Energy Trends and Emissions in the Former Soviet Union

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Overview

Looking back
- Economic and demographic trends
- Energy trends and energy intensity

Toward the future
- Economic projections
- Energy strategies of Russia and Ukraine
- Economic growth and energy prices
Looking Back: Historical Data
GDP trends in FSU

- Economic growth since 1998 crisis has regularly exceeded estimates
- Wages and real consumption up: 82% wage increase in Russia 1999-2003
- FSU has grown despite relatively small investments in capital stock—using old, inefficient stock
- Link between growth and oil revenue
Wealth is growing

Per Capita GDP (2000 $ PPP)

- Russia
- Ukraine
- Kazakhstan

Timeline: 1995, 2000, 2005
Population declining since 1990

Population (thousands)

- Ukraine lost almost 10% of its population in 15 years
- Russia will see an average annual population decline of 1% through 2050 (UN estimate)
- Central Asia states will see increase
Turning to Energy…
Russia and Energy

Reserves:
- Largest natural gas reserves in world
- 2nd largest coal reserves
- 8th largest oil reserves

Exports:
- Largest natural gas exporter
- 2nd largest oil exporter
- Historically, Russia has never grown more than 5.5% w/o an increase in oil prices

Consumption:
- 3rd largest energy consumer in world
Energy Trends: TPES

TPES per capita dropped sharply and is now increasing more gradually.
Fuel Mix in Russian Energy Balance

Coal’s use is declining. Gas is increasing. Oil demand dropped but is now increasing.
Russian gas demand growing faster than expected
Shortages could make Russia switch to other fuels
Are expectations of gas supply to China realistic?
May also affect price and demand in Europe
Energy Intensity Declining
…but still very high

OECD average: 0.2 in 2005
Power Production in Russia

Russian Electricity Generation by Fuel

Surprisingly stable fuel mix. Oil’s share dropped, nuclear and coal grown slightly.
Heat is also very important in FSU

- Over 1/3 of Russian energy use is for heat (without counting most of industry)
- District heating supplies 70% of residential heating in Russia
- Russia uses almost as much gas for heating as it exports (150 bcm vs. 180 bcm)
- In rest of FSU, heat demand has started to grow again.
Emission Trends: FSU and Poland

CO2 Emissions from Fuel Combustion

Mt of CO2

Former USSR
Russia
Ukraine
Poland
Kazakhstan

Looking Forward: Future Trends
### Population Projections

<table>
<thead>
<tr>
<th></th>
<th>Russian Population (millions)</th>
<th>Rest of FSU Population</th>
<th>Russia’s Share of FSU Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>144</td>
<td>142</td>
<td>50%</td>
</tr>
<tr>
<td>2050</td>
<td>108</td>
<td>141</td>
<td>43%</td>
</tr>
</tbody>
</table>

**Key Message:** Rest of FSU will likely see stronger emissions growth than Russia. Starting from a weaker economic base.
Russia’s Energy Strategy

- Exports stable
- Demand grows
- Production grows
- But is it realistic?

Based on policy goals.

- Production growth seems challenging
- Demand growth: to date, exceeded projections
Energy Strategy: Change in GDP and Energy Intensity

- Change in Intensity: Baseline Scenario
- Change in Intensity: Optimistic Scenario
- GDP as % of 2000, Optimistic Scenario
- GDP as % of 2000, Baseline Scenario
Energy efficiency: a bargain in Ukraine

The graph shows the comparison between Power+Coal and Energy Efficiency. The y-axis represents Mtoe (Million tonnes of oil equivalent) and the x-axis represents Billion $. The chart indicates a significant improvement in energy efficiency, with a decrease in Mtoe and an increase in Billion $.
Subsidies in FSU

- Russian natural gas prices: just a fraction of European netback levels, though above Russian production costs

- Electricity: 2.7¢ and 2.8 ¢ for residential and industrial customers—risen in recent years

- In 1992: FSU $151 B in energy subsidies; today less than ¼ of this, if you ignore the rising external price of natural gas

- In 2005: $8 billion in Russia for electricity and natural gas; more for heat
Threats to Growth

- Energy intensity
- Rapid shifts in oil prices (up hurts most smaller states, down hurts Russia, Kazakhstan and Azerbaijan)
- Decline in natural gas production
Dutch Disease: How Vulnerable is Russia’s Economy to the Price of Oil

- World Bank study showing 25% of Russian GDP from oil and gas; 30% of government revenue
- Russian data show smaller %
- Energy’s share of GDP has probably grown with the price of oil
- Also affects Kazakhstan, Turkmenistan, Azerbaijan
- If the price of oil drops…
- Russia’s economic stabilization fund at over $160B
Concluding Thoughts

- Are current energy growth levels sustainable without improvements in energy intensity?
- Exports of natural gas to China may be less than anticipated
- The rest of the FSU:
  - Will the poorer FSU states start to see rapid economic growth?
  - What impact will desire to diversify energy supplies have on emissions?
- Influence of state on energy and emissions trajectories