How to Build an SMR in Estonia Quickly?

New Generation Nuclear Energy in Estonia

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SMR Economics

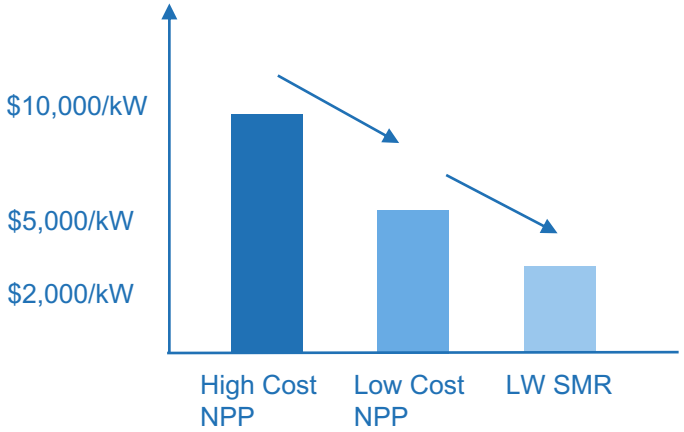
- New nuclear is expensive
  - Cost cut is necessary to attract investors.
- Cost drivers
  - Assessments of poor NPP projects show that indirect costs and interest drive the investment cost.
- Construction time
  - A fast construction is crucial to make nuclear power affordable.
- Lessons learned
  - Implement identified key drivers from plant design and construction projects.

Time
is money!

Assessments of poor NPP projects are made by:
- NEA,
- ETI,
- MIT,
- EPRI and others

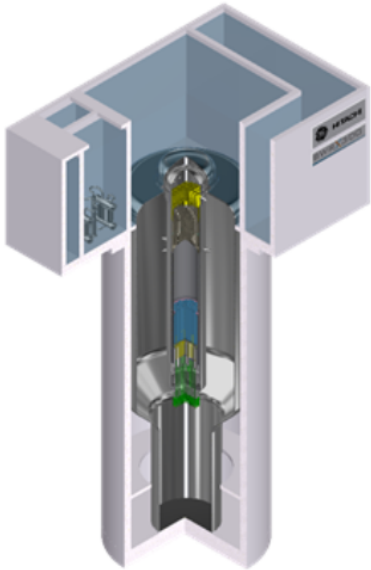
SMR Economics, *cont.*

- Reaching low cost NPP projects
  - Simplification, standardization and modularization.
  - Manage the risks during construction.
- Reaching even lower cost projects
  - Smaller size
  - Further simplification in design
  - Further standardisation → Design certification
  - Construction → Manufacturing
- Economy of scale, size → numbers
  - Modular construction of smaller scale plants will be cheaper and easier to deploy. Economy of scale based on number of units.



GE Hitachi's BWRX-300

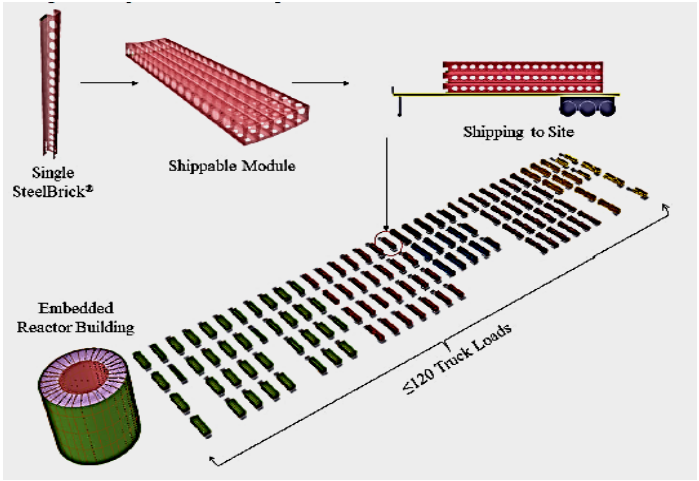
- Design
  - 300 MWe Boiling Water Reactor.
- Design characteristics
  - Leverages GEH's earlier reactor development.
  - Proven, simple processes and systems.
  - Limited plant volume through a focus on design-to-cost.
  - Natural circulation.
  - Passive cooling for a minimum of seven days without power.
  - Less capital cost per MW compared with other LW SMR.
- Status
  - Licensing activities in U.S, Canada, UK and Poland.
  - FOAK in operation, 2028.



Plant Design Capabilities

- Simplification
  - Passive safety systems, compact reactor building, etc.
- Standardisation
  - Proven BWR technology.
- Modularisation
  - Where economically viable, e.g. steel bricks
- Design Completion
  - FOAK in U.S. or Canada.

Constructability through:
- Proven Technology
- Increased Modularity
- Labour Training
- Develop multiple units



Project Implementation

- Project Development
  - Designing adoption. Scheduling. Business Case. Contractring.
- Site Work
  - Investigations. Preparation. Construction. Commissioning.
- Procurement
  - Long Lead Items
- Licensing
  - Three step process. Reviews and inspections.

Schedule Drivers
- Design completion
- Preparatory work
- Contracting
- Site logistics
- Project management
- Quality management

The success of a new build project is to a high degree decided before construct-ion starts.

Project Implementation, *cont.*

- Project Development

Design, Scheduling, Business Case. Contracting

- Site Work

Site Inv. **Preparation** **Construction**

- Procurement

Long Lead Items

- Licensing

DIP **Construction Licence** **Operating Licence**

First Unit
- Pre-construction 48 m
- Construction 36 m

Sub-sequent Units
- Pre-construction 36 m
- Construction 24 m

Summary

- Deployment
  - High degree of on-site construction.
  - Construction time: 36 months (first unit) / 24 month (following units)
  - Pre-construction: 48 months (first unit) / 36 month (following units)
- Conclusion
  - Light water SMRs can be deployed in the near future.
  - The BWRX-300 enables a way to build SMRs in Estland quickly.
  - Licensing and construction will be in favor of the proven technology.

Thank you!