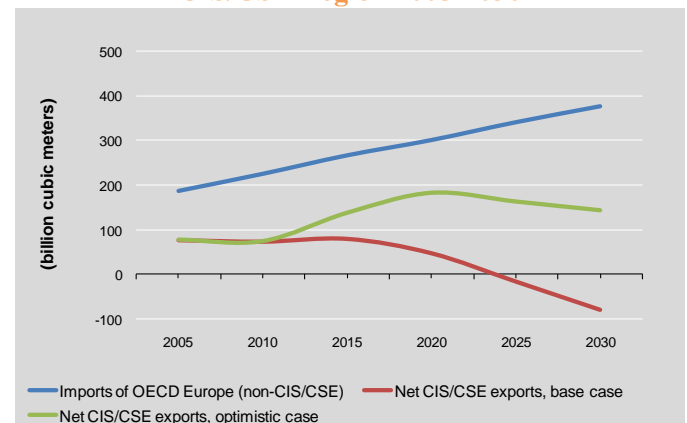
Source: World Bank staff calculations

The reduction in economic activity that has accompanied the financial crisis has eased some of these immediate concerns, but the respite is only temporary. While the region, as a whole, is not expected to recover to the level of 2008 output until 2013, there are reasonable prospects that it can expect the resumption of long-term average economic growth of almost 5% a year after 2011. This translates into an average growth rate for the period 2005-2030 of 4.4% a year. The assumption of a 4.4% growth rate results in an expected annual increase in electricity consumption of about 3.1%, and an annual increase in primary fuel consumption of about 1.9% (Table 2). This translates into about a 90% increase in electricity consumption relative to 2007 and about a 50% increase in primary fuel consumption.

Where Will Additional Supplies Come From?

At the beginning of the transition period, the energy sectors of the various countries were heavily inter-dependent. The energy exporters (the Russian Federation and the Central Asian countries) relied on the energy-importing countries in the region as outlets for their primary fuel exports and, in a number of cases, as transit routes to access markets in Western Europe. The energy importers, in turn, were heavily dependent on Russia and, to a lesser extent, the Central Asia exporters for their primary energy supplies.

Figure 1: Actual and Projected Gas Exports from the CIS/CSE Region 2005-2030



Source: World Bank staff calculations

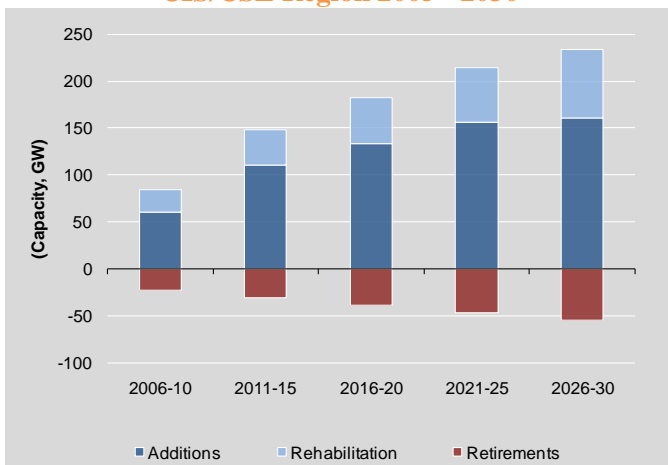
Following the break-up of the Soviet Union, the focus steadily switched from an emphasis on optimization of energy production and distribution at the regional level to an emphasis on greater self-sufficiency at the individual country level. However, while countries did begin to diversify their supply sources, the established energy infrastructure has dictated some continuing reliance on historic supply channels. This is particularly the case for gas supplies. While it is relatively easy for consumers to replace oil supply sources, it is far more difficult to replace gas supply sources given the nature of the supporting infrastructure.

The Russian Federation is a major supplier of gas to the European Union, meeting some 25% of its overall gas demand and some 40% of its import requirements. It is also a key supplier to the region's gas importing countries located west of the Caspian Sea. However, it has not been investing in the upstream gas sector at a level that would allow it in the longer term to sustain, let alone increase, existing production levels. Russian gas production has the potential to be increased to about 900 billion cubic meters a year, but to do so will likely require investments of about \$20 billion a year; simply maintaining production at current levels over the next 20 years would require investments to the order of \$15 billion a year. However, between 2001 and 2008, only \$36 billion was invested in the upstream gas sector - far less than would be required to sustain production.

Absent a significant upturn in investment or actions to limit demand growth (an aggressive program of energy efficiency is one example of how this could be achieved), the outlook for exports post-2020 looks rather bleak, with a very real possibility that the region overall could become a net importer of gas by 2030 (Figure 1).

The outlook for electricity supply is of even greater concern than the outlook for gas and other primary energy supplies. Nearly 80% of the power plants were built before 1980 and most thermal plants have been operating well beyond their design life. This adverse situation has been compounded by the lack of major maintenance in the 1990s, a situation that is recurring in the current financial crisis. Also, investment in new capacity since 1990 has been negligible. As a result, the region is now confronting the effects of decades of neglect and needs significant investments for rehabilitation of existing capacity and the installation of new capacity if the expected generation capacity requirements are to be met (Figure 2).

Figure 2: Projected Power Generation Capacity Additions, Rehabilitations and Retirements in the CIS/CSE Region 2005 - 2030



Source: World Bank staff calculations

Energy Efficiency: Untapped Potential

Investing in energy efficiency achieves three goals simultaneously and at least cost: lower greenhouse gas emissions, better energy security, and more sustainable economic growth. An additional \$1 invested in energy efficiency may avoid more than \$2 in production investment. But much potential remains untapped because of the many obstacles to investments in energy efficiency, including inadequate energy prices and lack of payment discipline, a lack of information on the latest technologies, too few contractors and service companies, and financing constraints.

Governments have a major role to play in energy efficiency, not only in allowing energy tariffs to reflect costs, but by being proactive in setting and updating energy efficiency standards for homes, equipment, and

vehicles, and in enforcing them. In order to set an example, governments should undertake energy efficiency programs in the public sector, inform the public on energy efficient technology options, and design cities with alternative means of transport.

Investments Required in Energy Production and Infrastructure

Over the next 20 years, the projected investment requirements in the power sector amount to \$1.5 trillion in 2008 dollars, and the total requirement for the sector is about \$3.3 trillion or about 3% of cumulative GDP (Figure 3).

Figure 3: The ECA Region Will Face Significant Investment Needs Over the Next Two Decades

Sector	Projected Energy Sector Investment Required by 2030 (billions of 2008 dollars)
Electricity	1,500
Crude Oil	900
Heating	500
Gas	230
Coal	150
Refining	20
Total	3,300

Source: World Bank staff calculations

Although the public sector in these countries will clearly have to finance a portion of these investments, it will not have the capacity to meet the full investment needs. The countries in the region will therefore need to call on the financial depth and technical know-how of private sector investors and energy companies. Although the current financial crisis is a serious impediment to private sector investment in any activities or countries seen as high risk, as the financial crisis passes, the prospects for such investment will improve. However, in order to attract these investors, countries will need to create attractive investment environments that provide secure ownership rights, are subject to the rule of law, foster transparency, and enable reasonable risk mitigation. In addition, individual sectors will have to be viewed as financially and commercially viable.

In order to create an attractive environment for investment, countries will need to adhere to ten key principles (Box 1). Although these principles are not equally important, all have significant bearing on perceptions of the overall climate for investment. Government actions that are consistent with these principles will go a long way toward creating an attractive and competitive investment climate in the energy sector.

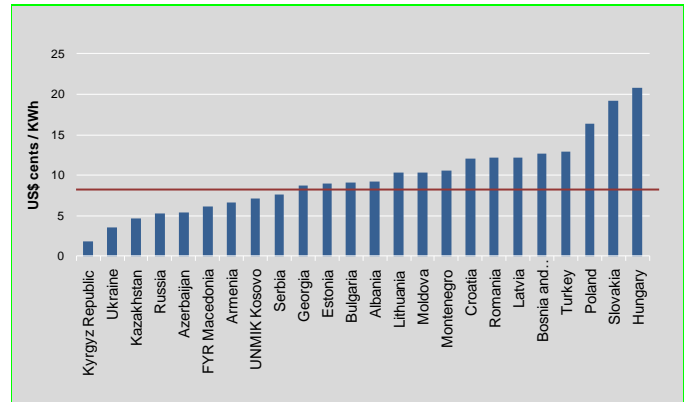
Box 1. Dos and Don'ts for Creating a Better Investment Climate

1. Don't impose a punitive or regressive tax regime.
2. Do introduce an acceptable legal framework.
3. Do provide supporting regulations administered by an independent and impartial regulator.
4. Do create an environment that facilitates assured nondiscriminatory access to markets.
5. Don't interfere with the functioning of the market place.
6. Don't discriminate among investors.
7. Do honor internationally accepted standards.
8. Do abide by contractual undertakings and preclude the use of an administrative bureaucracy to constrain investor activities.
9. Do prevent monopoly abuses.
10. Do ensure that the sector is kept corruption-free.

One of the most critical elements in creating an attractive investment environment is ensuring the financial and commercial viability of the sector. Some of the important concerns are payment discipline, excessive losses and tariffs that are below cost recovery levels. There has been progress in all three areas and electricity collection rates, for example, have increased from an average of 75% in the mid-1990s to 93% by 2008. However, recent reviews of tariff levels indicate that there is still much to be done to ensure financial viability in several countries in the region. Assuming gas prices in the range of \$250 to \$300 per thousand cubic meters, the long run marginal cost of generation from new gas fired combined cycle power plants will be to the order of 6.5 to 7.5 cents/kWh (excluding costs associated with transmission and distribution).

In 2008, most of the countries in Eastern Europe were covering their long run marginal cost of generation. As a result, these countries were able to attract both foreign and domestic investors. In contrast, tariffs in many of the former Soviet Union countries did not appear to adequately cover long run marginal costs although, in several countries - notably Russia - domestic tariffs for gas were well below international parity levels and hence short-run marginal costs were substantially lower than in countries in which gas was priced at full international levels (Figure 4). Nonetheless, these countries will need to bring their tariffs up to levels that will cover long run marginal cost if they are looking to attract investors.

Figure 4: Weighted Average Electricity Tariffs for Residential Consumers in 2008



Source: ERRR Tariff Database

Addressing Climate Change

Securing the funding to meet the region's future energy needs is clearly a key priority. However, the countries of the region also need to ensure that in developing their energy strategies and in implementing their investment programs they act in an environmentally responsible fashion. Relative to GDP, carbon emissions in the region are among the highest in the world. In 2005, Russia was the third largest carbon dioxide emitter in the world after the United States and China. Other countries in the region, however, also have significant emission levels. These high emission rates reflect the region's reliance on abundant domestic coal, low energy efficiency and outdated technology. If emissions are to be held down, focused efforts will be required to reduce emissions associated with the use of fossil fuels--in particular coal. These efforts should include the use of carbon financing and consideration of measures such as carbon taxes to constrain emission levels.

In conclusion, the region faces a potential energy crunch. The financial crisis has provided some breathing room to address the potential energy constraints, but countries need to act quickly to take advantage of this window of opportunity by promoting an attractive climate for investment. At the same time they need to ensure that the energy strategies they pursue are perceived as being responsive to environmental concerns.