GIF - MSR provisional System Steering Committee (pSSC) Overview and Activities

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On behalf of Stéphane Bourg and the MSR pSSC members

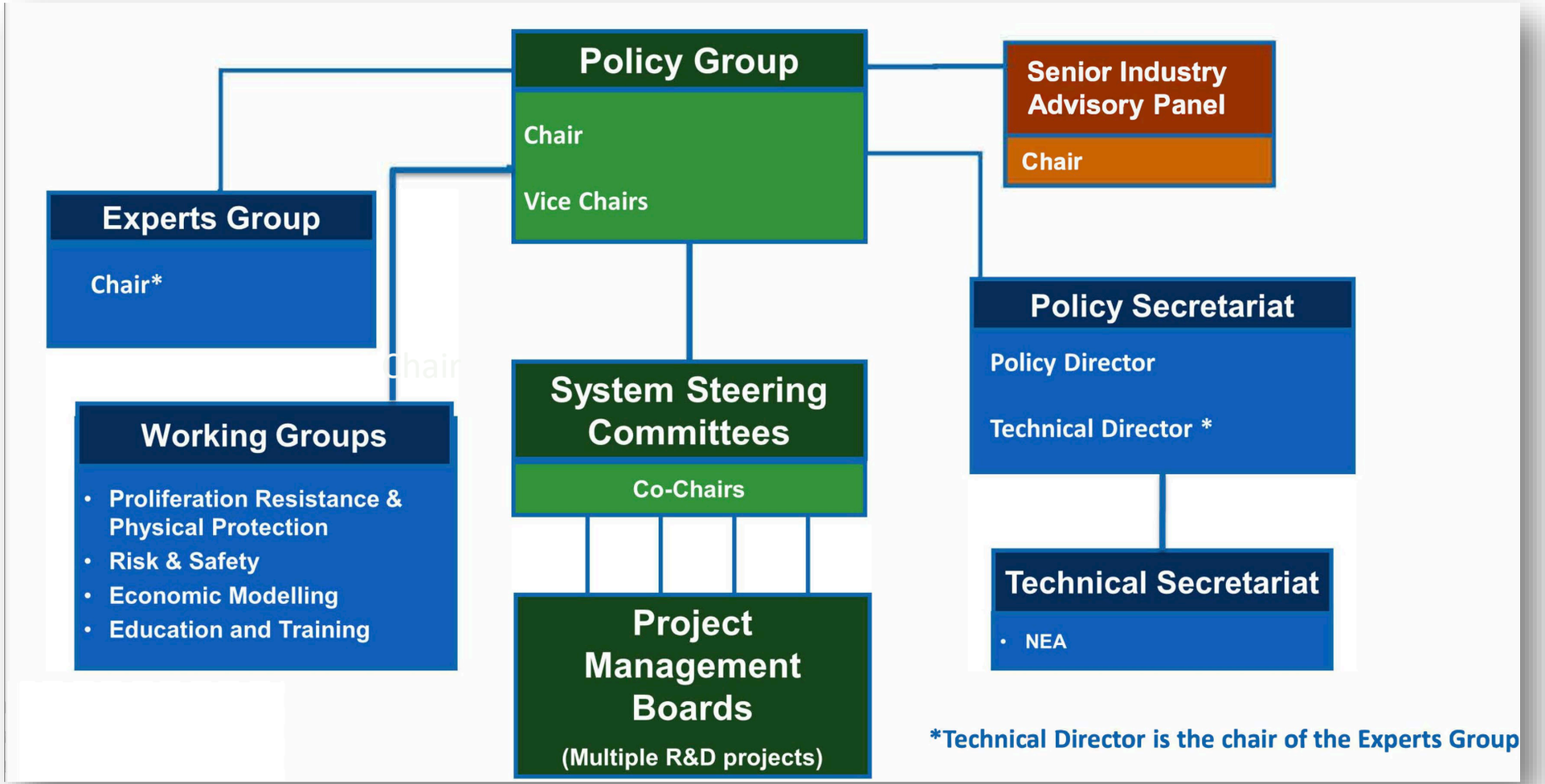
The **Generation IV International Forum (GIF)** is an international framework for co-operation in research and development for the next generation of nuclear energy systems

Six reactor technologies have been selected for further research and development:

1) Gas-cooled fast reactors,
2) Lead-cooled fast reactor,
3) **Molten salt reactors,**
4) Sodium-cooled fast reactors,
5) Supercritical-water-cooled reactors, and
6) Very high-temperature reactors

https://www.gen-4.org/gif/

Activities for Each Advanced Reactor Type are Coordinated Through System Steering Committees

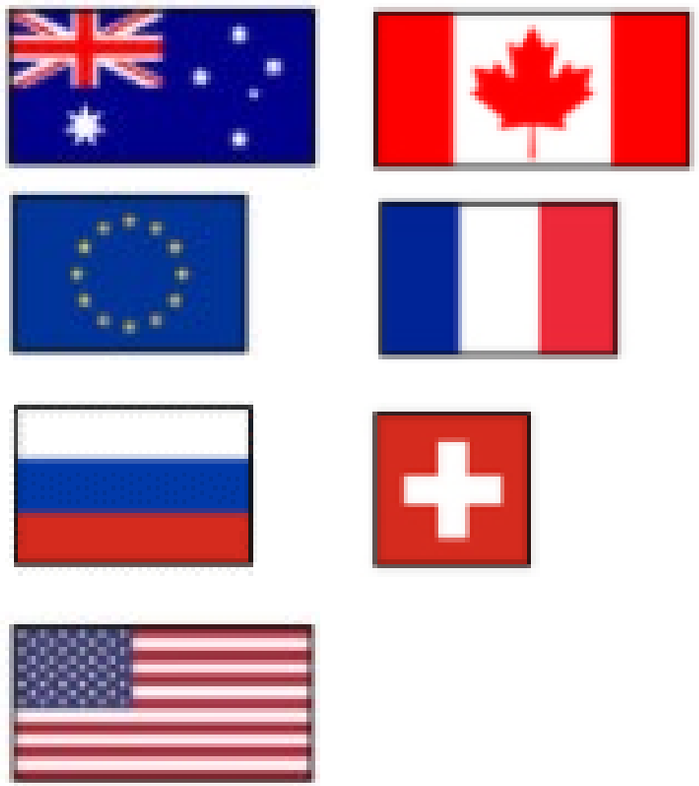


Goals for Generation IV Nuclear Energy Systems	
Sustainability-1	Generation IV nuclear energy systems will provide sustainable energy generation that meets clean air objectives and provides long-term availability of systems and effective fuel utilization for worldwide energy production.
Sustainability-2	Generation IV nuclear energy systems will minimize and manage their nuclear waste and notably reduce the long-term stewardship burden, thereby improving protection for the public health and the environment.
Economics-1	Generation IV nuclear energy systems will have a clear life-cycle cost advantage over other energy sources.
Economics-2	Generation IV nuclear energy systems will have a level of financial risk comparable to other energy projects.
Safety and Reliability-1	Generation IV nuclear energy systems operations will excel in safety and reliability.
Safety and Reliability-2	Generation IV nuclear energy systems will have a very low likelihood and degree of reactor core damage.
Safety and Reliability-3	Generation IV nuclear energy systems will eliminate the need for offsite emergency response.
Proliferation Resistance and Physical Protection	Generation IV nuclear energy systems will increase the assurance that they are very unattractive and the least desirable route for diversion or theft of weapons-usable materials, and provide increased physical protection against acts of terrorism.

MSR pSSC Operates Under a Memorandum of Understanding (MOU)

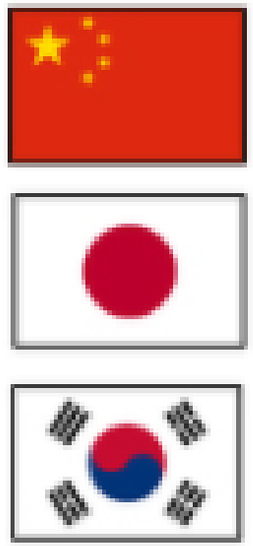
MOU signatories

Australia
Canada
Euratom
France
Russia
Switzerland
USA



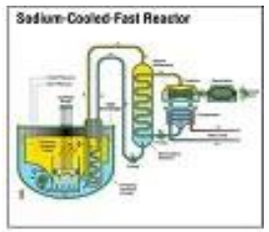
Observers

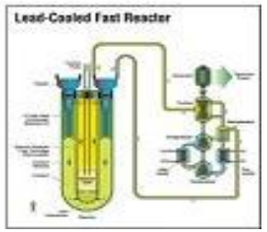
China
Japan
Korea

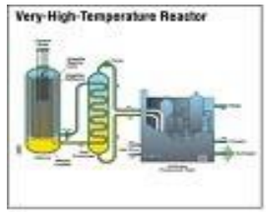


Terrestrial Energy and CNL have signed the MOU under Canadian sponsorship
Copenhagen Atomics has signed the MOU under Euratom sponsorship

The Challenge Faced by Gen IV MSR Systems







Liquid-Fuel MSR

Thermal

Fast

U

Th/U233

U/Pu

TRU

Th/U233

Fluoride

Fluoride

Chloride

Fluoride

Chloride

Fluoride

Fluoride

Terrestrial Energy IMSR
Thorcon
SINAP TMSR-LF1

SINAP TMSR
Flibe Energy LFTR

TerraPower MCFR
Elysium MCSFR

VNIINM FMSR

MOLTEX SSR-W

KI MOSART

EURATOM MSFR
KI MOSART
BARC IMSBR

pSSC Membership Consensus is for Cooperative Activities Remain Open and Fundamental

- Highly diverse designs are being pursued
  - No member state is currently pursuing a single design
- Designs are united by the common features and properties of molten salts and their impacts on reactor characteristics
  - Fundamental salt property data is applicable to all designs
  - Fundamental chemical and physical properties are inherently non-proprietary
- Information relied upon to make safety-related decisions on nuclear power needs to be publicly accessible
- GIF MSR safety cooperation focuses on developing fundamental information and validating methods suitable for use in safety decisions
  - Includes appropriate quality assurance
  - Does not include evaluation of specific design features

Cooperation under the MOU is voluntary, open, and fundamental

Cooperation Areas Have Been Selected as a Means to Increase Efficiency

Task	System Integration & Cross-cutting issues
1.1	Phenomena Identification and Ranking Table (PIRT)
1.2	Multiphysics simulation
1.3	Reactor core physics and fuel cycle
1.4	Plant dynamics

Task	Fuel and Coolant Salt Properties
2.1.	Properties of Fuel and Coolant salts
2.2.	Retention capacity of Fuel salt
2.3.	Fuel Salt Clean-Up
3.4.	Redox control of the Fuel salt

Task	Materials and Components
3.1	Assessment and evaluation of selected materials and manufacturing methods for the reactor plant and fuel salt processing unit:
3.2	Codification of very-high-temperature mechanical design rules for potential application materials and manufacturing methods. Modeling and description of materials behavior and damage development will provide the basis for codification improvements.