Status and Prospects of Nuclear Power Development in Russia

Report of the Russian Federation Minister for Atomic Energy

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Ministry of the Russian Federation for Atomic Energy
Program documents

- Strategy of nuclear power development in Russia for the first half of the XXI century
- Energy strategy of Russia
- Federal program “Power effective economics for 2002 – 2005 and 2010 perspective”, section” Safety and development of nuclear power”
- Laws and decrees of the President of the Russian Federation:
  - Decree of 10 July 2001 No 828 “On the Special Commission for issues of foreign origin fuel assemblies import to the Russian Federation territory”
Priorities of Nuclear Power Development

- Providing for NPP safety
- Electricity production efficiency enhancement
- Power units modernization and service life extension
- NPP output increment and increase
- Innovation technologies implementation
Nuclear Power Plants in Russia

Kola – 1.8 GW
Leningrad - 4 GW
Smolensk - 3 GW
Kursk - 4 GW
Completing construction - 1 GW
Novovoronezh – 1.8 GW
Balakovo – 4 GW
Completing construction - 2 GW
Volgodonsk – 1 GW
Completing construction - 1 GW
Beloyarsk – 0.6 GW
Bilibino – 0.05 GW

In operation –10 NPPs, 22 GW
Under construction – 4 units, 4 GW
Reserve for development, 14 GW

NPP share: in capacity 11.5%
in production 15%
(21% in the European Region)
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NPP electricity production dynamics

Potential: 154 bln kWh

There is a reserve for production increase at operating NPPs up to 30 billion kWh annually

Potential: 160 bln kWh

Potential: 162 bln kWh

ICAF – 77%
Dynamics of events at NPP

Events not important for safety – “0” level and lower on the INES scale

Events important for safety – level “1” on the INES scale

Events important for safety – level “2” on the INES scale

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NPP resource potential

Operational readiness date extension

<table>
<thead>
<tr>
<th>Year</th>
<th>Total output, billions kWh</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>13</td>
</tr>
<tr>
<td>2003</td>
<td>21</td>
</tr>
<tr>
<td>2004</td>
<td>36</td>
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<tr>
<td>2005</td>
<td>48</td>
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<td>2006</td>
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<td>2007</td>
<td>79</td>
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<td>2008</td>
<td>89</td>
</tr>
<tr>
<td>2009</td>
<td>97</td>
</tr>
<tr>
<td>2010</td>
<td>115</td>
</tr>
</tbody>
</table>

New capacity input

- Kola - 1, Leningrad - 1
- Bilibino - 1,2, Kola - 2
- Bilibino - 3, Leningrad - 2
- Bilibino - 4, Kursk - 1
- Kursk - 2, Leningrad - 3
- Beloyarsk - 3, N.-Voronezh - 5
- Kalinin - 3
- Kursk - 5
- Volgodonsk - 2
- Balakovo - 5
- Beloyarsk - 4
- Kalinin - 4

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New VVER-1000 abroad

New construction:

- Tyanvan NPP in China
- Busher NPP in Iran
- Kudanculam NPP in India

Completing construction:

- Khelminitsky and Rovensky NPP in Ukraine
Closed fuel cycle

- Enrichment
- Ore mining
- Nuclear fuel fabrication
- Reprocessing
- Storage
- Conditioning
- Conditioning at NPP
- Long-term storage
- RW disposal
- NPP

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Task of Russia at the international market of services for spent nuclear fuel management

- Nuclear fuel cycle contracted deliveries implementation
- Providing for nuclear weapon non-proliferation regime
- Providing for the future nuclear power resource base involving uranium and plutonium regeneration
- Financial resources provision for solving ecological problem in Russia accumulated during nuclear weapon program implementation
- National infrastructure development for spent nuclear management meeting international standards
President of Russia
Vladimir Putin initiative at the UN Millennium Summit

It is necessary to safely cut off nuclear weapon scattering paths. It can be provided for, interalia, by the exclusion of enriched uranium and pure plutonium from the use in peaceful nuclear power programs.

Burning up of plutonium and other radioactive elements gives opportunity for the final solution of the RW problem. It will open to the world principal new prospects of the safe life in our planet.

Russia proposes to develop and implement an appropriate international project with the IAEA participation.
Future nuclear power should provide for:

- Safety and competitiveness of NPPs
- Fuel supply task solution for wide scale nuclear power programs
- Solving problems of spent nuclear fuel and radioactive waste management
- Technological support of the non-proliferation regime of nuclear materials suitable for weapon use
# Advanced designs of power units

<table>
<thead>
<tr>
<th>Power unit</th>
<th>Designation</th>
<th>Planned putting in operation</th>
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<tbody>
<tr>
<td>Upgraded VVER-1000</td>
<td>Base power unit for domestic market and export</td>
<td>Before 2010</td>
</tr>
<tr>
<td>VVER-1500</td>
<td>For effective replacement of first generation units and output increase</td>
<td>After 2013</td>
</tr>
<tr>
<td>WK-300\NHPP</td>
<td>Electricity and heating for Russian towns (regional application)</td>
<td>After 2010</td>
</tr>
<tr>
<td>BN-800</td>
<td>For plutonium utilization and ecological problems solution</td>
<td>2010</td>
</tr>
<tr>
<td>Innovation technologies</td>
<td>Fast reactors with heavy and light liquid metal coolant (BREST, SVBR, BN)</td>
<td>After 2015</td>
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<tr>
<td></td>
<td>High temperature gas-cooled reactors (GT-MGR)</td>
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