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Nuclear Power – Preparing for the Future

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Global Energy Factors

- Increase in worldwide demand
- Security of supply concerns
- Aging infrastructure
- Market designs changing
- Greater recognition of environmental concerns
- Society preference for renewables…but changing!

Given this common set of global energy factors, the need for new nuclear is clear. For this reason, the debate over new nuclear is taking place throughout the world.

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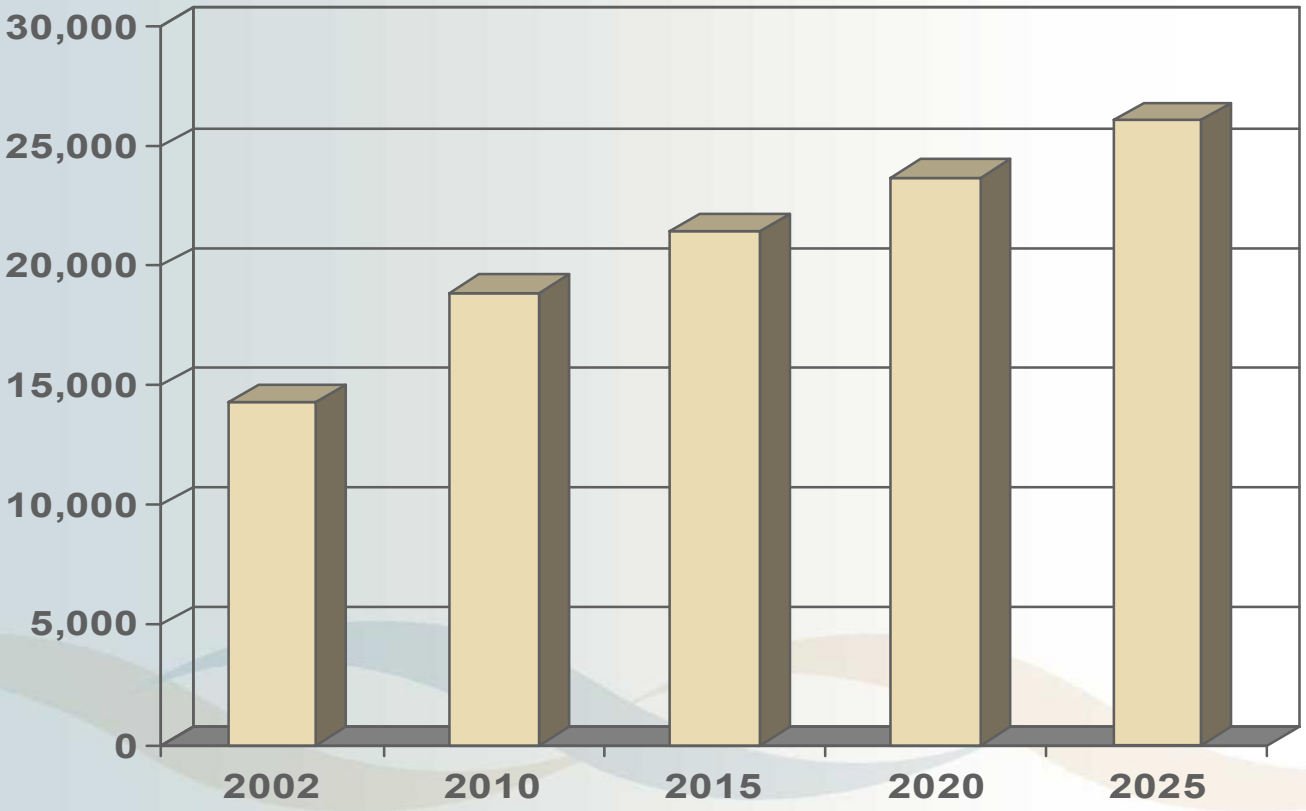
Global Electricity Demand



By 2025 electricity consumption from emerging economies will increase by over 250%.

*Billion Kilowatt-hours

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Nuclear in the world today

- There are 440 commercial nuclear power reactors operating in 31 countries, with over 364,000 MWe of total capacity.
- These units supply 16% of the world's electricity, as base-load power, and their efficiency is increasing.
- 56 countries operate a total of 284 research reactors.

The vast majority of these commercial reactors will be reaching their end of life in the next two decades and will require either refurbishment or replacement.

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Reactors Globally

Type	Main Countries	Number
Pressurized Water Reactor (PWR)	United States, France, Japan, Russia	268
Boiling Water Reactor (BWR)	United States, Japan, Sweden	94
Gas-cooled Reactor (Magnox & AGR)	United Kingdom	23
Heavy Water Reactor (CANDU)	Canada, China, Romania	40
Light Water Graphite Reactor (RBMK)	Russia	12
Fast Neutron Reactor (FBR)	Japan, France, Russia	4
Total		*441*

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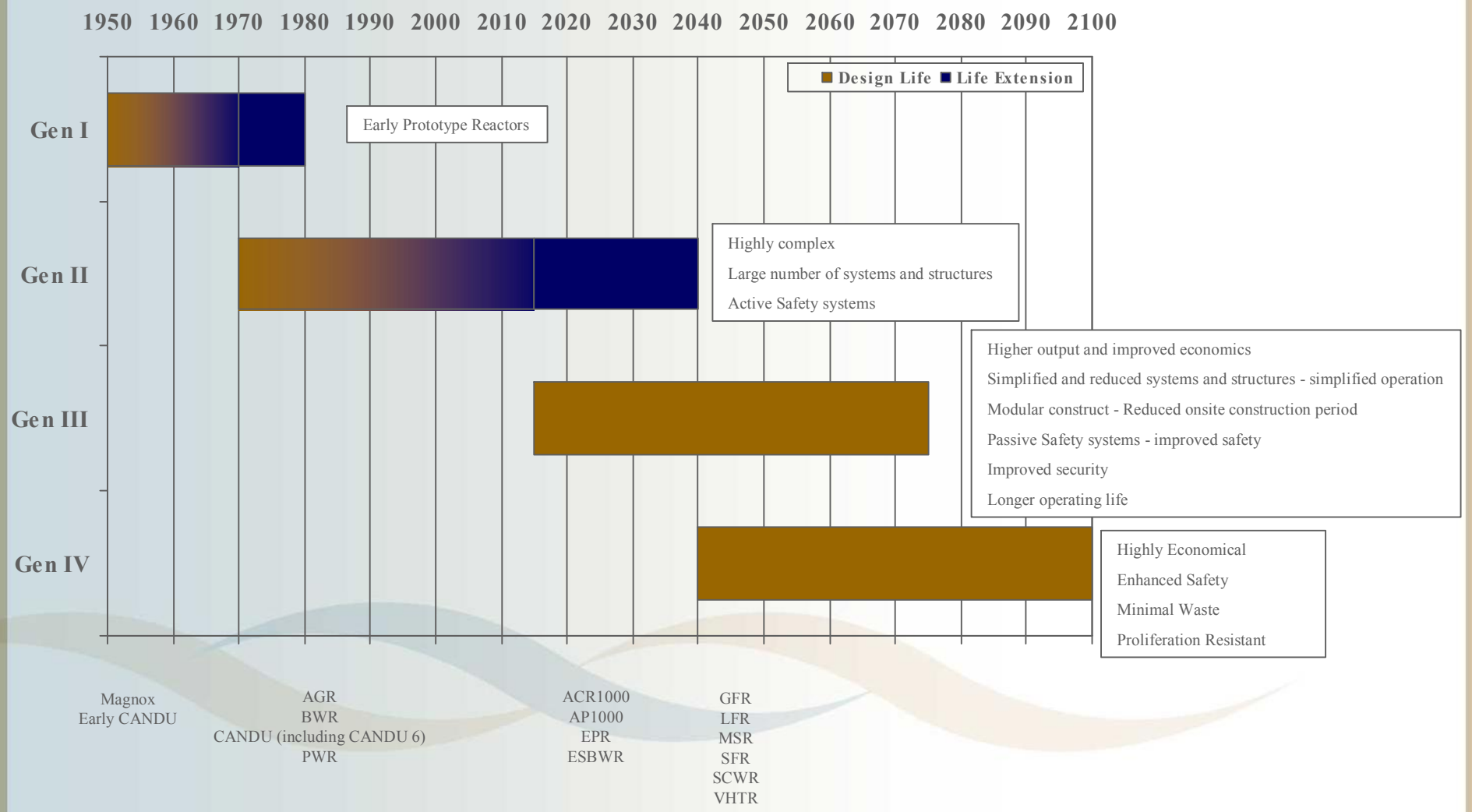
New Reactors Globally

Approximately 30 power reactors are being constructed in 11 countries:

Type	Main Countries	Number
Pressurized Water Reactor (PWR)	China, India, Russia, Japan, Finland, Pakistan	21
Boiling Water Reactor (BWR)	China	2
Heavy Water Reactor (CANDU/PHWR)	China, India, Romania	6


1950 1960 1970 1980 1990 2000 2010 2020 2030 2040 2050 2060 2070 2080 2090 2100
Design Life
Life Extension
Gen I
Early Prototype Reactors
Gen II
Highly complex
Large number of systems and structures
Active Safety systems
Gen III
Higher output and improved economics
Simplified and reduced systems and structures - simplified operation
Modular construct - Reduced onsite construction period
Passive Safety systems - improved safety
Improved security
Longer operating life
Gen IV
Highly Economical
Enhanced Safety
Minimal Waste
Proliferation Resistant
Magnox
Early CANDU
AGR
BWR
CANDU (including CANDU 6)
PWR
ACR1000
AP1000
EPR
ESBWR
GFR
LFR
MSR
SFR
SCWR
VHTR

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Systems Under Development

- Gas Fast Reactor (GFR)
- Lead cooled Fast Reactor (LFR)
- Molten salt Fast Reactor (MFR)
- Sodium cooled Fast Reactor (SFR)
- Super Critical Water cooled Reactor (SCWR)
- Very High Temperature Reactor (VHTR)

Canada's participation is in the R&D of two systems – Super Critical Water cooled Reactor (SCWR) and the Very High Temperature Reactor (VHTR)

Members of GEN IV Alliance

Argentina	Japan
Brazil	Republic of South Africa
Canada	Republic of South Korea
France	Switzerland
United States	United Kingdom
China	Russia

Nuclear technology can play a key role in this future by providing a means of supplying people all over the world with a safe, proliferation-resistant, and economic means of producing electricity—and eventually hydrogen—without harming the environment in which we all live and breathe – GEN IV International Forum

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Key Attributes of GEN IV Designs

- Highly economical
- Enhanced safety
- Minimal waste
- Proliferation resistant
- Hydrogen production

Canada's Key Milestones

- February 2005 – Approval to sign treaty.
- National Generation IV program established in 2006 under the Program of Energy Research and Development (PERD).
- November 2006 – Canada signs system arrangements with other countries for the SCWR and the VHTR systems.

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