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THE STATE ATOMIC ENERGY CORPORATION ROSATOM

ROSATOM 2018

Zdeněk Šima

Director

Rosatom Central Europe

NERS 2018 Prague



30.1 GW

No 1-36 UNITS



OF INSTALLED CAPACITIES OPERATED IN RUSSIA

BY NPP UNITS IN INTERNATIONAL BACKLOG



18.9 %



OF TOTAL RUSSIAN ELECTRICITY GENERATED BY ROSATOM

36 %

OF GLOBAL ENRICHMENT MARKET



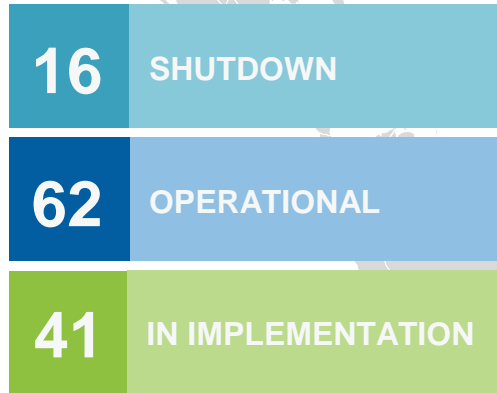
14 % OF GLOBAL URANIUM EXTRACTION



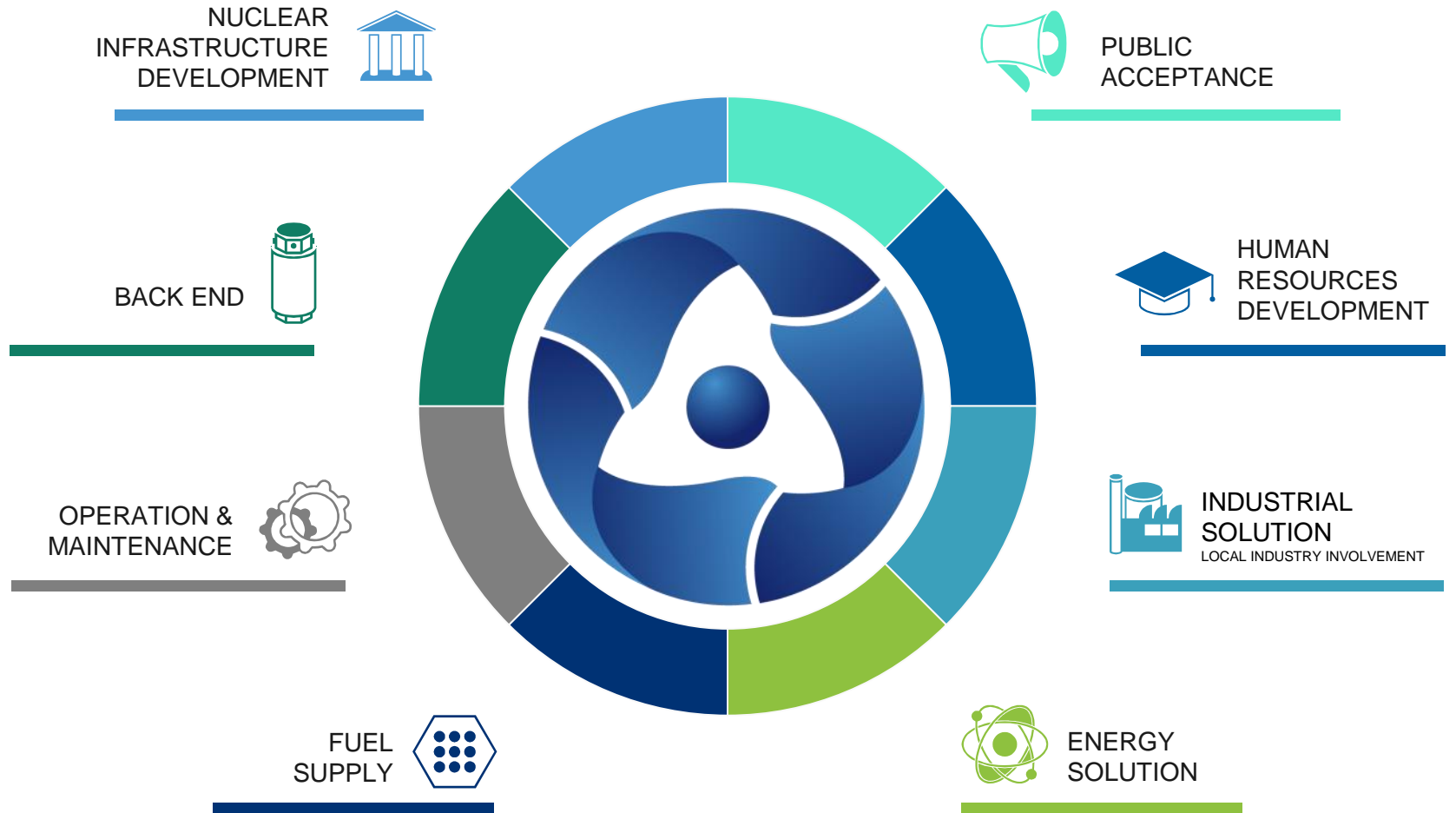
Rosatom references: Global VVER Fleet



ROSATOM SUCCESS STORY:



TOTAL: 119



Rosatom's Advantages for Localization in the Czech Republic



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Temelin NPP

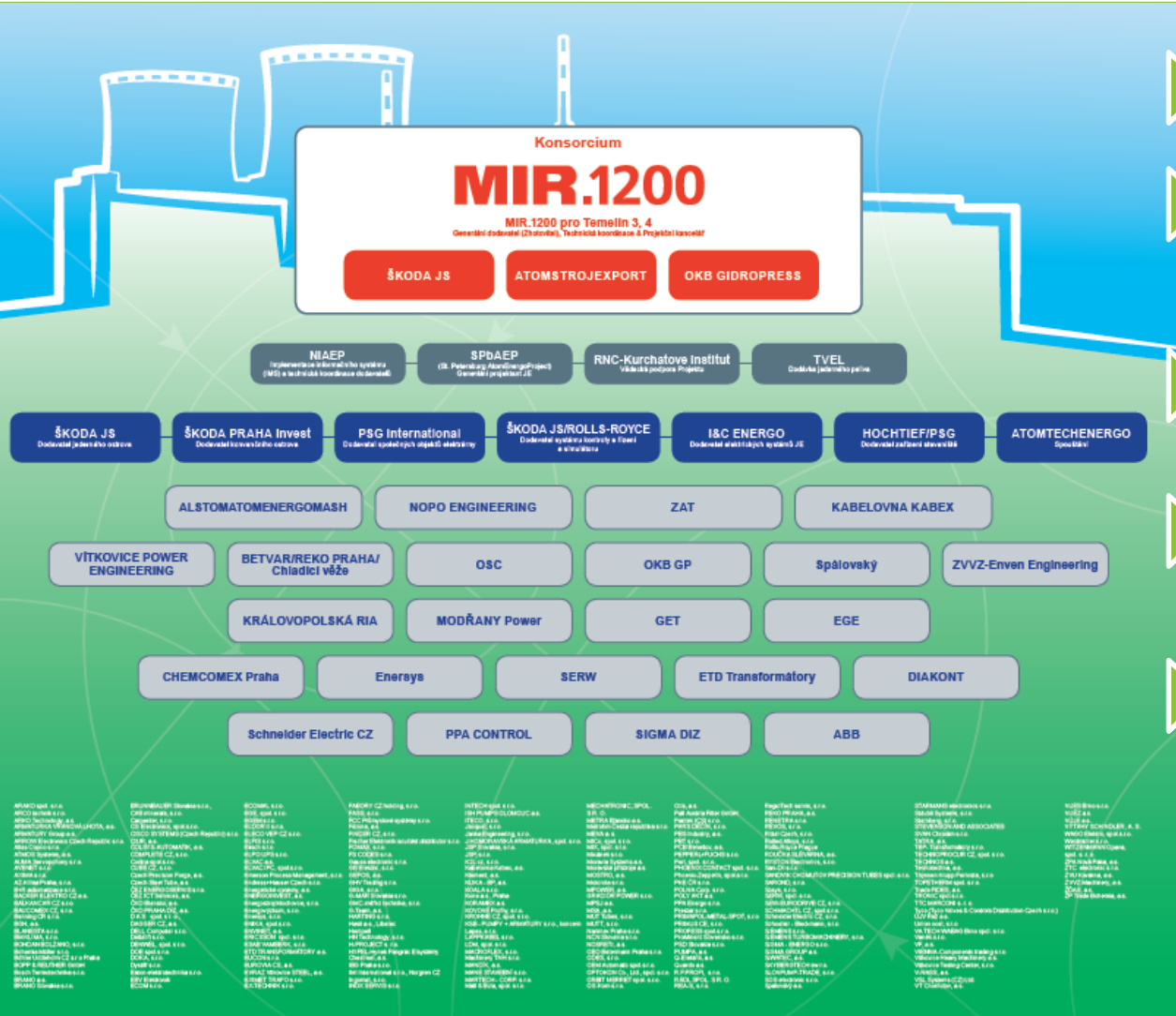


Dukovany NPP

- ✓ Extensive track record of cooperation with the Czech companies on construction, operation and maintenance of the currently operating VVER NPP units at Temelin and Dukovany
- ✓ Czech manufacturers' experience with the Russian nuclear norms and standards
- ✓ A large number of the Czech manufacturers are referent suppliers to the Russian designed NPPs worldwide
- ✓ Extensive production cooperation opportunities between Russian suppliers and their Czech manufacturing subsidiaries (including Rosatom-owned)
- ✓ Significant knowledge, experience and due diligence work executed in preparation for Temelin-3,4 project

- USUAL SCOPE OF LOCALIZATION BY A FOREIGN VENDOR FOR THE FIRST TWO NPP UNITS VARY UP TO **25-35%**, WHILE ROSATOM CAN OFFER OVER **50%** OF THE LOCAL CONTENT
- EXISTING CZECH UNITS – MORE THAN **80%**

Previous Experience: Localization Scheme Proposed for the Temelin-3,4 Project



- ▶ Comprehensive study and liaison with the Czech industry
- ▶ Executed technical audits and due diligence of the Czech suppliers
- ▶ **39 MoU** signed with potential suppliers in the Czech Republic
- ▶ More than **350** potential local suppliers involved in the project
- ▶ In case of Czech project and partnership with Rosatom wide cooperation in Czech industrial sector is possible, as well as there are opportunities for participation in international projects together with Rosatom

ROSATOM: Energy Major with Global Outreach



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Russia Leningrad NPP-2
Unit: I (2018)
VVER-1200



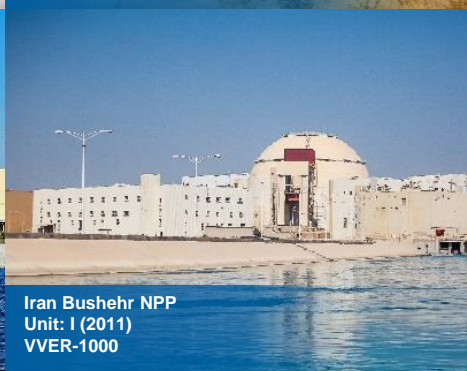
Russia Rostov NPP
Unit: II (2010), III (2014), IV (2018)
VVER-1000



India Kudankulam NPP
Unit: I (2013), II (2016)
VVER-1200



Russia Belyarsk NPP
Unit: IV (2015)
BN-800



Iran Bushehr NPP
Unit: I (2011)
VVER-1000



Russia Novovoronezh NPP-2
Unit: I (2016)
VVER-1200



China Tianwan NPP
Unit: I (2006), II (2007)
VVER-1000



Russia Kalinin NPP
Unit: 2004, 2011
VVER-1000



China Tianwan NPP
Unit: III (2017)
VVER-1000

**14 NPP
UNITS
LAUNCHED
BY ROSATOM
IN 12 YEARS**

Paks NPP (5-6) Hungary

Project specifications:

- **Reactor Design: VVER-1200**
- **Capacity: 2*1200 MW**
- **Lifetime: 60 years**

January 2014 - IGA

Agreement between the governments of Russia and Hungary on cooperation in peaceful use of nuclear energy

March 2014 – Financial IGA

Financing of the Project

December 2014 - Implementation Agreements

The state owned and controlled Project Companies of Russia and Hungary entered

into the following Implementation

Agreements:

Engineering, Procurement and Construction Contract (EPC Contract)
Operation and Maintenance Support Contract (O&M Support Contract)
Nuclear Fuel Supply Contract (NFSC)

March 2017

Final „green light” was given for the project



Finland - Hanhikivi Unit 1

Project highlights



ОСНОВНЫЕ ПАРАМЕТРЫ АЭС

Reactor type: VVER

Capacity: 1200 MW

Legal base: EPC-contract dd. от 21 December 2013

Customer: Fennovoima Oy (Finish ownership, >66%)



Leningradskaya NPP (5-6) Russia

Project specifications:

- Reactor Design: VVER-1200
- Capacity: 2*1200 MW
- Lifetime: 60 year

Operational **Generation III+**
NPP

2018

November 2018

Commercial operation of

Unit 5

Installation of main equipment
stage of

Unit 6



Project specifications:

- **Reactor Design: VVER-1200**
- **Capacity: 2*1200 MW**
- **Lifetime: 60 years**

1st operational Generation III+ NPP

2018

The 6th unit of Novovoronezh NPP with the first VVER-1200 reactor to be completed was awarded **Top Plant** in the nuclear generation category by **POWER Magazine February 2017**

Commercial operation of **Unit 6**

Commencements of commissioning works, cold and hot functional test of **Unit 7**



Ostrovets NPP (1-2) Belarus

Project specifications:

- Reactor Design: VVER-1200
- Capacity: 2*1200 MW
- Lifetime: 60 years

November 2013

Construction of the Unit 1 was launched

2016-2017

Nuclear Fuel Supply Contract
Operation and Maintenance Contract

2018

Spent Nuclear Fuel Treatment Contract



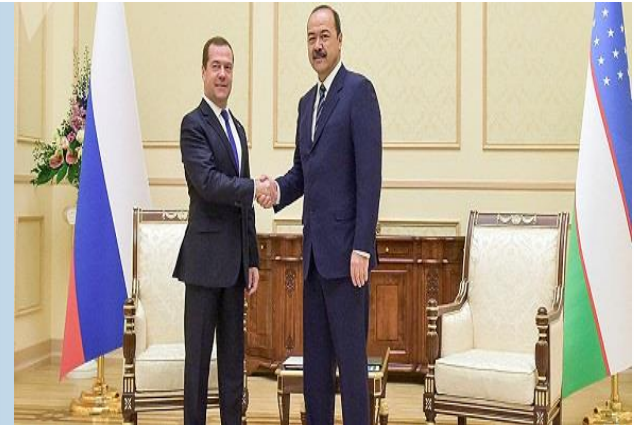


PROJECT SPECIFICATIONS

- **Reactor Design:** VVER-1200
- **Capacity:** 2*1200 MW
- Technology AES-2006, Novovoronezh II, Russia a reference plant with total capacity 2,400 MW (2x1200 MW)
- 07.09.2018 - Intergovernmental Agreement between Russian Federation and Uzbekistan for NPP construction
- 07.09.2018 – Contract for consultation on engineering survey for site selection

2018

- **Preparatory phase** including activities necessary for site selection
- First batch of nuclear regulations **to be issued**





EL DABAA NPP EGYPT



PROJECT SPECIFICATIONS

- **Reactor Design:** VVER-1200
- **Capacity:** 4*1200 MW
- **Lifetime:** 60 years

2017

- EPC-Contract
- Nuclear Fuel Supply Contract
- Operation and Maintenance Contract
- Spent Nuclear Fuel Treatment Contract
- Agreed with Egyptian Party

2018

- Works completed on engineering surveys at the site of the future NPP
- Design preparation for NPP
- First subcontractors construction contracts to be signed by the end of 2018

LOCATION OF EL DABAA NPP



ILLUSTRATIVE DESIGN OF NPP





PROJECT SPECIFICATIONS

- **Reactor Design:** VVER-1200
- **Capacity:** 4*1200 MW
- **Lifetime:** 60 years
- **1st NPP ever being developed under BOO**

2017

- License obtained for electric energy generation
- Approval received for construction works of the sites
- Final approval and permission obtained for land usage
- Limited permission received for TAEK construction
- Agreement regarding electric energy purchase signed between Tetas and JSC «Akkuy Nuclear», which potentially guarantees revenue worth \$34,5 bln

2018

- JSC «Akkuy Nuclear» is awarded with full strategic investor status
- TAEK lisenca obtained for Block №1 construction of Akkuyu NPP
- First concrete base: 03.04.2018

SITE OF AKKUYU NPP



LOCATION OF AKKUYU NPP



Project specifications:

- **Reactor Design:**
VVER-1000
- **Capacity:** 2*1000 MW
- **Lifetime:** 60 years

December 2016

Contract entered into force

October 2017

The opening ceremony of the construction of the Bushehr NPP (Unit 2) Intergovernmental agreement signed for construction of 8 blocks





**NPP
Tianwan**



**NPP
Xudapu**



- Reactor design VVER-1000;
- General contractor – JSC “Atomstroyexport”



**Gas centrifuge uranium
enrichment plant**

- Four lines are put into operation;
- Total capacity 1.5 million SWU;
- All obligations to the PRC have been fulfilled by 2014.



CEFR

- Experimental fast neutron reactor;
- Thermal power comprises 65 mW;
- Based on the BOR-60 model (Russia).



Nuclear fuel supplies

- Supplies for block #1 of the TAPP;
- Supplies for block #3 and #4 of the TAPP;
- Supplies for the CEFR reactor.



NPP Tianwan, Jiangsu Province, Lianyungang

POWER UNITS ## 1-2

based on the Russian design (NPP-91)

POWER UNITS ## 3-4

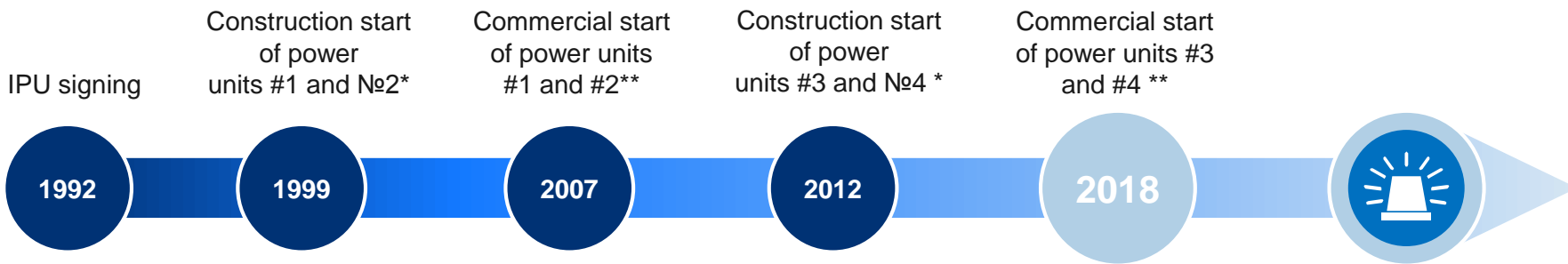
are in process of construction based on the Russian design (NPP-91); a unique format was developed in terms of the actual joint design and construction of the station: Russian side is responsible for the design and supply of nuclear island equipment, China is responsible for the design and supply of a non-nuclear island, as well as auxiliary systems.

POWER UNITS ## 5-6

are built based on the Chinese model

БЛОКИ №№7-8

is planned to build jointly with the Russian Federation.



*date of first concrete base

**date of signing the protocol of preliminary acceptance by the Customer.

Kudankulam NPP (3-6) India



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Project specifications:

- Reactor Design: VVER-1000
- Capacity: 4*1000 MW
- Lifetime: 60 years

February 2016

Construction of the Units 3&4 was launched

Level of national participation – 37%

2022

Commissioning of the Unit 3

2023

Commissioning of the Unit 4

June 2017

The General Framework Agreement for construction of the Kudankulam NPP (5&6)





PROJECT SPECIFICATIONS

- Reactor complex
- 200 kW research reactor
- Neutron activation analysis laboratory
- Radioisotopes laboratory
- Multipurpose Irradiation Center
- Plasma laboratory
- Radiobiology and radioecology laboratory
- Lifetime: 50+ years

PROJECT TIMELINE

March 2016

- Intergovernmental agreement on construction of CNTRD was signed

July 2016

- Project Development Agreement on construction of CNTRD was signed

August 2016

- Contracts for national nuclear infrastructure assessment and preliminary site survey were signed

September 2017

- Contract for CNTRD construction was signed

April 2018

- Contract for national nuclear infrastructure development was signed

BOLIVIA, LA PAZ



ILLUSTRATIVE DESIGN OF CNTRD





PROJECT SPECIFICATIONS

- Reactor complex
- 10 MW research reactor
- Neutron activation analysis laboratory
- Radioisotopes laboratory
- Radiobiology and radioecology laboratory
- Non-radiation material science laboratory
- Multipurpose Irradiation Center
- Nuclear Medicine and Oncology Center
- Lifetime: 50+ years

PROJECT TIMELINE

February 2017

- Intergovernmental agreement on construction of CNST was signed

June 2017

- Project Development Agreement on construction of CNST was signed

June 2017

- Contracts for national nuclear infrastructure assessment and development and preliminary site survey were signed

May 2018

- Contract for CNST construction was signed



ZAMBIA, LUSAKA



ILLUSTRATIVE DESIGN OF CNST





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THANK YOU FOR ATTENTION

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