



SVBR-100 SMALL MODULAR NUCLEAR POWER PLANTS: OPPORTUNITIES FOR INTERNATIONAL SUPPLY CHAIN COOPERATION

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SVBR-100 is the Russia's first innovative project in NPP development conducted in the format of public-private partnership (JSC AKME-Engineering)



ROSATOM

State Atomic Energy
Corporation
Rosatom

50%

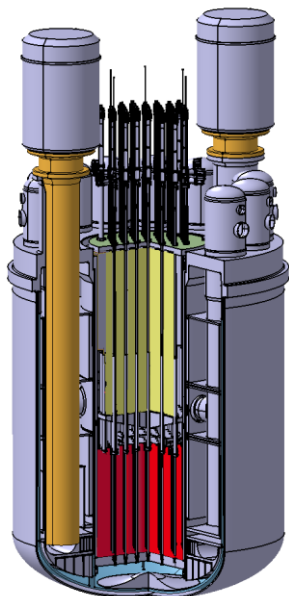


- **established** in **2009** as a public – private partnership
- **specialization:** development and construction of a **generation IV** small modular nuclear power plants (SVBR-100, 100 MWe) with inherent safety features
- **core technology:** **fast neutron reactor** with a lead – bismuth coolant (initially being applied in marine)



Basic Element - diversified industrial group made up of over 100 Russian and international companies

50%



Capacity	100 MW-e
Thermal output	70-100 Gcal/h
Steam parameters	580 tons/hour, saturated steam, p=6.7Mpa, T~282.9°C
Municipal hear	More than 100 Gcal/hour
Desalinated water	Max 200 000 tons/day
Fuel campaign duration	7-8 years (for UO2 fuel with 16,3% enrichment)
Reactor weight	~280 tons
Reactor dimensions	4.5 m. diameter/ 8.2 m. height
Useful lifetime	60 years

Possible applications of SVBR-100 and SMRs (small modular reactors) market forecast



Construction of regional small and medium NPP allocated close to the cities and energy-intensive industries, including sites in developing countries that do not have complex power grids for electricity transmission and distribution, remote areas, island locations, etc.

1

Construction of high capacity modular NPP for large / centralized energy systems, with a gradual build-up of the installed capacity

2

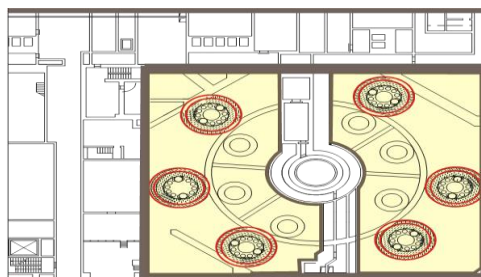
Renovation of retired NPP units . Renovation activities **minimize the unit** capital costs two fold as compared with the construction of new capacities.

3

The concept of **coastal desalination nuclear power complex** comprising two types of onshore desalination plants (multi-layered distillation and reverse osmosis).

4

Example of possible allocation	Industry
Construction of terminals, port "Taman" (Krasnodarsky region)	Transportation
Oil and gas and chemical complex (Primorsky kray.)	Oil & Gas
Zheleznorudniy Ore Mining and Processing Industrial Complex (Buryatiya)	Metal industry
"Peschanka" gold-copper field development (Chukotsky region)	Mining



Example of possible renovation of VVER-440 units



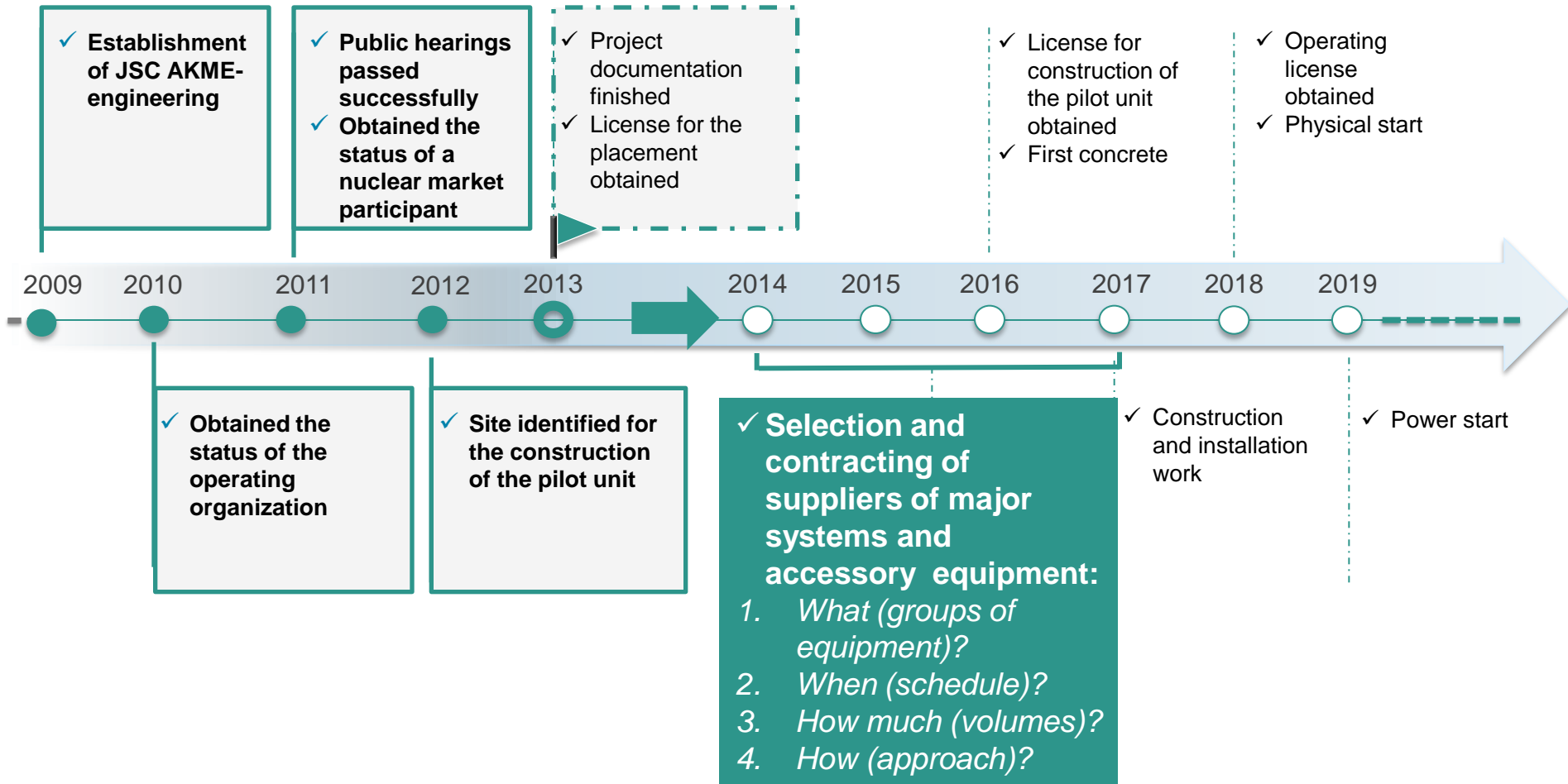
Example of an onshore desalination complex

	[GWe]	[\$ bln.]
China	14,7	73,5
India	9,2	46
Russia	5,5	27,5
Brazil	2,9	14,5
Poland	2,5	12,5
Indonesia	2,3	11,5
S. Africa	1,6	8
Kazakhstan	1,5	7,5
Turkey	0,9	4,5

Consensus forecast of SMR market volume till 2030 (including co-generation, renovation and desalination) is up to 40 GWe of installed capacity or up to 200-220 bln. US dollars

Sources: Platts, The World Bank, IAEA, WNA, expert assessments, Roland Berger Strategy Consultants, experts' opinions

Project current status and milestones



Concept design

Design and
engineering

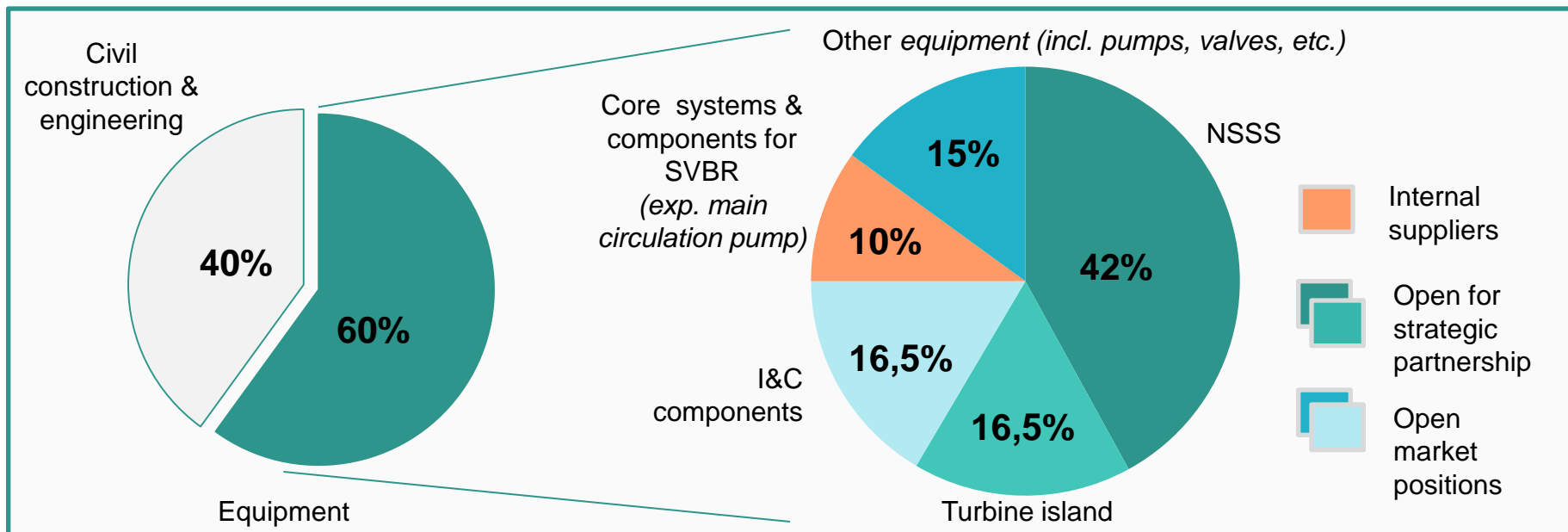
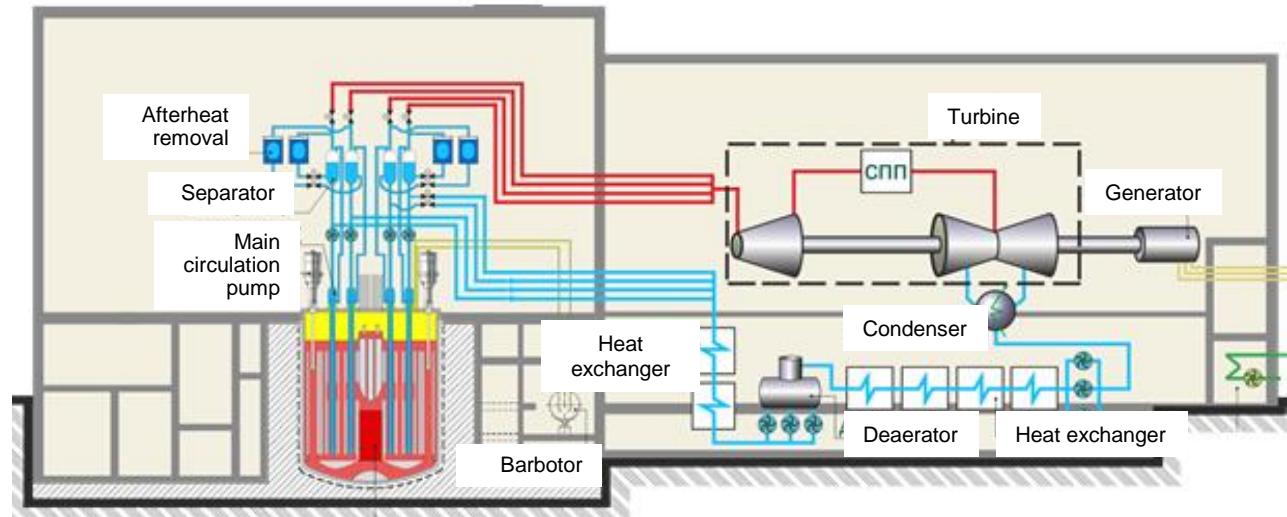
Construction

Operation and
Commercialization

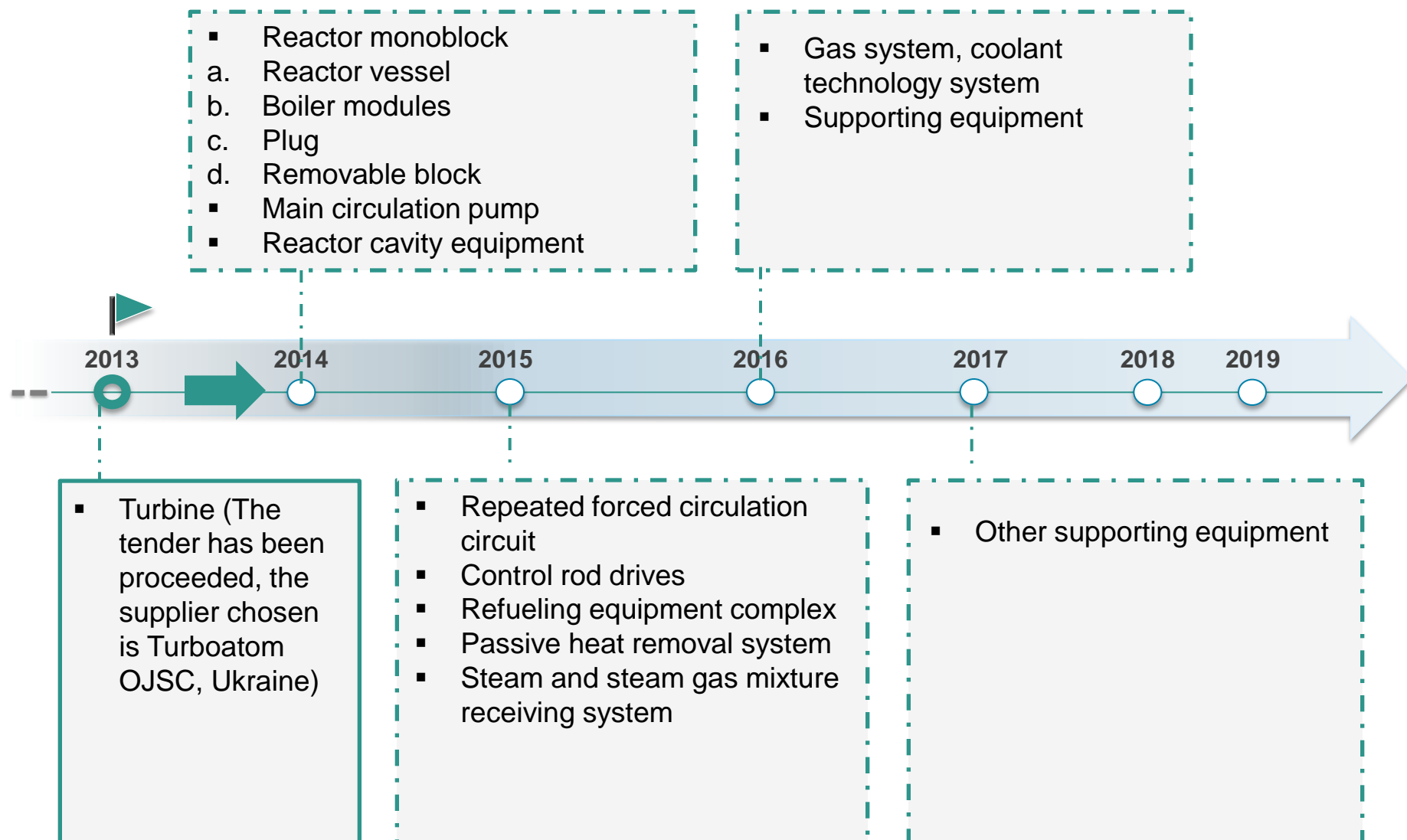
What: a broader base of possible suppliers is available for SVBR-100. Up to 90% of orders for systems and components can be open for international suppliers



- **Relatively small dimensions** of major equipment due to the small capacity (100 MWe) per unit in comparison with “GWt” NPPs
- **Relatively lower requirements to first circuit equipment** due to the small internal pressure
- **Integral (monoblock) equipment layout** of the first circuit. All primary circuit equipment combined in a single vessel.



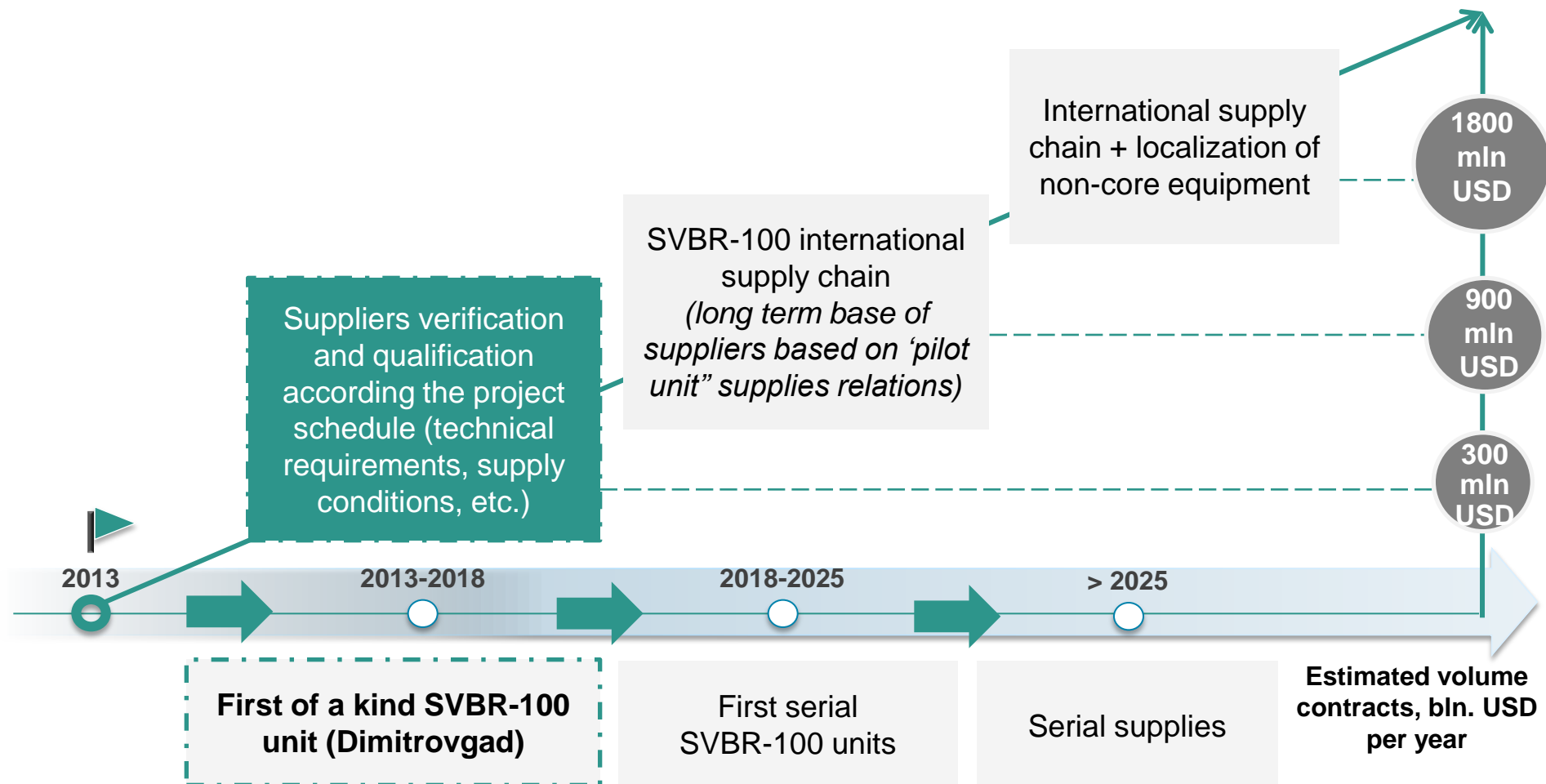
When: preliminary schedule of the equipment procurement for Pilot Nuclear Power Plant with SVBR-100



How much: basic approach to SVBR-100 supply chain development



Future SVBR-100 serial supplies will provide up to USD1,8 bln of contract for open market annually since 2025 and later according the costs breakdown structure above



*) preliminary estimations based on average market price for future SMRs contracts (now all projects are under development)

How: building cooperation on the bases of long term supply chain development approach linked to the pilot unit construction schedule



SVBR – 100

- new project for a new developing market of SMRs
- Max. standardized components
- open policy of supply chain development: about 90% of equipment supplies – strategic partnership and open market supplies
- up to 300 mln. USD for a pilot unit – contacts for 2014-2017, up to 1,8 bln. USD for serials supplies
- long term partnership approach starting with a pilot unit supplies
- suppliers verification and qualification according the project schedule (technical requirements, supply conditions, etc.)



**) discussing opportunities for cooperation*

Memorandums signed with 13 Czech companies: SKODA JS, VÍTKOVICE, SIGMA GROUP, MODŘANY Power, MPOWER Engineering, PROMONT, ETD TRANSFORMÁTORŮ, ARAKO, CHEMCOMEX Praha, ZAT, ZVVZ-Enven Engineering, Chladící věže Praha, Sandvik Chomutov Precision Tubes

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