Ukraine - energy trends: short-term and long-term recommendations

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International Energy Agency
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International Coal Dialogue: Quo vadis Ukraine?
Ukraine energy balance: key role for gas and coal

Breakdown of 2013 gas consumption (50.4bcm)

- Households: 34%
- Industry: 42%
- District heating: 17%
- Technical gas and losses: 5%
- Public organisations (hospitals, schools, administrations): 2%

Source: IEA data; Ukrstat

Total Primary Energy Supply, 1990-2012

Electricity generation by fuel, 1990-2012

*negligible.
Economic challenges and trends

Challenges

- Economy in recession since mid-2012, and getting deeper (6.5% of GDP decline - IMF forecast for 2014, however situation is still better than in 2009 when GDP dropped 14.8%)
- Severe Hryvna depreciation massively increases real import costs of gas, oil products and coal
- Naftogaz deficit worsening, increasing public sector fiscal deficit
- Industrial production down
- Banking sector crunched
- Infrastructure destruction in the East
- Energy crises: coal, gas, electricity
- Fiscal austerity, but higher military spending, tax revenues down

Positive trends

- Financial assistance: IMF, EU, USA, World Bank
- Structural reforms have started
- Hryvna depreciation can foster international competitiveness
- Positive external trade balance
Gas transit pipelines so far not in conflict zone, yet some key shale gas places are

Gas situation 2013-2014

SUPPLY

- Decreased import from Russia
- An agreement reached with Gazprom for supply until 31 March 2015
- Reverse gas imports from Europe
- Insufficient incentives for domestic gas production
- Gas storage has been partly replenished

DEMAND

- Lowered demand (by 14.6% from a similar timeframe in 2013)
- Industrial and residential sectors are affected in case of gas supply disruptions
- Energy efficiency: potential equals all current gas import from Russia (UA expert estimates)

No problem with TRANSIT, although transit volumes through Ukraine are reduced
Power plants by type and the issue of coal supply

This map is without prejudice to the status of or sovereignty over any territory, to the delimitation of international boundaries and to the name of any territory, city or area.
Coal production in Donbass disrupted, coal-fired power generation partly shut down

Key coal producing regions in Ukraine, 2011 volumes

<table>
<thead>
<tr>
<th>Region</th>
<th>Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>Donetsk</td>
<td>36.3 Mt</td>
</tr>
<tr>
<td>Luhansk</td>
<td>27.3 Mt</td>
</tr>
<tr>
<td>Dnipropetrovsk</td>
<td>15.4 Mt</td>
</tr>
<tr>
<td>Lviv</td>
<td>2.4 Mt</td>
</tr>
<tr>
<td>Volyn</td>
<td>0.55 Mt</td>
</tr>
</tbody>
</table>

Installed capacity at Ukraine’s coal fired power plants, 2011

<table>
<thead>
<tr>
<th>Name</th>
<th>Owner</th>
<th>Years of Unit Commissioning</th>
<th>Units</th>
<th>Capacity (MW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slavyanskaya</td>
<td>Donbassenergo</td>
<td>1955 – 69</td>
<td>2</td>
<td>880</td>
</tr>
<tr>
<td>Starobeshevskaya</td>
<td>Donbassenergo</td>
<td>1961 – 67</td>
<td>10</td>
<td>2 000</td>
</tr>
<tr>
<td>Pridneprovskaya</td>
<td>Dneproenergo</td>
<td>1959 – 66</td>
<td>8</td>
<td>1 800</td>
</tr>
<tr>
<td>Krivorozhskaya</td>
<td>Dneproenergo</td>
<td>1965 – 73</td>
<td>10</td>
<td>3 000</td>
</tr>
<tr>
<td>Zaporozhskaya</td>
<td>Dneproenergo</td>
<td>1972-77</td>
<td>7</td>
<td>3 600</td>
</tr>
<tr>
<td>Zmiyevskaya</td>
<td>Centreenergo</td>
<td>1960 – 69</td>
<td>10</td>
<td>2 400</td>
</tr>
<tr>
<td>Tripolskaya</td>
<td>Centreenergo</td>
<td>1969 – 70</td>
<td>6</td>
<td>1 800</td>
</tr>
<tr>
<td>Uglegorskaya</td>
<td>Centreenergo</td>
<td>1972 - 75</td>
<td>7</td>
<td>3 600</td>
</tr>
<tr>
<td>Dobrotvorskaya</td>
<td>Zahidenergo</td>
<td>1959-64</td>
<td>5</td>
<td>600</td>
</tr>
<tr>
<td>Ladyzhinskaya</td>
<td>Zahidenergo</td>
<td>1970 – 72</td>
<td>6</td>
<td>1 800</td>
</tr>
<tr>
<td>Burshtynskaya</td>
<td>Zahidenergo</td>
<td>1965-73</td>
<td>12</td>
<td>2 400</td>
</tr>
<tr>
<td>Luganskaya</td>
<td>Shidenergo</td>
<td>1956 – 69</td>
<td>8</td>
<td>1 500</td>
</tr>
<tr>
<td>Kurakhovskaya</td>
<td>Shidenergo</td>
<td>1972 – 75</td>
<td>7</td>
<td>1 400</td>
</tr>
<tr>
<td>Zuyevskaya</td>
<td>Shidenergo</td>
<td>1982 – 88</td>
<td>4</td>
<td>1 200</td>
</tr>
</tbody>
</table>

Oil supply & transit security: idle Lisychansk refinery destroyed, no market impact

Energy Efficiency – PRIORITY fuel for Ukraine

Energy intensity indicators TPES/GDP

Efficiency indicator of heating and hot water supply. 2011

Structure of energy consumption in Ukraine and the EU, 2011

Potential energy saving by sector in 2011*

<table>
<thead>
<tr>
<th>Sector</th>
<th>Potential energy saving, mtoe</th>
<th>Share in total saving, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industry</td>
<td>12.7</td>
<td>48%</td>
</tr>
<tr>
<td>Residential</td>
<td>9.2</td>
<td>35%</td>
</tr>
<tr>
<td>Services</td>
<td>2.4</td>
<td>9%</td>
</tr>
<tr>
<td>Agriculture</td>
<td>1.5</td>
<td>6%</td>
</tr>
<tr>
<td>Construction</td>
<td>0.5</td>
<td>2%</td>
</tr>
<tr>
<td>Total</td>
<td>26.5</td>
<td>100%</td>
</tr>
</tbody>
</table>

26.5 mtoe $\implies$ 29.3 bcm of natural gas (GCV) $\implies$ is higher than gas import from Russia

* Estimates by Ukrainian experts
Short-term:
Recent energy policy developments: reducing gas consumption - emergency demand side measures

- Reducing average heat temperature: -2°C
  - Electricity cuts: 9-11:00 and 20-22:00
- Hot water cuts in major cities including Kiev
- Mandatory gas saving by industry
- Tariff incentives to switch away from individual gas boilers and to support electric accumulative boilers
- Improving payment arrears collection from district heating companies and taking legal actions to enforce payments
Impact on Energy Supply/Demand in Japan

- Tokyo Electric Power Company supplies electricity to 42 million people and 40% of Japan’s GDP.
- It lost 40% of its generation capacity just after the earthquake and tsunami.

- ▲ 15% demand reduction target for large users, small users and households
  - Large users ( > 500kW) : through a regulation
  - Small users ( < 500kW) : through a voluntary plan developed together with the government
  - Households and individuals: “Menu of Electricity Saving Measures” through TV, newspaper and website.
Short-term - emergency supply side measures

- *(reduced)* Demand: around 4 bcm per month

- Supply
  - Domestic gas production (1.6 bcm per month)
  - Withdrawal from gas storage
  - Import from Gazprom
  - Reverse gas imports from Europe
Long-term - Energy market reforms

- Mandatory heat, hot and cold water metering by 2017
- Information campaigns
- Reformed tariffs
  - Reduced subsidies
  - Targeted payments to low income population
  - Demand side management
- Incentives for Renewable Energy - Reforming green tariffs
  - Developing the bioenergy potential
- Promote domestic gas production through privatizations and gas sector restructuring
- Coal industry reforms:
  - mining sector re-evaluation;
  - coal-fired power plants – efficiency and environmental issues,
  - coal gasification
Residential sector tariff increases not sufficient to reduce financial losses

Evolution of regulated gas prices for different categories of customers, 2004-2014 (in PPP)

Level of reverse flow import prices, assuming USD 380/kcm and 1USD/13 UAH exchange rate

Difference EU import price – household gas price = ~ 3200 UAH/kcm

Difference EU import price – district heating gas price = ~ 2400 UAH/kcm

UAH 419: gas extraction price of Naftogaz

Industry

Households (average for less than 2500 m3/year)

District heating companies

Russian gas import price
Key messages and conclusions

Demand side

1. Inform the public on
   • possible shortages this winter
   • what people can do to cut demand
   • what the government is doing to deal with short-term crisis
   • what the government is planning to do in the long-run
   • energy and economic situation: subsidies, electricity production cost and sales prices

2. Prioritize Energy Efficiency: information, incentives

3. Start moving towards market tariffs while preserving subsidies for targeted protection and support for those in need (i.e. retired, low-income population)

Supply side

1. Incentivize domestic gas production

2. Diversify energy sources – incentivize Renewables!

3. Prioritize industrial and power plant Energy Efficiency

4. Start moving towards fair market rules