Republic of Bulgaria

Power Sector Rapid Assessment

May 27, 2013

The World Bank
Europe and Central Asia Region
This note has been prepared by the World Bank in response to a request by the Government of Bulgaria in March 2013 to conduct an assessment of the issues and challenges in the Bulgarian power sector in the wake of the crisis in January 2013.

This note is intended to help inform the Government's deliberations on how to improve public confidence and trust in the governance of the power sector, enhance the sector’s financial standing, and provide adequate support to poor households so that they can afford environmentally sustainable and reliable electricity service.

This assessment has been undertaken by the World Bank within a very short period of time based on data provided by the Ministry of Economy, Energy and Tourism (MEET), the State Water and Energy Regulatory Commission (SWERC), the National Statistical Institute (NSI), and the Ministry of Labor and Social Policy (MLSP). This rapid assessment is not a substitute for more detailed analysis that will inform and guide specific implementation steps and sector reforms.

The World Bank will be available to continue the policy discussion on the findings of this assessment and the suggested package of reforms with the Government to develop and support a viable program of reforms that will help achieve reliable, efficient, and affordable electricity and heating services for the citizens of Bulgaria.
Synopsis of Diagnosis and Recommendations

- **Public has lost confidence and trust in the management of energy companies and the Government’s oversight of the electricity sector.** Common believe that some State officials and enterprise managers have investments in the energy sector has compromised public trust. Bulgarian Energy Holding (BEH) is an unnecessary level of State oversight.

- **Sector has large financial deficits that are increasing contingent liabilities on the State.** High cost structure stemming from flat energy demand, poorly regulated growth in renewables, misuse of incentives for cogeneration, long-term contracts, and inefficient trade/export incentives.

- **Declining level and coverage of social assistance benefits have made energy unaffordable for the poor.** Budget contribution for targeted social safety net programs is a third of levels in 2003.

- **Comprehensive package of actions needed to improve public confidence, financial viability and affordability:**
  - Enhance credibility, independence, and capacity of energy regulator.
  - Eliminate incentives that lead to inefficient investments and rent-seeking behaviour.
  - Address financial liabilities that arise from the off-take of renewable energy, co-generation, long-term power purchase agreements, and failed investments in an equitable manner.
  - Increase budgetary funding to expand level and scope of targeted social assistance benefits for vulnerable consumers.
  - Eliminate conflicts of interest of state officials and senior managers in having personal/family financial interests in the power sector.
Note Structure

I. Public distrust

II. Unsustainable cost structure

III. Affordability

IV. Future directions
I. Public distrust
Serious structural issues in the sector contributed to a political crisis

- Governance
  - Perception of deep rooted corruption
  - Governance of State Owned Enterprises
  - Undermined regulatory framework

- Unsustainable cost structure
  - High cost generation mix
  - Inefficient operation of the system
  - Poorly regulated growth in renewables

- Affordability
  - Inadequate social protection
  - High and inefficient electricity consumption

Unless these issues are comprehensively addressed, service delivery will worsen and threaten economic stability
Consumers are frustrated by tariff hikes and the lack of transparency in the sector

Electricity market performance (MPI): second lowest scoring country in the EU

- Lowest scores for “trusting the provider” (to respect laws and regulations protecting consumers) and “live up to what you wanted” (the service consumers want is actually being delivered)

The Market Performance Indicator (MPI) is a composite index based on the results of survey which information on consumer markets in terms of comparability, trust, consumer problems and complaints, expectations, choice and switching.

Source: European Commission
Overall, high perception of corruption

Bulgaria is the lowest scoring country in the EU area after Greece in terms of the Corruption Perception Index (CPI) for 2012.

A country or territory’s score indicates the perceived level of public sector corruption on a scale of 0 - 100, where 0 means that a country is perceived as highly corrupt and 100 means it is CPI (2012) perceived as very clean.

Source: Transparency International
Consumers upset over billing practices

- Consumers are not sure what they are being charged for
- Bills do not make essential information understandable
- Past consumption is not explained
- Billing cycles are irregular
State ownership through Holding Company BEH compromises transparent and professional management of the energy enterprises

- State assets are being priced inefficiently. For example, some hydroelectricity priced artificially low to accommodate high priced renewables

- Growing Government liabilities hidden making it difficult to assess impact on the State Budget

* The structure shall be completed when the Electricity System Operator EAD (ESO EAD) shares be transferred from NEK EAD to BEH EAD.
Constraints to transition to EU-compatible electricity market

- Large generation capacity share of “must-run” plants makes the system inflexible for a competitive, more efficient electricity market

- Incentives grossly distorted:
  - Co-generators sell power at preferential power prices and buy back cheaper power for their own use
  - Large cross-subsidies from electricity to heat
  - Renewable incentive framework and growth poorly designed and regulated
  - Allocation of power generation quotas for the regulated market driven by social considerations

- Key market mechanisms not in place:
  - No balancing market
  - No power exchange

A competitive, more efficient market can be achieved but needs a fundamental re-think on market transition
Current market structure a good platform to facilitate market transition

- **Well disaggregated sector** - although transmission separation to be completed
- **The single buyer NEK** can transition to a balancing market and power exchange
- **Active cross-border trade** with neighbouring countries will help the transition
Energy Regulator: lack of independence and capacity

- **Regulatory independence is insufficient**
  - In the last 6 months there have been two changes of the Chairman of the Regulator (SWERC)
  - Decision to decrease prices was pre-announced by the State officials and followed a change in the Energy Law allowing price decreases
  - Regulator is blamed but unable to make the necessary political decisions to correct problems in the electricity sector
  - Some regulatory decisions are unpredictable and not fully explained or supported by transparent information

- **SEWRC has insufficient technical, financial capability to fulfil its duties**
  - Number of staff (128) is small considering scope of activities covering electricity, gas and water
  - There are about 15 experts covering the electricity sector
  - The budget is insufficient and 2nd lowest per employee in Europe; it is part of the central budget and not ring-fenced

- **Lack of key regulatory building blocks**
  - No accounting standards framework for regulated utilities
  - No cost benchmarking of regulated utilities e.g. generation, transmission, and distribution
  - Allocation of quotas for the regulated market not based on efficiency principles
II. Unsustainable cost structure
Factors contributing to financial unsustainability

1. Adequate power capacity for domestic use, but administrative constraints to exporting surplus power
2. Inefficient allocation of power generation quotas for the regulated market and distortions in operational dispatch of power plants
3. Rapid build-up of renewable energy at high feed-in tariffs
4. High preferential tariffs paid to “cogeneration” plants imposed by law
5. Cost of long-term Power Purchase Agreements (PPAs)
6. Mismanagement of contingent liabilities in the sector
Adequate supply for exports

- Even with rising demand for electricity, Bulgaria will continue to have a supply surplus to maintain energy security and facilitate exports.

Source: Generation mix projections MEET, alternative demand scenarios calculated by ECA.
Exports declined but not dramatically

- Exports to Western Balkans and Greece have fallen over the past two years due to economic downturn. Turkey is now an important off-take market, but its increase has not fully offset fall in other countries.

- Additional constraints to exports include:
  - Access to electricity priced at competitive levels for the regional market
  - High transmission fees
  - Limited grid capacity for export

“Power costs from Bulgaria are too high. I’m better off selling power from Hungary to Turkey”
… Power trader
System not dispatched at least cost due to “must-run” plants

Supply curve* (least–average cost)  
Supply curve (with must-run plants)

* Nuclear do not include costs for decommissioning of existing plants, long-term fuel storage, nor externality costs

- Simplified supply curve on the left stacks generation options by least average cost order.
- Without “must-run” plant constraints, average load could be covered mainly by the operation of Kozloduy, Maritza 2, HPP, Varna, Bodov Dol and Maritza 3.

- The curve on the right shows must-run plants (RES, PPAs and DH) stacked first in order from the left. Lower cost plants (nuclear, thermal and hydro) are hardly dispatched.
- This illustrates the impact of the must-run constraints; it is expensive for the system and consumers.
Long Term Power Purchase Agreements, Cogeneration and Renewables are a large share of the electricity output in 2012 (TWh).

- Nuclear power plant, 35%
- Thermal plants, 23%
- Cogeneration and factory plants, 12%
- Renewable energy sources, 15%
- Long term power purchase agreements, 15%
Rapid build-up of Renewable Energy (RE) and more expected

Renewable Generation Capacity as of March 2013

| Source: MEET |

Bulgaria has gone a long way in improving the sector’s environmental sustainability and is in good track to meet its obligations specified in the EU 20/20 package.

Renewable capacity additions slowed down in 2013 given reductions in feed-in-tariffs. It is unlikely that a significant amount of the contracted new capacity becomes on-stream.
Development of Renewables driven by high Feed-in-Tariffs

* Lower and upper level of the levelized cost of RES calculated assuming weighted average cost of capital of 7% and 10%, respectively
Source: FIT from MEET and levelized costs calculated by Bank staff
Worsening generation cost trend – putting pressure on electricity prices

- There has been an upward trend in generation costs (fixed + variable costs) over the past five years.

- The cost of long term agreements and renewables is well above the generation cost of the rest of State-owned power plants.

- This will puts pressure on electricity prices.

* Nuclear and do not include costs for decommissioning of existing plants, long-term fuel storage, nor externality costs. Coal-fired plants do not include externality costs.
Growing financial gaps threaten fiscal stability

Estimated financial gaps resulting from long-term agreements, high efficiency cogeneration, and renewable energy Feed-in-tariffs (FTIs), net present value 2013-2030

- Total financial gaps til 2030 projected to range from 5 to 20 Billion BGN
- Financial deficit in the next 12 months is projected to be between 800-1,200 Million BGN
- Several measures will be needed to address this gap -- increasing prices is not the only solution.

Estimated net present value of financial gap until 2030 assuming that only 10% of RES new contracted capacity will go on stream and assuming a 5% discount rate.
Large debt accumulation if no action is taken

Financial gaps per year resulting from long-term agreements, high efficiency cogeneration, and renewable energy Feed-in-tariffs (FTIs) in nominal terms

*Estimated the level of financial gap until 2030 assuming that only 10% of RES new contracted capacity will go on stream*
Mismanagement of contingent liabilities

• NEK's precarious financial situation is the result of many state actions:
  • Generous payments for service delivery for some technologies set by law
  • Lack of planning of renewable additions
  • Public investments in the power sector handled off budget
  • Delays in introducing market reforms (e.g., balancing power market, export)

• No government entity monitoring arrears build-up to assess the consequences on government finances and the economy.

• Bulgaria lacks a system to properly manage contingent liabilities (e.g. a recording system in the Ministry of Finance and established legal principles for approving sub-sovereign liabilities and their provisioning).

• Contingent liabilities that have materialized could be managed more efficiently by the Ministry of Finance rather than BEH.
III. Affordability
The financial crisis affected the poorest households

The poor were particularly hit: real income of the poorest dropped by 12.6% between 2009 and 2010.

The unemployment rate doubled between Q2 of 2008 and the Q2 of 2012.

Real Income per capita growth

Quintiles of expenditure per capita, where 1 is the poorest quintile and 5 the richest quintile.

Source: Bank Staff Estimates based on EU SILC (2007-2011)

Unemployment rate

Source: EUROSTAT
**Electricity is the most important energy source for households, especially for the poor**

Bulgarian households are more reliant on electricity than households in other EU Member States.

The poorest spend the most on electricity (up to 9% of their total household expenditures).

Source: Bank staff estimates, ECAPOV database
61% of Bulgarian households considered energy poor*

- 78% of the energy poor are located in urban areas
- Bulgaria (61%) ranks second among countries in Europe and Central Asia, with the highest rate of energy poor after Hungary (80%) and just before Tajikistan (60%)

* A conventional measure of high spending on energy is energy poverty, defined as spending more than 10 percent of household resources to cover energy needs
Electricity tariffs hiked in 2012 but still below 2007 levels

Electricity tariffs for households by block of consumption, in real terms

Source: Bulgaria National Statistic Institute
Despite increases, tariffs lowest among EU Member States

Retail electricity prices (€ per kWh)

<table>
<thead>
<tr>
<th>Country</th>
<th>Price (€ per kWh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bulgaria</td>
<td>0.08</td>
</tr>
<tr>
<td>Estonia</td>
<td>0.11</td>
</tr>
<tr>
<td>Romania</td>
<td>0.13</td>
</tr>
<tr>
<td>Lithuania</td>
<td>0.14</td>
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<tr>
<td>Latvia</td>
<td>0.14</td>
</tr>
<tr>
<td>Greece</td>
<td>0.15</td>
</tr>
<tr>
<td>France</td>
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</tr>
<tr>
<td>Poland</td>
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</tr>
<tr>
<td>Czech Republic</td>
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<tr>
<td>Slovakia</td>
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<tr>
<td>Slovenia</td>
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<tr>
<td>United Kingdom</td>
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<tr>
<td>Finland</td>
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<td>Hungary</td>
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<tr>
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<td>Slovakia</td>
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<td>Portugal</td>
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<td>Spain</td>
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<tr>
<td>Sweden</td>
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<tr>
<td>Austria</td>
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<tr>
<td>Ireland</td>
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<tr>
<td>Netherlands</td>
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<tr>
<td>Italy</td>
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<tr>
<td>Belgium</td>
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<tr>
<td>Cyprus</td>
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<tr>
<td>Germany</td>
<td>0.26</td>
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<tr>
<td>Denmark</td>
<td>0.30</td>
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</tbody>
</table>
Targeted safety nets have been marginalized

Expenditure on Social Assistance declined

Index (2003=100)

Source: World Bank ECA Social Protection Database
There have been large declines in expenditure and beneficiaries of Guaranteed Minimum Income and heating allowance…

Expenditure on GMI benefits (as a percent of GDP) in 2010 was 1/4\textsuperscript{th} the expenditure in 2003

<table>
<thead>
<tr>
<th></th>
<th>2003</th>
<th>2010</th>
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</thead>
<tbody>
<tr>
<td>Guaranteed Minimum Income</td>
<td>0.28</td>
<td>0.07</td>
</tr>
<tr>
<td>Heating Allowance</td>
<td>0.24</td>
<td>0.09</td>
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</tbody>
</table>

Number of beneficiaries of heating allowance halved between 2003 and 2010

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<tr>
<th></th>
<th>2003</th>
<th>2010</th>
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<tbody>
<tr>
<td>Guaranteed Minimum Income</td>
<td>143,493</td>
<td>44,342</td>
</tr>
<tr>
<td>Heating allowance</td>
<td>542,685</td>
<td>255,047</td>
</tr>
</tbody>
</table>
... as a result, more than 78% of the poor have not been protected by targeted safety nets

Around 78% of the poor were not covered by the main programs targeted to protect them

88% of the poor did not benefit from the heating allowance

Percentage receiving the Guaranteed Minimum Income (GMI Benefits)

Percentage receiving Heating Allowance

To adequately protect the poor, at least restore budget allocation levels that existed in the early 2000s

Source: Staff estimates from ECAPOV
IV. Future Directions
The **full package of reforms needed to address the issues in the sector**

<table>
<thead>
<tr>
<th>Diagnosis and objective</th>
<th>Package of actions</th>
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<tbody>
<tr>
<td><strong>Immediate</strong></td>
<td><strong>Follow-on</strong></td>
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<tr>
<td><strong>Public distrust:</strong></td>
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<tr>
<td>Regain public confidence by emphasizing transparency</td>
<td>Ensure that state officials and senior employees disclose their financial interests in the energy sector</td>
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<td></td>
<td>Dissolve BEH to increase transparency and accountability of State Owned Enterprises (SOEs)</td>
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<td></td>
<td>Grant financial and decision-making independence for the Regulator as per EU Directives; Establish a plan to build technical capacity</td>
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<tr>
<td><strong>Unsustainable Cost Structure:</strong></td>
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<tr>
<td>Address growing deficits in the sector</td>
<td>Eliminate abuse of preferential pricing for cogeneration</td>
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<td>NEK and Ministry of Finance to equitably address financial liabilities arising from preferential tariffs for Renewable Energy, long-term agreements, and failed investments such as Belene</td>
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<td></td>
<td>Reduce costs by improving the allocation of generation quotas in the regulated market and ensuring economic dispatch</td>
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<tr>
<td><strong>Affordability:</strong></td>
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<tr>
<td>Make energy services affordable to the poor</td>
<td>Increase budgetary funding to enhance coverage and amount of the Guaranteed Minimum Income and Heating Allowance programs</td>
</tr>
<tr>
<td></td>
<td>Scale-up Energy Efficiency (EE) program in the residential buildings to make energy affordable</td>
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</tbody>
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Consult with citizens and other stakeholders to prepare and finalize a Policy Paper that sets the strategic direction for the recovery and long-term development of the power sector
Disclaimer:

This rapid assessment was conducted by staff of the International Bank for Reconstruction and Development/The World Bank. The findings, interpretations, and conclusions expressed in this assessment do not reflect the views of the Executive Directors of the World Bank or the governments they represent.

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