
GOWLING WLG

LEGAL AND REGULATORY REQUIREMENTS FOR SUCCESSFUL SMR DEPLOYMENT

ROBERT ARMOUR

GLOBAL REACH

Gowling WLG is an international law firm which consists of independent and autonomous entities providing services around the world. Our structure is explained in more detail at gowlingwlg.com/legal

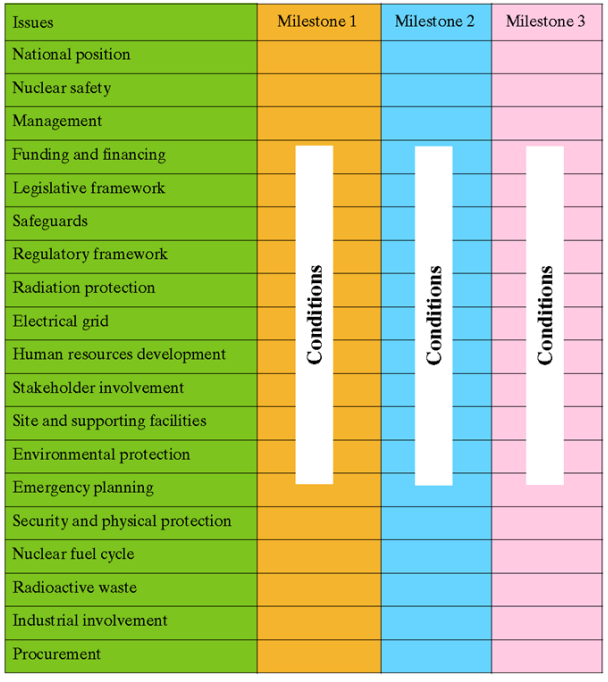
GOWLING WLG

HOST COUNTRY CORE COMPETENCIES

- Site Selection
- Licensing
- Legal and Regulatory Framework
- International Treaty Commitments
- Safety
- Security
- Safeguards
- Spent Fuel and Nuclear Waste
- Decommissioning
- Audit Regime

GOWLING WLG

NATIONAL NUCLEAR INFRASTRUCTURE - MILESTONES



Source: Milestones in the Development of a National Infrastructure for Nuclear Power, IAEA Nuclear Energy Series No. NG-G-3.1, IAEA, Vienna (2007)

GOWLING WLG

DEFINING SMALL MODULAR REACTORS

- “Civil reactors with power outputs of around 300MWe or less; much of the design and plant can be fabricated in a factory environment and transported to site”
- “Small Modular reactors (SMRs) are defined as nuclear reactors generally 300MWe equivalent or less, designed with modular technology using module factory fabrication, pursuing economies of series production and short construction times”

Department for Business, Energy & Industrial Strategy

W A N O
World Association of Nuclear Operators

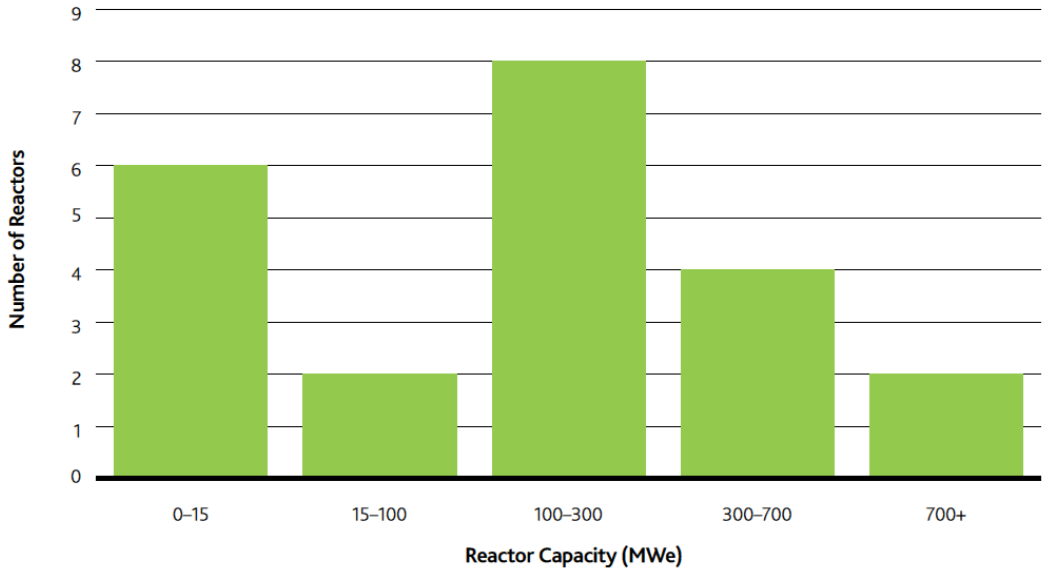
DEFINING SMALL MODULAR REACTORS

- “Advanced reactors that produce electric power up to 300MWe, designed to be built in factories and shipped to utilities for installation as demand arises”

IAEA
International Atomic Energy Agency

DEFINITIONS ARE FLEXIBLE

Electrical capacity of Commercial Plants being developed by Respondents

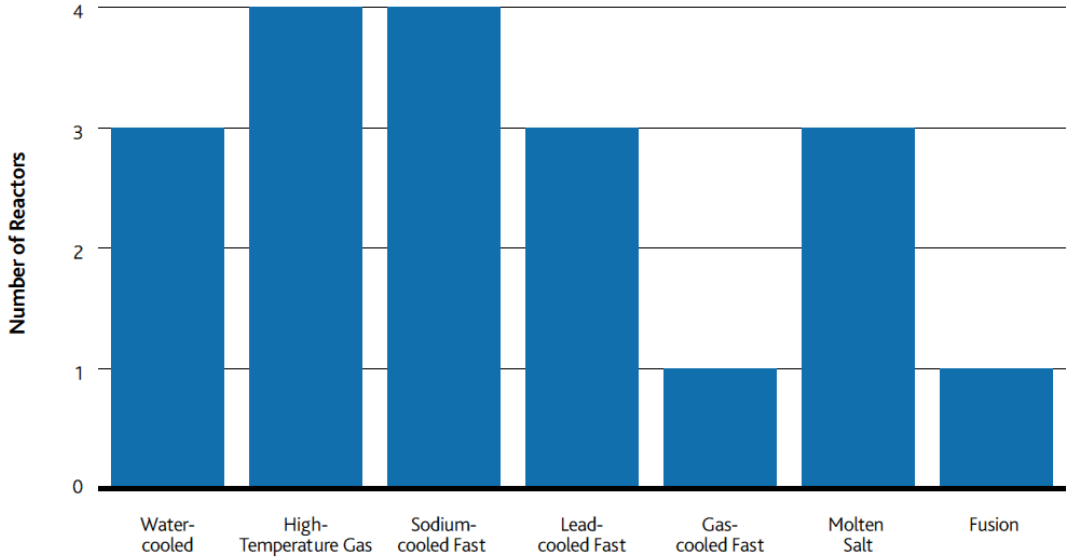


Source: Canadian Nuclear Laboratories - “Perspectives on Canada’s SMR Opportunity” Report issued 17 October 2017

GOWLING WLG

TECHNOLOGY SPREAD IS WIDE

Proposed SMR demonstration reactors

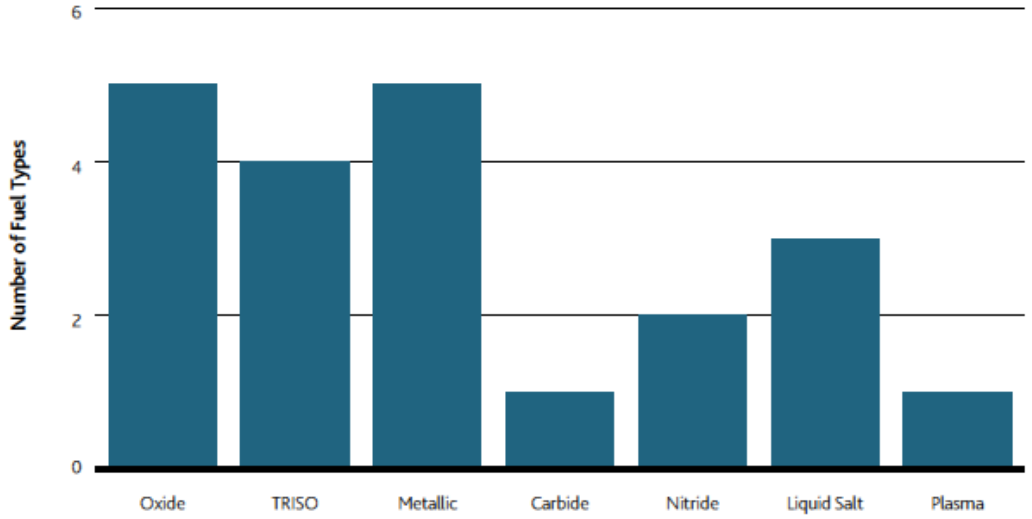


Source: Canadian Nuclear Laboratories - “Perspectives on Canada’s SMR Opportunity” Report issued 17 October 2017

GOWLING WLG

FUEL TYPES VARY WIDELY

Nuclear fuel types proposed for demonstration reactors[1]



[1] Number of fuel types may be larger than the number of reactors, as some designers are considering different fuel types, or are considering changing the fuel type during the lifetime of the prototype

Source: Canadian Nuclear Laboratories - “Perspectives on Canada’s SMR Opportunity” Report issued 17 October 2017

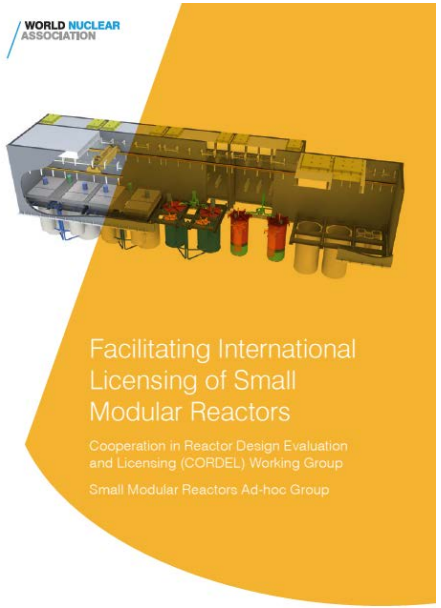
GOWLING WLG

STANDARDISED LICENCING

- Current Large Reactor Licencing is lengthy and exhaustive for each Project
- National Regulators differ in Approaches and Requirements
- Costs of Licencing are Prohibitive for small developments
- Regulatory Process Uncertainty is a Barrier
- What Role should the Regulator overseeing the reference plant have in relation to SMRs
- And the host country regulator overseeing later plant deployments?
- Who has Design Authority?
- The aerospace template?

GOWLING WLG

CORDEL PROPOSAL



“An internationally transferable modular reactor design”

GOWLING WLG

CORDEL PROPOSAL

"International design certificate is a long-term goal for large NPP designs, but this does not necessarily have to be the case for SMRs….SMRs can be seen as an early opportunity for seeking multi lateral or international regulatory approvals."

3 Standardized and Internationally Standardized Designs

Since its conception, CORDEL has noted the benefits of having an international standardization of reactors designs. The recently issued CORDEL report on *Design Knowledge and Design Change Management in the Operation of Nuclear Fleets* [5] defines standardization as follows:

'The concept of standardized reactor designs does not require units to be completely identical. Rather all units that use the standardized design technology should at least share the same global architecture and the same specifications for the nuclear steam supply system design and components, and associated safety systems.'

It is envisaged that the reactor modules and primary safety systems for an SMR design would meet this definition.

Whilst some progress in standardization of licensing and harmonization of regulatory requirements has been achieved, we are still far from an internationally standardized approach. This means that there are still significant changes required to designs deployed in different countries in other areas of the plant, even if the physical conditions (seismic risk, water access, etc.) are comparable.

International standardization of licensing as well as harmonization of regulatory requirements has been a goal of several programmes, including those of CORDEL, MDEP (Multinational Design Evaluation Programme) and ERDA (European Reactor Design Approval). CORDEL has looked at international aviation licensing [3] as a model from which good practices can be drawn.

International design certification is a long-term goal for large NPP designs, but this does not necessarily have to be the case for SMRs. Based on their size and design characteristics, SMRs can be seen as an early opportunity for seeking multi-lateral or international regulatory approvals.

GOWLING WLG

NATIONAL SOVEREIGNTY

- How far can Host Nations delegate scrutiny?
- Is the old Milestone Model appropriate?
- For New Build? Site customisation? Or Operations? Or Deconstruction and Waste Management?
- Implications for public confidence
- Programme costs are significant in addition to project costs.

NATIONAL COMPETENCE?

- Regulatory Model
- Design Certification
- Licencing
- Siting & Construction
- Operations and Operator Competence
- Safety and Environment
- Uranics and Fuel Cycle
- Security
- Proliferation Safeguards
- Export Control

GOWLING WLG

NATIONAL COMPETENCE?

- Local Supply Chain
- Decommissioning and Waste
- Liability Regime
- Oversight

The realities and the economics of SMRs require a rethink of the way we approach nuclear infrastructure.

What about:-

- Nuclear powered vessels
- Barge mounted SMRs
- Single unit SMRs
- Multiple Co Sited SMR Fleet

GOWLING WLG

CONCLUDING THOUGHTS

- Nuclear needs a sound Regulatory Framework for its "Licence to Operate"
- A system designed for large plants needs to adapt to a decentralised, smaller unit world
- The Framework has a major impact on risk and economics
- The Economics have to work...but SMRs won't work as one offs
- SMRs have a variety of roles to play in a low carbon economy
- Sustained Government support is critical to getting SMRs to commercial viability
- SMRs could be the Game Changer

GOWLING WLG

THANK YOU

GOWLING WLG

CONTACTS

ROBERT ARMOUR

UK Nuclear Practice Group Chair

+44 (0)20 7759 6410

robert.armour@gowlingwlg.com

Gowling WLG (UK) LLP is a member of Gowling WLG, an international law firm which consists of independent and autonomous entities providing services around the world. Our structure is explained in more detail at gowlingwlg.com/legal

GOWLING WLG


GOWLING WLG