1. RES-E support scheme

- Bulgaria held a significant RES potential already before the RES Directive – e.g. 2700 MW HPPs (1/4 of the total).
- RES Target – 16% of final gross consumption – already achieved in 2014
- The achievement of the target is questionable due to the methodology used
- RES-E Target – Almost Achieved in 2015 (20.8%)
- RES-E support based on feed-in tariffs under long-term contracts and EU Regional and Rural Development Funds:
  - 20 years for geothermal, solar PV and biomass
  - 12 years for wind power
  - 15 years for small HPPs until 10 MW
- Mandatory purchase was guaranteed until 1 January 2014 when hourly limitation was imposed
- IRR has been limited to WACC – 9% in 2011 down to 7% in 2014
- Compensation Mechanism:
  - Revenue from the sale of CO2 certificates
  - SRT imposed on participants on the free market
  - Surcharge include in regulated tariffs

Source: Ministry of Energy, NAP RES
RES – Gross Consumption by Source

Source: EUROSTAT
Structure of Final (Net) Energy Consumption by Fuel in Bulgaria

Source: PRIMES
Structure of Power Generation by Source 2050 (%)

- Nuclear energy: 49.6%
- Solids: 29.5%
- Oil (including refinery gas): 13.7%
- Gas (including derived gases): 18.5%
- Biomass-waste: 10.4%
- Wind: 12.9%
- Solar: 5.1%

Source: PRIMES
RES Overall Development and By Sector in Bulgaria – Share of RES by sector from gross consumption (%)
RES-E Development

Source: EUROSTAT, ESO, PRIMES (REF 2016)
Key barriers and success factors

• Barriers:
  - The energy system would not sustain high volumes of intermittent generation in a low carbon future, putting at risk the reliability of supply
  - Bottlenecks by the TSO and the DSOs for adding the RES to the grid
  - Intrasystem debt created by NEK’s non-payment of compensation to DSOs paying the FiTs to RES
  - Decentralised micro renewable energy generation – no sale to the grid
  - Lack of social acceptability due to the corrupt implementation of FiTs

• Success factors:
  - High FiTs covering investment costs and guaranteeing quick ROI + suitable weather conditions for wind and solar power developments
  - The power system is flexible with enough back-up capacity to balance intermittent RES supply
  - Developed regional interconnections making Bulgaria a net exporter of electricity
  - Rare instances of reducing base-load supply or DSOs to stop RES purchases
  - Well developed network of large HPPs (owned by NEC)
# Financial Framework for RES Support

<table>
<thead>
<tr>
<th>Year</th>
<th>Technology</th>
<th>IRR%</th>
<th>LCOE EUR per MWh</th>
<th>Wholesale market price EUR per MWh</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Minimum</td>
<td>Maximum</td>
</tr>
<tr>
<td>2011</td>
<td>Hydro power</td>
<td>9%</td>
<td>57,3</td>
<td>135,5</td>
</tr>
<tr>
<td></td>
<td>Wind power</td>
<td>9%</td>
<td>70,1</td>
<td>97,7</td>
</tr>
<tr>
<td></td>
<td>PV power</td>
<td>9%</td>
<td>248,3</td>
<td>309,5</td>
</tr>
<tr>
<td></td>
<td>Biogas power</td>
<td>9%</td>
<td>61,0</td>
<td>221,3</td>
</tr>
<tr>
<td></td>
<td>Biomass power</td>
<td>9%</td>
<td>61,0</td>
<td>221,3</td>
</tr>
<tr>
<td>2012</td>
<td>Hydro power</td>
<td>7%</td>
<td>50,2</td>
<td>117,3</td>
</tr>
<tr>
<td></td>
<td>Wind power</td>
<td>7%</td>
<td>53,4</td>
<td>76,0</td>
</tr>
<tr>
<td></td>
<td>PV power</td>
<td>7%</td>
<td>86,8</td>
<td>204,9</td>
</tr>
<tr>
<td></td>
<td>Biogas power</td>
<td>7%</td>
<td>183,0</td>
<td>205,0</td>
</tr>
<tr>
<td></td>
<td>Biomass power</td>
<td>7%</td>
<td>56,2</td>
<td>241,7</td>
</tr>
<tr>
<td>2013</td>
<td>Hydro power</td>
<td>7%</td>
<td>50,2</td>
<td>123,9</td>
</tr>
<tr>
<td></td>
<td>Wind power</td>
<td>7%</td>
<td>53,8</td>
<td>89,9</td>
</tr>
<tr>
<td></td>
<td>PV power</td>
<td>7%</td>
<td>81,9</td>
<td>181,0</td>
</tr>
<tr>
<td></td>
<td>Biogas power</td>
<td>7%</td>
<td>172,5</td>
<td>197,9</td>
</tr>
<tr>
<td></td>
<td>Biomass power</td>
<td>7%</td>
<td>45,6</td>
<td>231,7</td>
</tr>
<tr>
<td>2014</td>
<td>Hydro power</td>
<td>7%</td>
<td>47,9</td>
<td>121,1</td>
</tr>
<tr>
<td></td>
<td>Wind power</td>
<td>7%</td>
<td>42,5</td>
<td>70,5</td>
</tr>
<tr>
<td></td>
<td>PV power</td>
<td>7%</td>
<td>67,2</td>
<td>108,3</td>
</tr>
<tr>
<td></td>
<td>Biogas power</td>
<td>7%</td>
<td>173,0</td>
<td>198,4</td>
</tr>
<tr>
<td></td>
<td>Biomass power</td>
<td>7%</td>
<td>45,6</td>
<td>231,7</td>
</tr>
</tbody>
</table>

Source: Ministry of Energy
WACC Falling in Bulgaria

Source: 2016, ECOFYS
Social acceptability of RES support:

- RES FiTs are compensated through end-users' bills and special taxes – Social Responsibility Tax – EUR 18.26/MWh
- RES support costs around EUR 11.5 per MWh
- Households pay approx. EUR 34.25 per year for RES support
- Households pay the lowest power tariff in the EU – prices are kept artificially low
- 35-55% of the population is considered energy poor – No. 1 in EU
- Energy poverty aid to 230 000 households are granted with energy poverty aid which amounts to only EUR 36 per year
- In 2013, mass protests against rising power tariffs caused by RES, CHP and coal power plant support schemes toppled the government
- Full liberalization of the power market – socially unacceptable
## Keeping the Regulated Prices Artificially Low

<table>
<thead>
<tr>
<th>Suppliers</th>
<th>2015-2016</th>
<th></th>
<th>2016-2017</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>MWh - EUR/MWh</td>
<td>Volume (MWh)</td>
<td>Price</td>
<td>Share in the Mix</td>
<td>Volume (MWh)</td>
</tr>
<tr>
<td>NPP Kozloduy</td>
<td>1 021 230</td>
<td>15,3</td>
<td>6,42%</td>
<td>759 729</td>
</tr>
<tr>
<td>Big HPPs</td>
<td>1 329 775</td>
<td>30,2</td>
<td>1,76%</td>
<td>286 450</td>
</tr>
<tr>
<td>CHPs</td>
<td>2 472 097</td>
<td>82,7</td>
<td>18,03%</td>
<td>2 159 299</td>
</tr>
<tr>
<td>Renewable Energy Producers</td>
<td>2 797 854</td>
<td>139,6</td>
<td>22,58%</td>
<td>2 761 040</td>
</tr>
<tr>
<td>TPP AES Galabovo</td>
<td>3 035 682</td>
<td>75,3</td>
<td>19,93%</td>
<td>2 436 818</td>
</tr>
<tr>
<td>TPP Contour Global Maritsa</td>
<td>3 817 519</td>
<td>55,5</td>
<td>28,93%</td>
<td>3 537 292</td>
</tr>
<tr>
<td>East 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TPP Maritsa East 2</td>
<td>613 200</td>
<td>34,7</td>
<td>2,36%</td>
<td>288 000</td>
</tr>
<tr>
<td>Average Power Mix</td>
<td>15 137 652</td>
<td>73,5</td>
<td></td>
<td>12 228 628</td>
</tr>
<tr>
<td>Final Power Mix Price after</td>
<td>15 137 652</td>
<td>59,6</td>
<td></td>
<td>12 228 628</td>
</tr>
<tr>
<td>SRT and other deductions</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Significant Changes in RES Regulation 2015/2016

- FiT support for new RES was withdrawn for new wind and PV capacities in 2015
- Annual hourly limit on mandatory purchases of all generated power from RES - 2015
- Access fee for RES to the grid later reversed by the High Administrative Court – 2013/2014
- 20% revenue tax on all new RES plants
- Retroactive reduction of RES FiT based on reevaluation of the additional EU financing the projects had received
- Corrupt-driven energy law amendment providing EUR 175/MWh FiT for biomass power plants using animal waste
2. Impact of 2014 State Aid Guidelines on RES-E support

• in 2013 the Ministry of Energy of Bulgaria notified the EC that the 2020 RE share was already reached => Support schemes for new plants were fully cut off (except for micro-RE plants)

• the EC confirmed the national RE target was accomplished in compliance with the 2008 State aid Guidelines. => no place to apply the 2014 Guidelines to new plants since RE share exceeded 16%

• 2030 RE share will be pursued using the 2014 Guidelines

• Bulgaria has not yet introduced an auctioning system for new RES-E support
2. Impact of 2014 State Aid Guidelines on RES-E support

- Imported power coming from RES produced in an EU member-states will be exempt from the surcharge tax.
- Bulgarian authorities have committed to invest the income generated from the tax on the RES imports from EU countries (2011-2016) in a new power interconnection – 400 kV ‘Maritsa Istok – Nea Santa’ with 1500 MW capacity – around EUR 500 million.
- Energy intensive consumers were exempted from paying up to 85% from the SRT.
3. Long term energy/electricity vision of your country

Energy strategy:

• Latest long-term national energy strategy dates from 2011

• Up-to-date energy strategy postponed due to political uncertainty in Bulgaria

• 2011 energy strategy sets up targets only to 2020 which fully takes into account EU 20-20-20 objectives

• The Energy Ministry uses the PRIMES Model directly due to lack of financing for the purchase of a modelling tool
Carbon Pricing Policy

• Bulgaria does not have a national carbon pricing policy - abides by the EU ETS rules.
• RES deployment in Bulgaria: mainly driven by high FiTs, rather than by carbon pricing
• Bulgaria benefits from an exemption under the ETS allowing it to grant free carbon allowances to power plants until 2020
• Coal power units in Bulgaria: driven away from the energy mix due to market liberalization and compliance with EU climate rules than by ETS prices
Power Demand Forecast (2015-2024)

Source: Bulgarian Transmission Systems Operator (ESO)
New RES Installed Capacity Forecast

Source: Bulgarian Transmission Systems Operator (ESO)
CSD Energy Security and Policy Publications

- Energy Sector Governance and Energy (In)Security in Bulgaria
- Green Growth and Sustainable Development for Bulgaria: Setting the Priorities
- Green Energy Governance in Bulgaria at a Crossroads
- CSD Policy Brief No. 58: Transparent Governance for Greater Energy Security in CEE
- Country fact-sheets on national energy security indicators
- CSD Policy Brief No. 47: EU and NATO's role in tackling energy security and state capture risks in Europe
- CSD Brief No 23: Energy Efficiency in Bulgaria: The Case for Market-Based Approach and Transparency
- Ensuring Effective Cooperation Between Eu And Turkey To Foster Energy Security
Thank You!

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