Rosatom in Europe

Entretiens européens

20 October 2016, Bruxelles, Belgium
Rosatom NPPs projects in the world

Rosatom NPP construction long-term perspective backlog is more than 90 units
Rosatom integrated NPP construction solution

Energy Solution
- Modern NPP design (Gen III+)
- NPP construction and life cycle management support (fuel, services, modernization)
- Operation & maintenance

Industrial Solution
- NPP equipment manufacturing, service & works localization,
- Technology transfer,
- Certification of local suppliers, participation in Rosatom third countries projects

Regulation, Infrastructure and Public acceptance
- Creation and development of regulatory base
- NFC facilities construction,
- SNF & RW management,
- Social-political programmes support

Knowledge, skills, human capital
- Personnel education & training (incl. traineeship on NPP sites),
- R&D base development,
- NPP operation experience exchange

Financial Solution
- BOO projects implementation;
- State credits,
- Partnership projects

SAFETY - basic principle
Long-term operation (LTO) activities in Russia

34 Units in operation (+2 in test operation)
24 Units licensed for LTO
9 Units with LTO projects in progress

The LTO objective of Rosatom until 2025 is to keep 9 units of 6897 MW total capacity in operation
First criticality of a Gen III+ unit: Novovoronezh-6 with AES-2006
20 May 2016 at 16:11
Ongoing and planned newbuild nuclear projects in the EU and neighboring countries

- **EPR**
  - Olkiluoto-3, Finland
  - Flamanville-3, France
  - Hinkley Point C, UK
- **VVER**
  - Mohovce NPP 3-4, Slovakia
  - Hanhikivi-1, Finland
  - Paks units 5 and 6, Hungary
  - Ostrovets NPP units 1 and 2, Belarus
  - Akkuyu NPP, 4 units, Turkey
  - 8 units under construction in Russia
- **CANDU**
  - Cernavoda units 3 and 4, Romania

Important newbuild programme in Europe, with significant involvement of Rosatom
Construction of a VVER plant in Europe

- **European companies potentially involved in:**
  - Civil construction
  - Supply and installation of the turbo-generator
  - I&C supply
  - Engineering
  - Equipment supply
  - Certification and supervision of manufacturing & construction
  - Financing

- **Rosatom involved in:**
  - Supply of nuclear island equipment
  - Engineering and construction supervision
  - Fuel cycle
  - Financing

Rosatom’s NPP projects in Europe are European infrastructure projects
Construction of a NPP brings numerous opportunities to suppliers

Examples of realized supplies
- Valves, pumps and piping (6%)
- Other equipment (5%)
- Air cooling systems (3%)
- Turbine and generator equipment (6%)
- Electrical equipment (9%)
- I&C (6%)

Rosatom is ready for and has extensive experience in sourcing goods and services for new NPP construction projects

Orders volume for 2015-2030 – more than $300 bln.

~ 15% - Russian supply
~ 30-40% - local content
~ 45-50% - global sourcing

Potential for external sourcing

Civil construction & engineering*
~50%

NSSS**
~10-15%

Other Equipment
~35-40%

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### Rosatom cooperation with some European companies

**(non-exhaustive list)**

<table>
<thead>
<tr>
<th>AREVA</th>
<th>ALSTOM</th>
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<tbody>
<tr>
<td>✓ Successful joint business in nuclear fuel manufacturing and supply to world market</td>
<td></td>
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<tr>
<td>✓ Historic cooperation in I&amp;C supply for Rosatom projects in Russia (modernization of I&amp;C at 8 units) and abroad</td>
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<tr>
<th>DASSAULT SYSTEMES</th>
<th>EDF</th>
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<tr>
<td>✓ joint development of Multi-D project management suite for nuclear newbuild projects</td>
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<th>FREYSSINET</th>
<th>SCHNEIDER ELECTRIC</th>
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<tr>
<td>✓ Cabling of containment structure in Rosatom’s NPP</td>
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<th>ALSTOM</th>
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<tr>
<td>✓ 2007 – JV between Rosatom and Alstom on Arabelle turbo-generator</td>
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<tr>
<td>✓ Contract for supply of Arabelle turbo-generator for Baltic NPP and for Hanhikivi NPP</td>
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<tr>
<td>✓ Joint implementation of Kozloduy NPP units 5,6 LTO project</td>
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<tr>
<td>✓ Cooperation on LTO</td>
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<th>SCHNEIDER ELECTRIC</th>
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<tr>
<td>✓ 2013 – agreement on industrial license for production of specific electro-technical equipment</td>
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<tr>
<td>✓ 2014 – start of production on Rosatom facility</td>
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<tr>
<td>✓ 2015 – MoU on cooperation</td>
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Conclusions

- Rosatom has significant backlog of nuclear power contracts in Russia and overseas:
  - NPP construction
  - Operation, fuel cycle, electricity trading
  - Maintenance and LTO
  - Decommissioning

- Europe is the key client for Rosatom

- Rosatom plays an important role in the European NPP construction, operation, maintenance and lifetime extension programmes

- European companies are important partners for Rosatom for both national and overseas nuclear power projects