NEAR-TERM ACTIONS TO ENHANCE NES SUSTAINABILITY THROUGH COLLABORATION

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The basic concept of INPRO Task 1 “Global Scenarios” with respect to sustainability is to have the whole achieve more than the parts.

If one partner in a synergistic collaboration is achieving enhanced sustainability, then the other partner may achieve the same enhancement without the requisite investment in technologies and the related infrastructure.

International cooperation could help expand the benefits of innovative technologies to those users who have no plans to deploy them domestically.

Near and medium term actions are needed to continue to ensure and improve the longer-term sustainability of global nuclear energy. These actions can be grouped into several areas, including

- technology development,
- institutional developments,
- international cooperation and other.

All of these areas can benefit from collaboration and the resulting synergies.
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- Many of the options for improving sustainability require development of advanced technologies or improvements in technologies that have seen only limited deployment.

- Near and medium term actions for technology development are focused on developing and demonstrating enabling technologies for the sustainability improvement options.

- The maturation of these technologies in the near and medium terms will help improve sustainability in the longer term, even if the technology holders only use them for domestic programmes.

- Use of these technologies in synergistic activities to assist other less-developed programmes would further advance global sustainability.

- A key challenge for all advanced nuclear technologies is to improve economic performance.
Looking forward to manage growing SNF inventories in the near to medium term, geologic repositories need to be opened for SNF disposal or reprocessing capacities need to be expanded and geologic repositories opened for disposal of HLW.

Either option will allow for reductions in SNF inventories while providing a waste solution missing from today’s NES.

In the medium term, initial deployment of fast spectrum reactors is anticipated. This initial deployment may serve multiple purposes:

- First, it will help to reduce the technical risk associated with industrial scale application of these technologies.

- Second, experience in the construction and operation of a limited number of fast reactors will provide important lessons prior to a more rapid expansion of reactors later.

- Third, the initial facilities will help answer questions about the true cost of fast reactors, reducing the economic uncertainties and enabling better analyses of the costs/benefits of transition to closed fuel cycles.
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- A number of institutional developments would help to encourage more synergies on NES that would lead to more effective management and operations of nuclear systems and potentially to higher utilization of nuclear fuel cycle facilities.

- These efficiencies would in turn result in improved economics of NES.

- Many are in the areas of cooperation on planning and personnel development that require limited investments.

- Others are related to nuclear facilities and management of materials and wastes.
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- Both newcomer countries and countries with existing programmes can benefit from expertise and information sharing on licensing, regulations, radioprotection, environmental impact assessment, etc.

- Sharing of human resources and expertise can extend beyond regulations and safety to include routine operations.

- While the IAEA International Safeguards programme can provide assurances to the world of the peaceful intent of nuclear energy users, regional groups such as the Brazilian-Argentine Agency for Accounting and Control of Nuclear Materials (ABACC) can additionally improve trust and foster cooperation.
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- There are historical and on-going activities involving one party developing reprocessing capacity initially for domestic purposes and then selling reprocessing services to other parties, as well as those related to trans-boundary movement of spent fuel for storage or recycle in another country.

- These activities have resulted in the establishment of important institutional mechanisms to support the transfer of irradiated materials between countries, a key enabler for further expansion of cooperative synergistic activities.

- Such mechanisms need to be examined to ensure they will remain sufficient assuming a substantial expansion in the international transfer of spent fuels, reconstituted fresh fuels and waste materials.
The current practice for management of spent nuclear fuel in most countries with nuclear energy systems is interim storage pending development of geologic repositories.

One issue with interim storage is the lack of financial incentive to move on to a more permanent solution.

Standard economic treatment of net present value and discounting consistently shows the cost of long term interim storage is minimal and the larger disposal investments cost less if postponed. Because disposal costs are incurred in the near term but the benefits are distributed over very long time horizons, the standard application of discounting reduces values far into the future to essentially zero in present day terms.

However, such textbook application of economic theory fails to address the inter-generational aspect of sustainability. New economic models are needed in fuel cycle analyses to better model the costs of current practices and the benefits of sustainability.
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- Plans and projections are not guarantees that research will be successful or that development will occur on schedule. However, they do provide a vision of what is being attempted.

- When such visions are shared, groups can work together or independently to achieve those visions. Either approach increases the probability a vision will be realized.

- The large size and complicated nature of nuclear energy systems require significant human and capital resources be applied in multiple areas simultaneously. Shared visions can help coordinate these efforts by providing a roadmap for many (or for all) to follow.

- The more countries that are willing to share their plans and projections, the better the research, equipment, training, and other providers can plan their own efforts. This can improve the overall efficiency of all parts of the global system.
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- In the near-term, general roadmaps on the timing of nuclear reactor deployments can provide a starting point by indicating the level of construction services and fuel cycle services needed.

- Related workforce training, fuel cycle infrastructure development, and other needs can then be developed. When these plans include newcomer countries, the related development on institutional mechanisms, such as regulatory agencies, can better be assisted.

- When the plans include assumptions about services such as fuel lease / take-back, then potential service providers can better develop their own business plans, and improved institutional measures can be developed in advance of the need for their application.

- When these roadmaps include advanced reactors and advanced fuel cycles, they can also provide the basis for R&D roadmaps, which themselves can help catalyze development of shared research facilities.
Many plans are already shared, but there has not been an effort to collect and integrate these plans into a global shared vision. Due to the cascading impact of a shared nuclear infrastructure development plan, a nuclear roadmapping effort could be recommended as one of the first near-term activities.
Thank You!

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