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

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Living in The Cold: The 2006 District Heating Disaster in Alchevsk
MAJOR FINDINGS

- The countries of Eastern Europe and Central Asia region 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 in the demand and supply side. Significant investments will be required (3% of cumulative GDP over 2010-2030) and the public sector alone won’t be able to provide this level of investments.

- Countries need to take actions now to create a climate that is attractive for investments in the sector.
The Region’s Transition and The Current Economic Crisis

Changes in Real Output
(Index: 1990 = 100)

Central and South-East Europe (CSE)
CSE/CIS Region
CIS

Annual average GDP Growth (%)
-5.5  +1.1  +6.0  -5.6

The World Bank
Amply Endowed with Energy Resources and Oversized Infrastructure, the CIS/CSE Region is a Key Primary Energy Exporter.

Production reduced by 30% in 2000, but recovered by 2008.

Consumption stood at 80% of 1990 levels.

Million Tons of Oil Equivalent (Mtoe)

- Hydro
- Nuclear
- Coal
- Gas
- Oil

The World Bank
By 2008 Energy Supply Became a Constraint to Growth

<table>
<thead>
<tr>
<th>Region</th>
<th>Percentage of Firms (%)</th>
<th>Increase (%): 2005-2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIS South</td>
<td>21</td>
<td>+30</td>
</tr>
<tr>
<td>CIS North</td>
<td>9</td>
<td>+49</td>
</tr>
<tr>
<td>Southeastern Europe</td>
<td>26</td>
<td>+22</td>
</tr>
<tr>
<td>EU-10 (Central Europe)</td>
<td>11</td>
<td>+30</td>
</tr>
<tr>
<td>Europe and Central Asia Region</td>
<td>17</td>
<td>+30</td>
</tr>
</tbody>
</table>

The Economic Crisis Eased Some of These Concerns, But Respite is Only Temporary

Average Annual GDP, Electricity Consumption, and Primary Fuel Consumption Growth Rate in the CIS/CSE Region, 2005–30 (%)

Source: World Bank staff calculations.
Where will These Additional Supplies Come From?
The Russian Federation Plays a Key Role Meeting Natural Gas Needs of the EU and Will Continue To Do So

Gas Imports by the EU in 2008
(billion cubic meters)

<table>
<thead>
<tr>
<th>Source</th>
<th>Amount (billion cubic meters)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gas piped from Russia</td>
<td>127</td>
</tr>
<tr>
<td>Gas piped from Norway</td>
<td>93</td>
</tr>
<tr>
<td>Liquefied Natural Gas</td>
<td>50</td>
</tr>
<tr>
<td>Gas piped from Algeria &amp; Libya</td>
<td>45</td>
</tr>
</tbody>
</table>

Russia’s role in the EU gas sector:
- 40% of import requirements
- 25% of overall demand
Russia has Significant Potential to Increase its Production But Investments are Still Below the Required Levels

Actual and Projected Scenarios for Natural Gas Production (billion cubic meters)

Required Investments Vs. Historical Investments for Upstream Gas Exploration and Development (billion USD a year)

Source: World Bank staff calculations.

Source: World Bank staff calculations and Gazprom’s financial statements
Absent Significant Investments or Actions to Limit Demand Growth…

The region could become a net importer of oil and gas

Source: World Bank staff calculations.
And the Outlook for Electricity Supply is of Even Greater Concern

![Projected Generating Capacity Additions, Rehabilitations and Retirements in CIS/CSE region 2005-20 (GW)](image)

Source: World Bank staff calculations
The Region will Face Significant Investment Needs Over the Next Two Decades

Projected Energy Sector Investment Needed in the CIS/CSE region by 2030 (USD billion)

<table>
<thead>
<tr>
<th>Sector</th>
<th>Amount Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity</td>
<td>1,500</td>
</tr>
<tr>
<td>Crude Oil</td>
<td>900</td>
</tr>
<tr>
<td>Heating</td>
<td>500</td>
</tr>
<tr>
<td>Gas</td>
<td>230</td>
</tr>
<tr>
<td>Coal</td>
<td>150</td>
</tr>
<tr>
<td>Refining</td>
<td>20</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>3,300</strong></td>
</tr>
</tbody>
</table>

Source: World Bank staff calculations.

Estimated investments in the Energy Sector amount to 3% of cumulative GDP.

Although the public sector will need to finance a portion of these investments, it will not be able to do it alone, the financial depth and technical know-how of the private sector and energy companies will be required.
Countries Will Need to Create a Competitive Investment Climate by Adhering to 10 Key Principles

<table>
<thead>
<tr>
<th><strong>DO’s</strong></th>
<th><strong>Don’ts</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Do introduce an acceptable legal framework. (Electricity)</td>
<td>1. Don’t impose a punitive or regressive tax regime.</td>
</tr>
<tr>
<td>2. Do provide supporting regulations administered by an independent and impartial regulator.</td>
<td>2. Don’t interfere with the functioning of the market place.</td>
</tr>
<tr>
<td>3. Do create an environment that facilitates assured nondiscriminatory access to markets.</td>
<td>3. Don’t discriminate among investors.</td>
</tr>
<tr>
<td>4. Do honor internationally accepted standards.</td>
<td></td>
</tr>
<tr>
<td>5. Do abide by contractual undertakings and preclude the use of an administrative bureaucracy to constrain investor activities</td>
<td></td>
</tr>
<tr>
<td>6. Do prevent monopoly abuses.</td>
<td></td>
</tr>
<tr>
<td>7. Do ensure that the sector is kept free of corruption</td>
<td></td>
</tr>
</tbody>
</table>
One of the Most Critical Elements is Ensuring the Financial and Commercial Viability of the Sector

Weighted average electricity tariffs for residential consumers in 2008
US$ cents / KWh

Source: ERRA Tariff Database
…And Countries will Need to Ensure that They Will Act in an Environmentally Responsible Fashion

High carbon emissions reflect the region’s:

- Reliance on abundant domestic coal
- Low energy efficiency
- Outdated infrastructure

Source: World Bank World Development Indicators
Focused Efforts are Required if the Region is to Meet its Emissions Targets

**CO₂ emissions in 1990**

**EU Target**: 80% of 1990 levels by 2020

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**Actual and projected CO₂ emission in CIS/CSE region (million tons of CO₂)**

- **Other**
- **Residential**
- **Transport**
- **Manuf. and Construct.**
- **Electricity and Heat**

Source: World Bank staff calculations.
What Does this All Mean for Ukraine?

Ukraine will be **heavily hit** should the energy crunch materialize:

- The country is **highly dependent** upon **Russian gas** supplies

- Energy **infrastructure** is **old, inefficient** and **deteriorating**
  (The Alchevsk winter crisis)
Energy Intensity is Among the Highest in the Region

Source: World Bank World Development Indicators
And the Level of Required Investments is Considerable

Estimated Investment’s Requirements in Ukraine’s Energy Sector
(USD million a year)

<table>
<thead>
<tr>
<th>Sector</th>
<th>Amount Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gas transmission system</td>
<td>1,000</td>
</tr>
<tr>
<td>Power sector</td>
<td>1,000</td>
</tr>
<tr>
<td>Energy Efficiency</td>
<td>1.000</td>
</tr>
<tr>
<td>District Heating</td>
<td>500</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>3,500</strong></td>
</tr>
</tbody>
</table>

Source: World Bank staff calculations.

Estimated investments in the Energy Sector amount 3% of annual GDP
How Should Ukraine Respond?

A crucial first step is to establish financial discipline:

- The level and structure of prices need to be such to attract funding for new investments
- Regulatory Regime needs to be strengthened, NERC should be a truly independent body

Reduce dependence on gas imports is also a key measure:

- Reduce demand through energy efficiency measures
- Increase domestic production
Increasing Domestic Gas Production will Require Significant Efforts to Increase Investment Levels

**Actual and Projected Scenarios for Domestic Natural Gas Production (billion cubic meters)**

**Required Investments Vs. Actual Investments for Upstream Gas Exploration and Development (million USD a year)**

Source: World Bank staff calculations.

Source: World Bank staff calculations and Naftogaz
Measures to Boost Domestic Production

Domestic gas production could **be increased by 50%** by:

- Eliminating two-tier tariff system
- Allowing gas to be priced at international parity levels
- Ensuring that a share of additional revenues are directed to protect vulnerable population from price increases

**Other measures to encourage upstream gas investments** would include:

- Production Sharing Agreements (PSA) which conform to good international standards
- Equitable and transparent mechanisms to select investors
And Ukraine Needs to Address Perceptions that It is An Unreliable Gas Transit Country

Two essential first steps:

- **Improvements to the governance** within the gas sector
- **Ensuring financial viability** of gas companies

There is need to **rehabilitate gas transit and associated storage facilities**, which are major assets for the country
Tackling Ukraine’s Energy Efficiency Agenda

What would this take?

Decrease Energy Consumption by:

Targeted actions are needed in:

- Industrial sector
- District Heating modernization
- Modernization of the gas transmission system
Ukraine’s Carbon Emissions are Still Below the Kyoto Protocol Target But Levels Are Still Significant

**CO2 Emissions in 2005 (million metric tons)**

<table>
<thead>
<tr>
<th>Country</th>
<th>CO2 Emissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Russian Federation</td>
<td>1,503</td>
</tr>
<tr>
<td>Ukraine</td>
<td>327</td>
</tr>
<tr>
<td>Poland</td>
<td>302</td>
</tr>
<tr>
<td>Turkey</td>
<td>248</td>
</tr>
<tr>
<td>Kazakhstan</td>
<td>181</td>
</tr>
<tr>
<td>Uzbekistan</td>
<td>112</td>
</tr>
</tbody>
</table>

**CO2 Emissions Per Capita in 2005 (metric tons per capita)**

<table>
<thead>
<tr>
<th>Country</th>
<th>CO2 Emissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>20</td>
</tr>
<tr>
<td>Russian Federation</td>
<td>11</td>
</tr>
<tr>
<td>Poland</td>
<td>8</td>
</tr>
<tr>
<td>Ukraine</td>
<td>7</td>
</tr>
<tr>
<td>China</td>
<td>4</td>
</tr>
<tr>
<td>Turkey</td>
<td>3</td>
</tr>
</tbody>
</table>

Source: World Bank World Development Indicators
IN CONCLUSION

- The region faces a potential energy crunch and this could be serious for Ukraine.

- Ukraine needs to take advantage of the window of opportunity provided by the current economic crisis to address the potential energy constraints.

- Particular emphasis should be placed on improving the financial viability of the sector by ensuring that tariffs reflect the cost of the energy being supplied.

- Efforts should be directed at enhancing the attractiveness of investments in the upstream gas sector and increasing energy efficiency.

- At the same time, energy strategies need to be responsive to environmental concerns.
Thank-you

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