

INTERNATIONAL PROJECT ON INNOVATIVE NUCLEAR REACTORS AND FUEL CYCLES (INPRO)

Break-out Sessions on the Topic 3:

***Collaboration between technology users, technology holders
and other organizations on the infrastructure and institutional
arrangements necessary for the development and
deployment of sustainable NESs***

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Key points, major observations and conclusions



Observations & Needs Identified:

- Risk management (including risk analysis and assessment) within deployment of innovative NESs.
- Political and economic stability (national, regional) is a serious problem that in some cases preventing from undertaking NP programmes and even from active participation in collaboration activities.
- Challenges associated with the regulatory framework, regulatory documents and competence of regulators required for the fulfilling of regulatory functions associated with innovative NES and deployment of innovative / advanced designs.
- Regulatory framework for SMRs. The intent to use a 'graded approach' but currently not developed.

Key points, major observations and conclusions



- Cooperation with potential vendor countries is important, but having a robust and established regulatory framework is essential.
- Development of TSOs in support of SMRs licensing.
- Adequate HR and competent staff for NP programmes, and for R&D and TSO infrastructure still is one of biggest problems. Involvement of external consultants was recommended to consider more actively.
- Significant number of opportunities for additional cooperation between Member States with a potential involvement of the IAEA identified and discussed.

Key points, major observations and conclusions



- China offers / predicts a collective use (including research and fellowships) of the CEFR.
- ✓ CEFR is a platform to support the deployment of INES, it should be made fully used in the FR R&D, sharing the capability by collaboration:
 - Fast reactor new fuel R&D irradiation test
 - Cladding material irradiation test
 - The more MA transmutation irradiation test
 - Isotope production irradiation

Key points, major observations and conclusions



➤ Armenia – needs for collaboration:

- Development of sustainable NES (INPRO methodology is a good tool)
- Activities in support of the capacity building of national professionals in relevant areas
- Assistance to the dissemination of knowledge on nuclear energy use and public awareness activities
- Issues for adaptation of offered technology to users' requirements and limitations (i.e. load followed mode of operation, possibility to work at reduced power level etc.)

Key points, major observations and conclusions



- Armenia and other countries – a desire to host INPRO activities

- Armenia – proposals on capacity building:
 - To organize a meeting at the Armenian State University (SEUA) with the topic of harmonization curricula of nuclear energy specialities for both MA and BC levels

 - To arrange a cycle of regional workshops on permanent basis where Technology holders will present their advanced technologies to Technology users that can be used by them for future assessments of sustainable development of national NES

 - Potential use of the Armenia's Training Center on Nuclear Emergency Preparedness in SEUA for the training of newcomer countries with site visits to ANPP and use of NPP Simulator.

Key points, major observations and conclusions



➤ Albania:

- Respecting its Statute, IAEA having not the right to intervene, may/can suggest. The ways of support, through official channels, often results very efficient! The Albanian experience with IAEA (politicians refer to IAEA suggestions). The properly chosen IAEA support may have a fundamental role (previous experiences) in countries like Albania

➤ Montenegro:

- A study suggests that Montenegro should consider joining a possible (sub)regional nuclear power programme initiative in mid-term future (factors: economic, political, public acceptance)
- Montenegrin Academy of Sciences and University of Montenegro support strongly the idea of participating in a joint NPP programme in mid-term future

Key points, major observations and conclusions



- Receive from the IAEA some kind of 'guidance' how 'small' countries that cannot afford NP programmes may benefit from nuclear power.
- The need in strengthening regional collaboration.
- Albania and Montenegro (supported by Armenia and Bulgaria) – the need in Joint regional approach as a way towards benefiting from nuclear power programmes.
- Indonesia – an aim to develop fuel technologies. Looking for support and collaborations. E.g. assistance to approach suppliers.

Key points, major observations and conclusions



- Bulgaria - Experience of Bulgaria in the use of national and international TSOs.
- Bulgaria - Supported by the Bulgaria's Government, Bulgarian Academy of Sciences has started a program for cooperation with the Macedonia's Academy of Sciences and Arts.
- Bulgaria - As a small country with significant experience in operation of Nuclear Power Plant for Bulgaria is very important to share knowledge in nuclear field by national TSOs with other countries for improving and further developing nuclear technology.

Key points, major observations and conclusions



- EC NEWLANCER project - a catalogue mapping the research potential (presenting national TSO with their competences and infrastructure)
- EC CORONA project – Regional Centre of Competence on VVER Technology and Nuclear Applications
- JRC - Institute for Transuranium Elements (ITU) may be effectively used for collaboration on NFC
- NRC 'Kurchatov Institute' (RF) – not only outstanding R&D achievements but an excellent place for fellowships

Key points, major observations and conclusions



- ✓ NRC 'Kurchatov Institute' (RF):
 - A hybrid thermonuclear reactor “for fissile matter and electricity production” - “innovative breakthrough”
 - NEUTRON RESEARCH CENTER ON THE BASIS OF THE PIK REACTOR – a potential for future collaboration
 - Long-term nuclear energy strategy development activities have evolved into coordinated multinational efforts. The INPRO Project is an excellent permanent platform for these activities.
- France’s opinion – transportable NPPs may be a solution for small countries.
- The need in comprehensive databases on innovative technologies (including technical and economic data) (take note: IAEA / NPTDS ARIS <https://aris.iaea.org/>)
- INPRO is an excellent platform for collaborative work

Key points, major observations and conclusions (cont'd)



Recommendations:

1. More precise catalogue of IAEA products and services associated with the development and deployment of innovative NES and implementation of NP programmes.
2. Take advantage of various existing IAEA projects and activities (including INPRO, NPTDS, NIDS, Technical Cooperation national and regional projects). E.g. the IAEA provides opportunities for regional dialogue thorough Regional TC Projects.
3. To assist / perform in thorough and constructive review of national HR plans for R&D organizations and TSOs being involved in the deployment of innovative NES and NP programmes. **Multidisciplinary review teams involving the experts with proven hands-on experience would be helpful.**

Key points, major observations and conclusions (cont'd)



4. Enhance collaborative educational and training activities for the acquiring competence needed for the development and deployment of innovative NES. This requires not only quality training material but also involvement of highly competent tutors and experts.
5. Continue and further strengthen a dialogue between technology holders and technology users.
6. INPRO may consider to establish a working group to discuss in-depth regional challenges / opportunities for cooperation.

Key points, major observations and conclusions (cont'd)



7. It is suggested to consider establishing a working group within INPRO (with potential involvement of other IAEA organizational units) on Joint regional approaches to energy systems, particularly involving 'small' countries, possibly leading to joint undertaking of or participating in nuclear power programmes. The working group should be open not only to countries and regions directly concerned, but to nuclear power matured countries as well, assuming their contribution to the topic. The working group could discuss advantages & benefits, drawbacks & obstacles, variations & modalities and ways forward in joint approaches.