

Nuclear Energy

The Role of the IAEA in Meeting Energy Needs

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International Ministerial Conference

IAEA - Paris, 21-22 March 2005 « Nuclear Power for the 21st Century »



IAEA, Vienna

Jacques BOUCHARD, September 30th, 08

Near term deployment of industrial reactors: Gen III Reactors

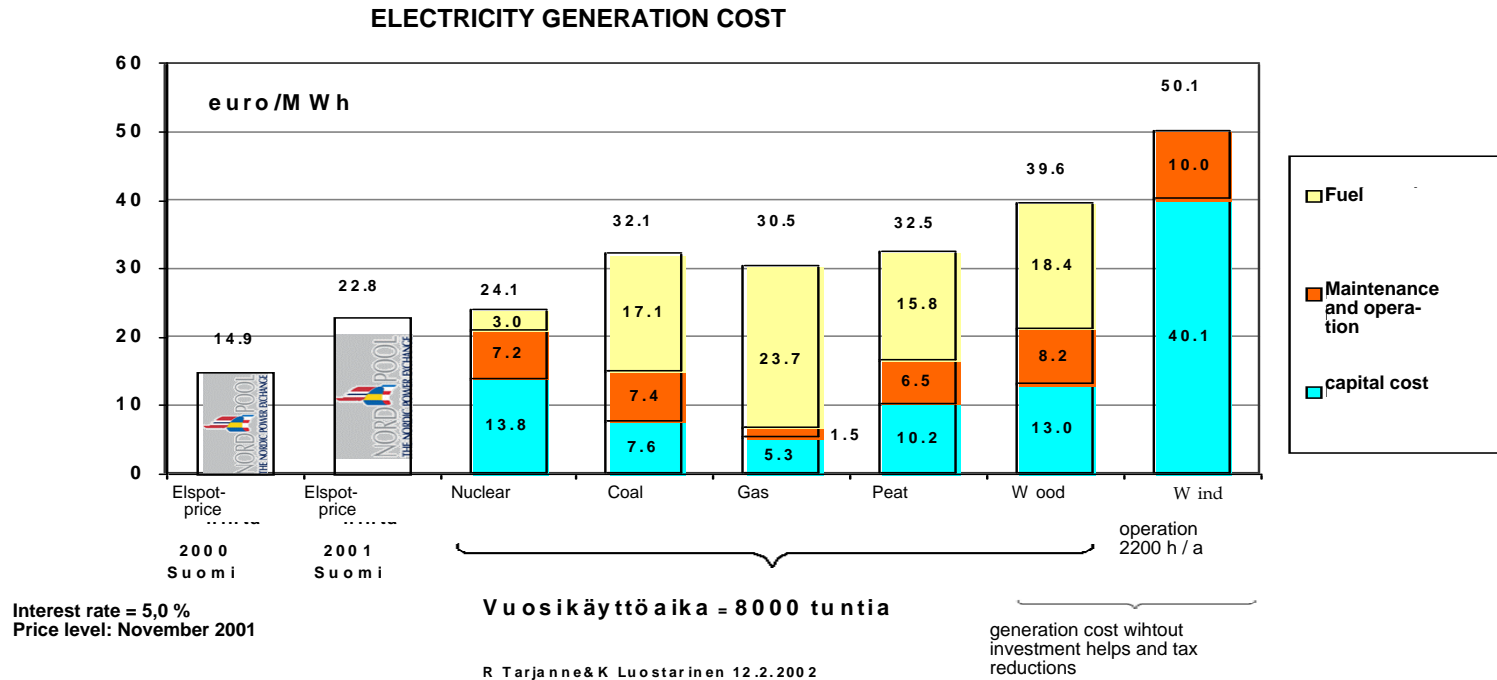
- A new generation of reactors which design takes benefit of the large experience acquired in the operation of Gen II plants and of the lessons coming from TMI;
- Light Water Reactors are still dominating;
- To make new improvements in safety while keeping economic competitiveness have been the main objective;
- Different approaches have been studied and are still competing in the industrial offer :
 - small vs. large reactors,
 - passive vs. active safety systems;
- Mitigation of severe accident consequences is a major step.

To meet the Sustainability requirements of the 21st century:

- Economy
- Safety
- Uranium Resources
- Waste Management
- Proliferation resistance

Nuclear Energy : Economy

- Production cost is among the lowest, and stable with time

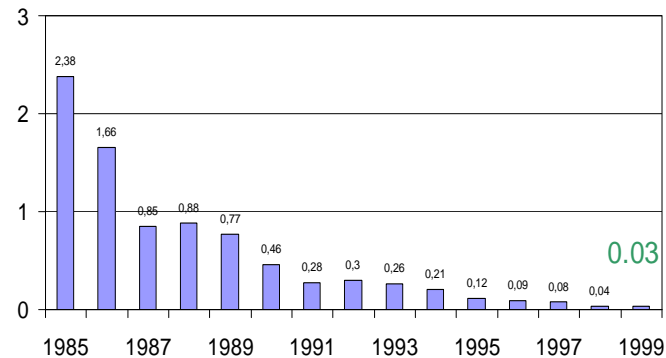


IAEA's decisive role in putting in place information exchange processes, peer reviews, policy approaches has enabled reliable construction schedules, licensing review procedures, and other factors affecting nuclear electricity costs.

Safety :

- Gen II : satisfactory data for 20 years

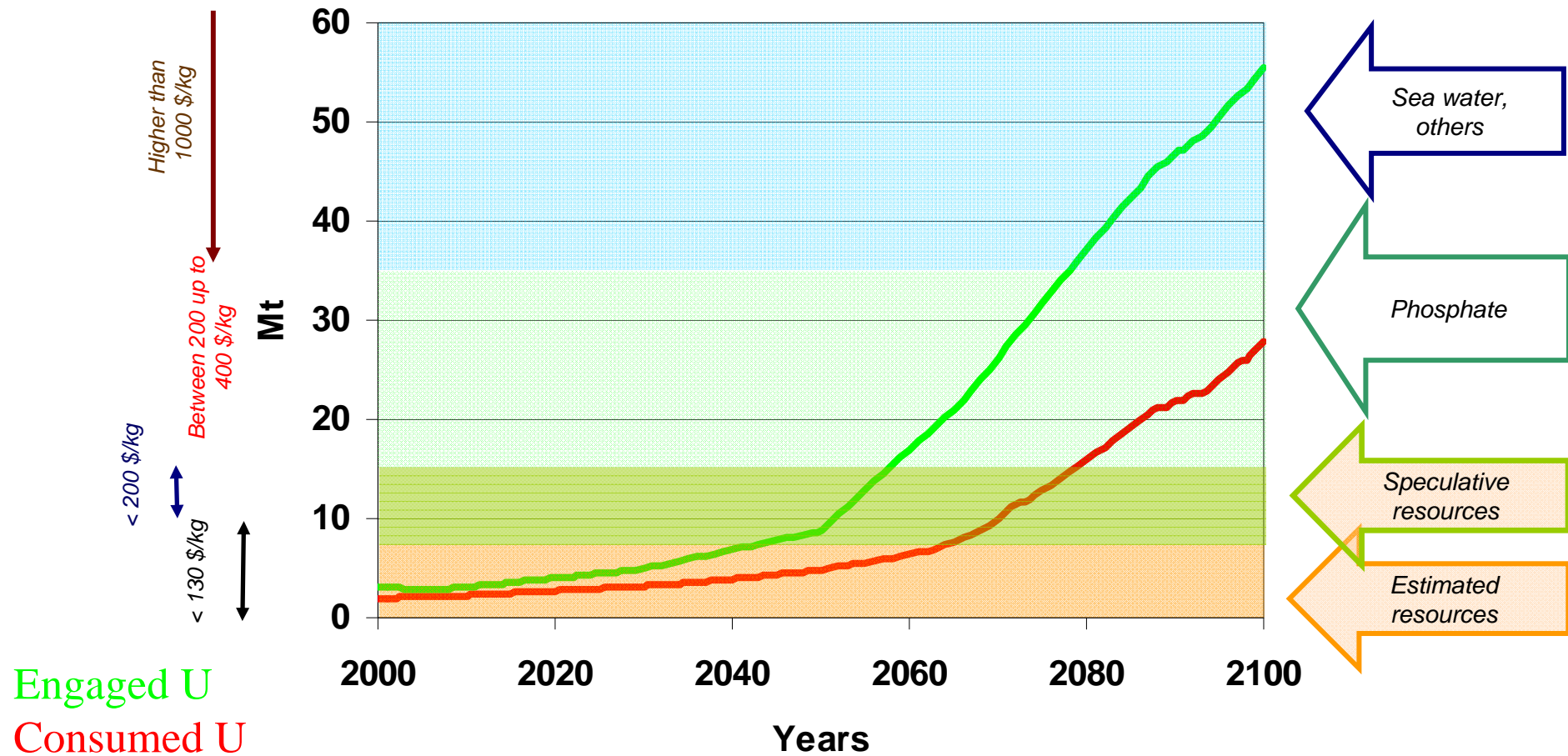
Safety performances at high levels



IAEA's efforts to develop strong international nuclear safety networks over the past two decades have paid off. However, gaps still exist: existing facilities with older design features still require upgrades or compensatory measures to ensure acceptable safety levels. Also, the IAEA's role is crucial in ensuring that lessons learned at one NPP are effectively incorporated into the operational practices of all other relevant facilities

- A new step with Gen III reactors
- Gradual improvements to be pursued for Gen IV reactors

Uranium Resources



IAASA A2 Scenario PWR only open cycle

Spent Fuel and Plutonium Accumulation

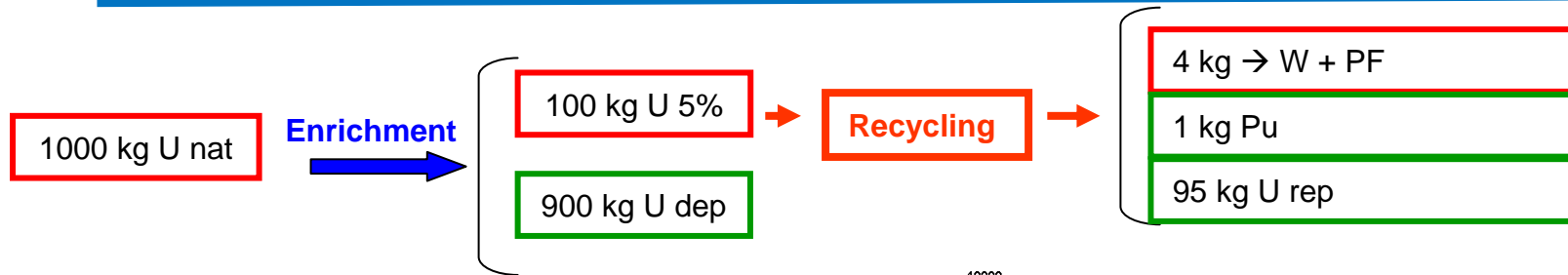
- 'The plausible scenario';
- R&R limited to a few countries;
- Gen IV systems implemented progressively after 2040.

	2005	2025	2050
Nuclear capacity (GWe)	360	650	1400
LWR capacity (GWe)	320	550	1200
Stored spent fuels (Mtons)	0,2	0,5	1,0
Plutonium amount (tons)	1500	4000	8500

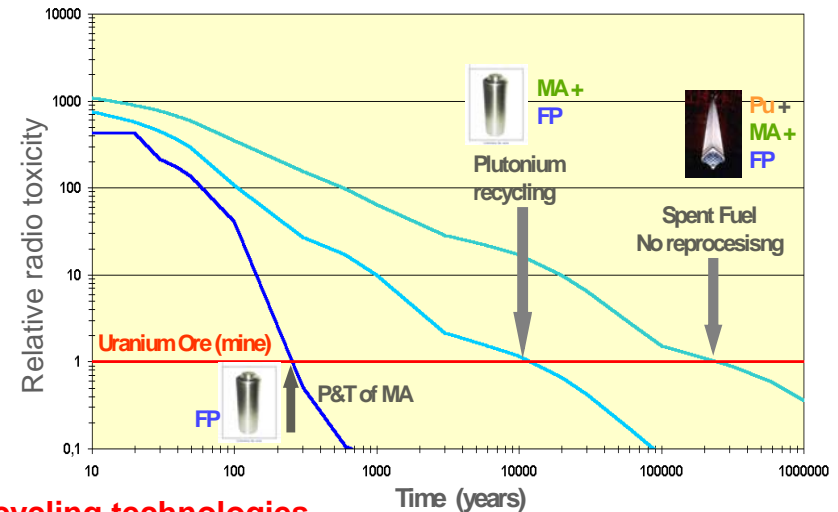
Once through: the easy way out, which is a purely short-term solution, as it does not save resources, does not minimize waste, leads to Pu accumulation, does not contribute to Public Acceptance

= Inappropriate answer to sustainable development of Nuclear Energy

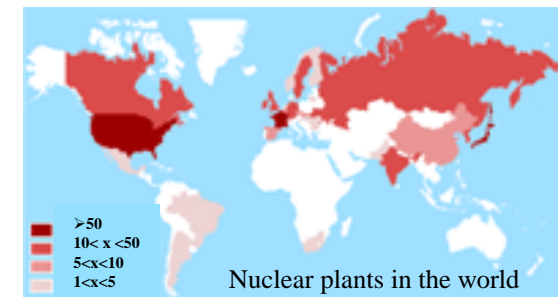
Closed Cycle: a path to sustainability, as opposed to Open Cycle



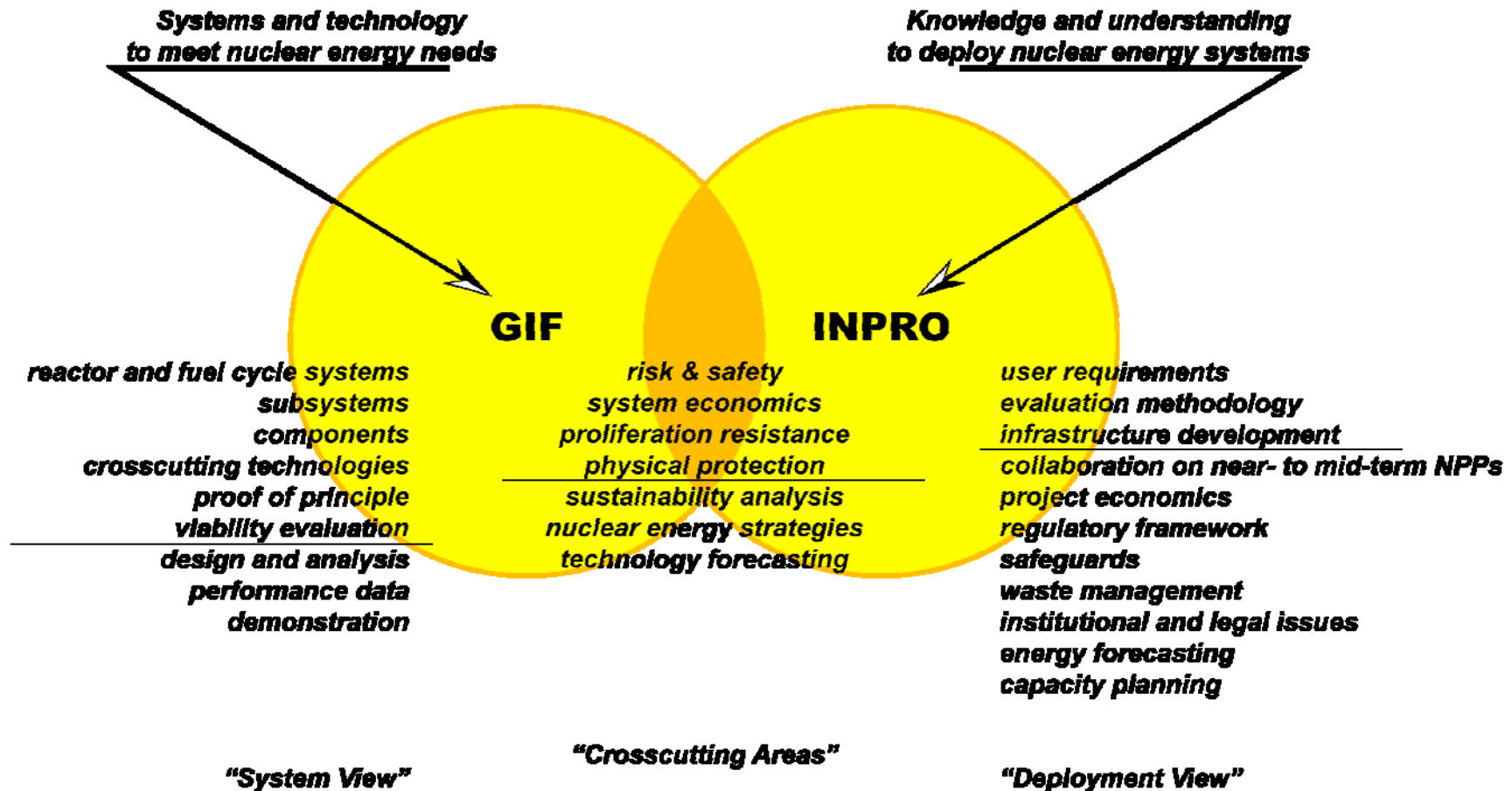
Recycling ~ 95% of spent fuel materials in LWRs
Saving resources ~ 25% in FRs
 ~ x 50 or more in FRs
Costs ~ 6% of the kWh total cost
Reducing by 5 waste long-term radiotoxicity
Reducing by ~ 10



- **Back-end cycle organisation**
 - **Supply of treatment plants based on advanced proven recycling technologies**
 - La Hague
 - Rokkasho
 - **Distribution of the treatment facilities on a regional basis**
 - Asia
 - Europe
 - North America
- With a Management involving the IAEA**



GIF and INPRO Expand and Integrate their Activities



Nuclear Energy

A structuring choice for a country

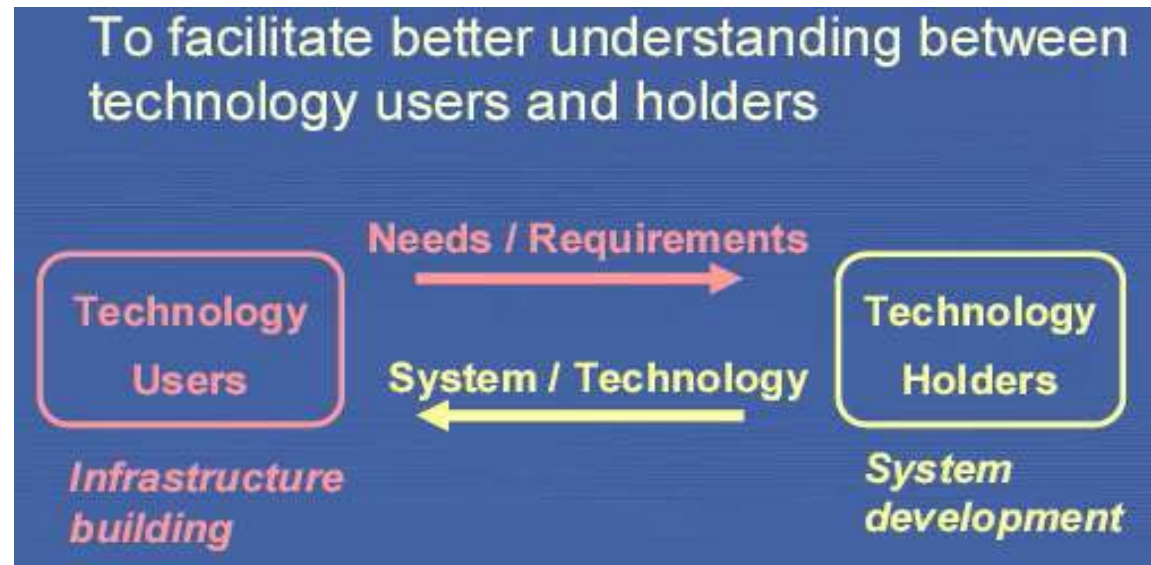
- Financial resources,
- Risks: industry which bears risks, which, in turn, requires stringent professional behaviour (transparency, acceptance of controls): this professionalism in the operation is acquired with time and rigour
- Infrastructures: need for a Safety Authority, competent and independent from the operators a Safety Authority, an appropriate grid, an appropriate waste management policy, an industrial network of firms involved in the development and the operation of nuclear installations
- Human and cultural dimensions: Public Acceptance is a very sensitive issue for Nuclear Energy, which should not be underestimated

International cooperation between countries inexperienced or with limited financial capabilities is recommended. The IAEA should pursue and intensify its efforts, such as those carried out by the SAGNE, to provide criteria and guidance for sharing nuclear power infrastructure during the stage of nuclear power project life cycle.

Addressing worldwide needs/preoccupations

- IAEA's Common User Criteria/Requirements

The IAEA will identify common user requirements and criteria from developing countries with respect to the reactor systems necessary in the 21st century, focussing on small and medium sized reactors, and potentially establishing joint actions by technology holders and users for development and deployment of such reactor systems.



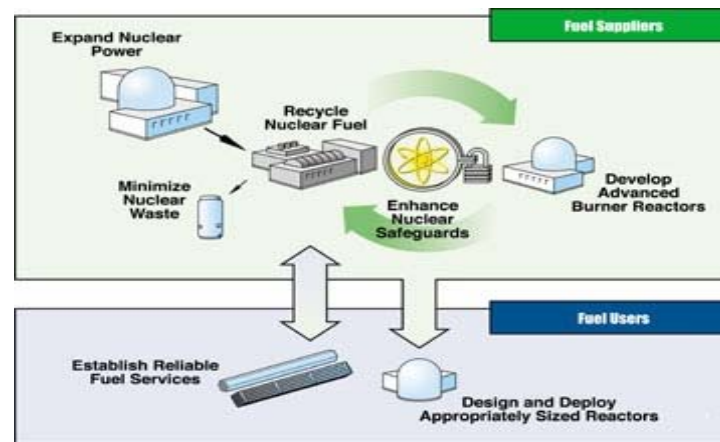
Guarantees of nuclear fuel supply

IAEA's proposal's to administer a nuclear fuel reserve, to ensure a back-up supply for power reactors throughout the world, on a non-discriminatory, non political basis, reducing the need for countries to develop their own uranium enrichment technologies.

Global Nuclear Energy Partnership (GNEP)

Develop worldwide consensus on enabling expanded use of economical, carbon-free Nuclear energy to meet growing electricity demand.

Use a nuclear fuel cycle that enhances energy security, while promoting non-proliferation. Goal achieved by having nations with secure, advanced nuclear capabilities provide fuel services — fresh fuel and recovery of used fuel — to other nations who agree to employ nuclear energy for power generation purposes only.



Conclusion

- **Many challenges yet to be overcome to allow for worldwide expansion of nuclear energy, related to its competitiveness, its safety features, and the radioactive waste issue.**
- **Also, new concepts should be designed and proposed, fully compatible with the concept of sustainable development**
- **Strengthen all possible ways of cooperation to overcome these challenges.**
- **Crucial role of the IAEA, which should also be given full authority to inspect for indicators of nuclear weaponization.**
- **The IAEA= sole body capable of harmonization national visions of nuclear energy expansion**