IAEA
International Atomic Energy Agency
Atoms for Peace and Development

Economic Aspects of SMRs
An International Perspective

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1954

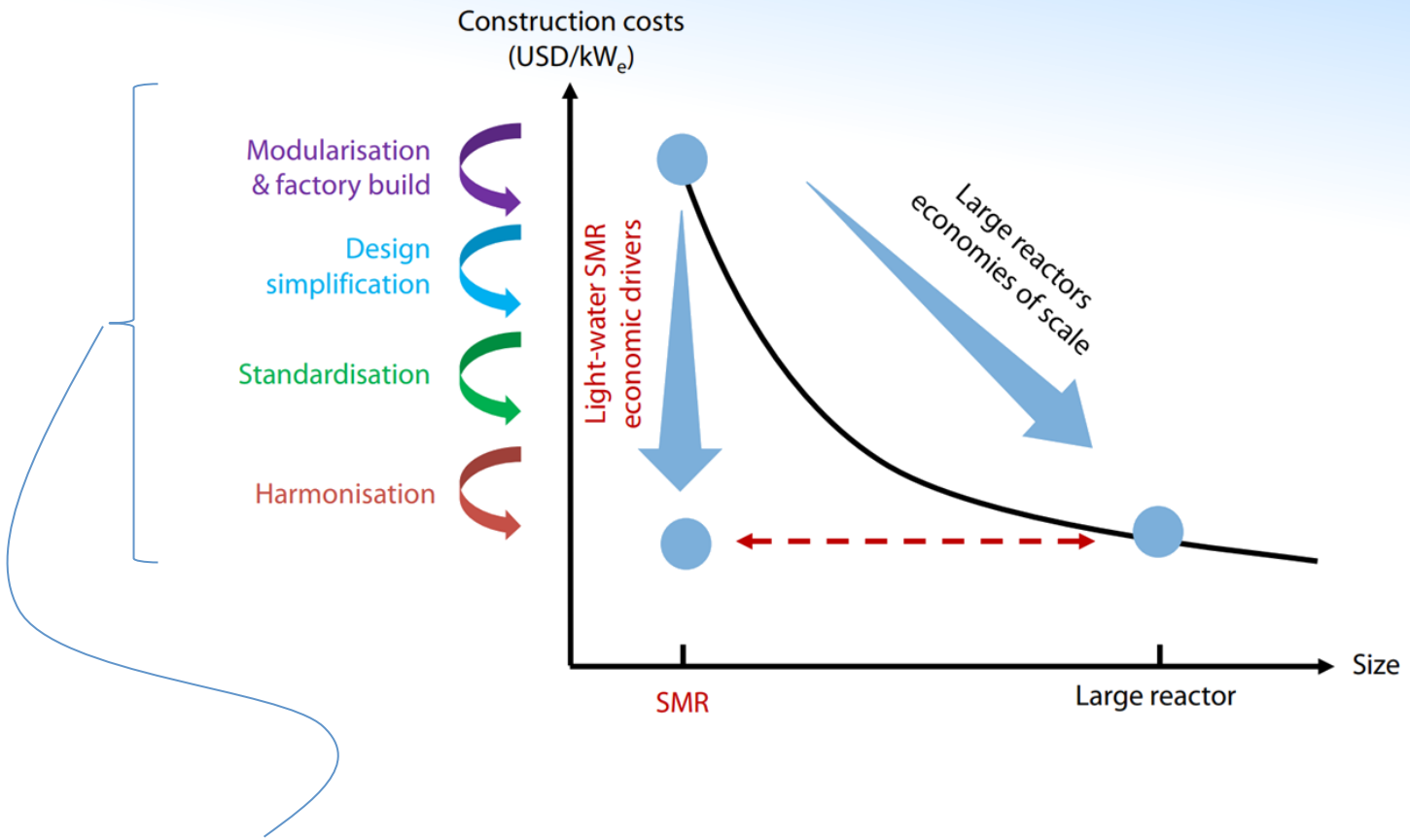
1954, Obninsk, Russia.
APS-1 with a net electrical output of 5 MW was connected to the grid.

SMRs have been powering submarines and aircraft carriers since USS Nautilus was launched in 1954.

As a power plant gets larger in size, it gets progressively cheaper to add additional capacity.

REACTORS

Name	Type	Status	Location	Reference Unit Power [MW]	Gross Electrical Capacity [MW] ▲	First Grid Connection
BEZNAU-1	PWR	Operational	BEZNAU	365	380	1969-07-17
BEZNAU-2	PWR	Operational	BEZNAU	365	380	1971-10-23
MUEHLEBERG	BWR	Permanent Shutdown	MUEHLEBERG	373	390	1971-07-01
GOESGEN	PWR	Operational	DAENIKEN	1010	1060	1979-02-02
LEIBSTADT	BWR	Operational	LEIBSTADT	1220	1275	1984-05-24



Already proven in other industries, e.g., shipbuilding, aircraft industry.

Illustration: Unlocking Reductions in the Construction Costs of Nuclear A Practical Guide for Stakeholders
https://www.oecd-nea.org/jcms/pl_30653/unlocking-reductions-in-the-construction-costs-of-nuclear?details=true

One of the largest CRPs the IAEA has ever run

Press coverage

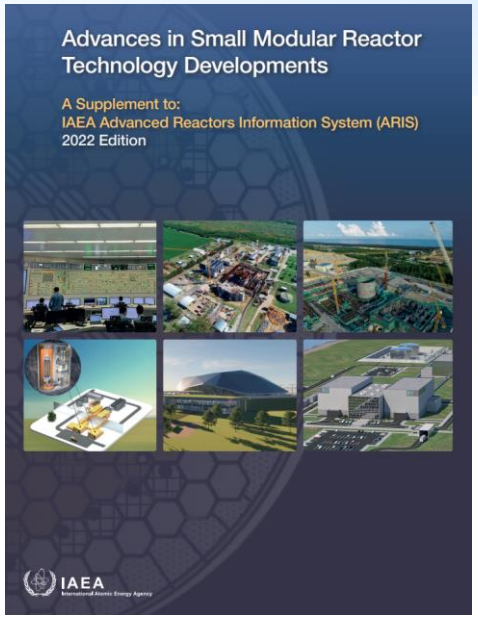
Economic Appraisal of Small Modular Reactor (SMR) Projects: Methodologies and Applications

Participating Organisations / Member Countries

Argentina: CNEA; Australia: ANSTO; Belgium: TRACTEBEL; Brazil: EPE; Bulgaria: KOZLODUY; Canada: CNL; China: CNPE, SNERDI, SPIC; Croatia: U-ZAGREB; Czech Republic: UJV; Democratic Republic of the Congo (DRC): CREN-K; Estonia: FERMI; Finland: VTT; France: CEA; Ghana: GAEC; Indonesia: BRIN; Italy: POLIMI; Japan: CRIEPI, JAEA; Jordan: JAEC; Kuwait: KISR; Morocco: CNESTEN; Pakistan: PAEC; Poland: NCBJ; Russian Federation: ROSATOM; South Africa: MOZWELI; South Korea: KAERI; Spain: IDOM; Sri Lanka: SLAEB; Tunisia: CNSTN, U-CARTHAGE; Turkey: U-ISTANBUL; United Kingdom: U-LEEDS; United States: ARC, KAIROS, NECG, PILLSBURY, TAMU.

Challenge

- SMR have **unique design, safety and economic features** that make them attractive to potential project developers and end-users but also investors, governments, and communities worldwide.
- More than **80 SMR designs and concepts are currently under development** and have varying degrees of readiness levels. For each of these projects:
  - Development **costs** need to be understood, as well as construction and operation expenses, which still need to be appropriately estimated, analysed and optimised.
  - Specific **revenue models** are also needed for **demonstrating the business** case and secure **access to funding, financing, and low cost of capital** for the promoters of the technology.
  - Finally, the **macroeconomic impact** associated with SMR development, manufacturing, construction and operation has to be quantified and communicated to **gain the support of the government and society at large**.



Advances in Small Modular Reactor Technology Developments (2022) https://aris.iaea.org/Publications/SMR_booklet_2022.pdf

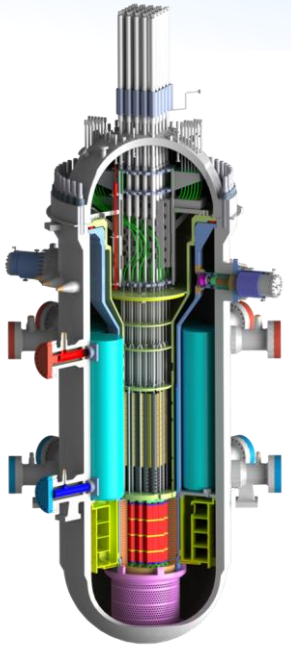
Objectives and End-users

- The three-year CRP, initiated in early 2021, aims at providing Member States with **an economic evaluation basis (the "COOSMR Framework"), informing the design of policies and strategies enabling the development and deployment of SMRs**.
- COOSMR addresses the needs of both **public sector decision-makers**, investigating the relevance of the SMR option in their respective countries, and **project developers**, in demonstrating the business case and securing funding and financing.

Perspective matters!

Workstreams

- **Methodological Basis** (the “COOSMR Framework”)
  - Characterizing SMRs’ Role in Evolving Grids and Energy Markets.
  - Assessing Costs and Benefits, including Macroeconomic Impacts.
  - Demonstrating the Business Case Associated with SMRs.
  - Developing Strategies for SMR Projects’ Derisking and Financing.

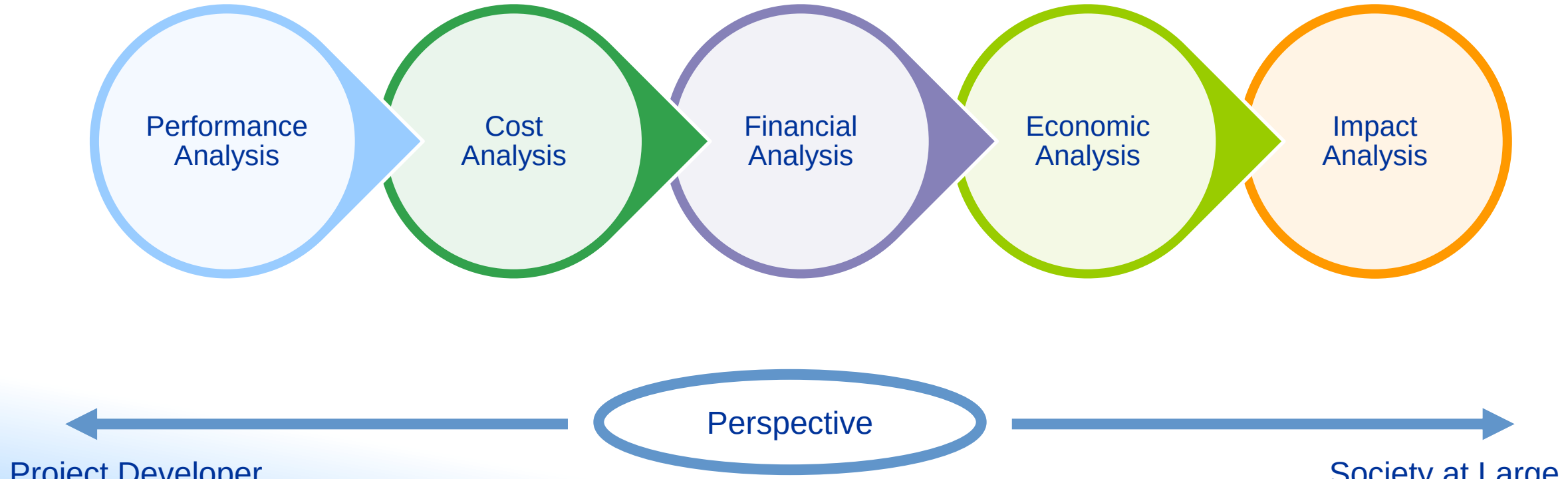


- **Case Studies**
  - SMRs for Electricity Generation and Provision of Grid Services.
  - SMRs for Heating and Cooling Applications, Desalination, and Hydrogen Production.

The “COOSMR Framework”

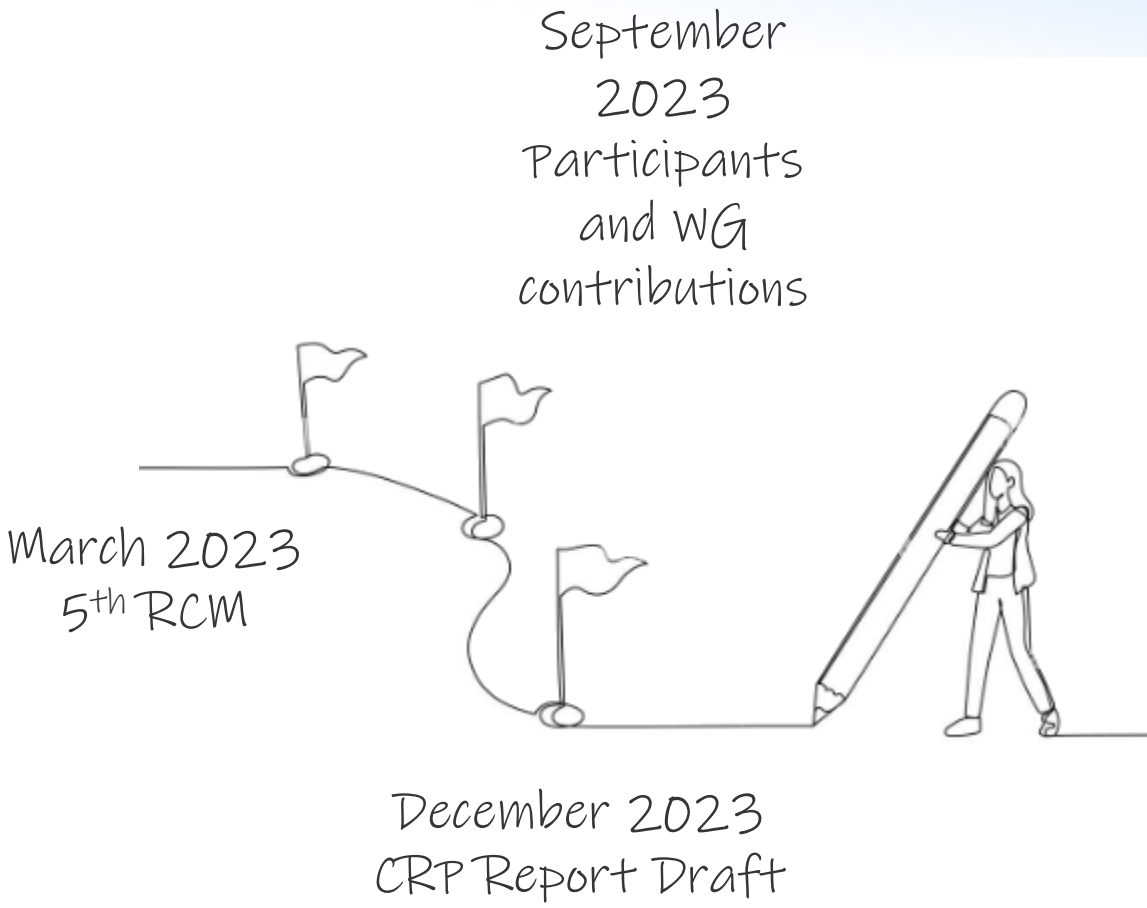
Quantitative Uncertainty and Risk Analysis

Assign a confidence level to key performance and indicators



Deliverables

- **D1**: A **generic framework** (the COOSMR Framework) for the economic appraisal of SMR.
- **D2**: Supporting **methods, tools, and datasets**.
- **D3**: **Country cases and other case studies**, focusing on potential SMR uses, and illustrating the application of the COOSMR Framework.
- **D4**: The **CRP report**, documenting D1-D3 deliverables, to be published at the end of the project.



thank you!

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