

INPRO Dialogue Forum on International Collaboration on Innovations to Support Globally Sustainable Nuclear Energy Systems

Break-out session 3-1: *Collaboration between technology users, technology holders and other organizations on the infrastructure and institutional arrangements necessary for the development and deployment of sustainable NESs*

Features and Issues of Collaboration of Small Country in Implementation of Innovative NES

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INPRO
International Project on
Innovative Nuclear Reactors
and Fuel Cycles

18–21 November 2014, IAEA Headquarters, Vienna, Austria

Presentation Outline:



- Armenia as a “Small Country”
- Features and Issues of Collaboration

Armenia as a “Small Country”

Armenia as a “Small Country”

Territory: 29.8 thousand km², landlocked

Population: 3.03 million inhabitants (~0.042% of World population)



Main Economic Indicators (2013 / 2012)

GDP, million \$	10 417 / 9 949
GDP per capita, \$	3 441 / 3 287
GDP growth, %	4.1 / 7.2

Small Power Grid (Network)

- ✓ 220 kV HVL – 1527 km
- ✓ 220 kV SS – 14

Armenia as a “Small Country”



Limited Domestic Energy Resources (Renewable):

- ✓ Hydro – 1 600 MW (utilized 74% – 1 187 MW)
 - HPP – 1 230 MW (utilized 965 MW)
 - Small HPPs – 370 MW (utilized 222 MW)
- ✓ Wind – 200 MW (utilized 2.6 MW)
- ✓ Solar PV – 100 MW (cumulative for 2020)
- ✓ Geothermal – 25 MW (after 2018)

Total domestic capacities: 1 925 MW

used: 1 190 MW

available potential: 735 MW

Estimated total production from domestic sources: ~3 200 million kWh

Armenia as a “Small Country”



Limited Financial Resources:

- ✓ Social and economic problems
- ✓ External debt level (>40% of GDP)

Limited Human Resources

- ✓ Few energy research companies/centres
- ✓ Few number of professionals in each energy field

Limited grid operation & control capabilities

- ✓ Big differences between daytime and night consumptions
- ✓ Quite big variation between summer and winter loads

Features and Issues of Collaboration

Features and Issues of Collaboration



Energy policy of the country is usually formed based on the studies of energy development strategies. Typically, two main scenarios namely “nuclear” and “non-nuclear” are being considered in those investigations.

Collaboration between technology users and technology holders at the stage of formation of national strategies covering development of sustainable NES will essentially improve the strategies quality.

One of the goals of collaboration may be achieved through the organization of regional energy planning studies in cooperation with representatives/experts of different countries (not only geographically neighbour countries), as well as through dialogues and discussions among Decision Makers in relevant countries addressed to coordination and “synchronization” of the national energy systems development strategies in consideration of big nuclear energy system as a regional source of energy.

Features and Issues of Collaboration



Creation and submission of databases that consist of some brief descriptions of innovative technologies (as much as allowed by technology owners) including highly demanded main (indicative) technical and economic characteristics.

Use of INPRO Methodology by technology users and by technology holders at least in the initial investigation stages will give an opportunity to “speak in the same language” and to more easily understand each other related to the needs of technology users and opportunities of technology providers to meet those needs.

INPRO Methodology could become a tool to use during R&D activities on elaboration of NES.

Other important areas of collaboration are:

- ✓ activities on 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' network requirements and limitations (i.e. load followed mode of operation, possibility to work at reduced power level etc.)

Plans for Regional Collaboration

Plans for Regional Collaboration



In the Minutes of 22nd Meeting of INPRO Steering Committee held in 24-27 June 2014 the following was stated:

“6. Findings, Conclusions and Recommendations

...

In addition to Poland (which expressed interest in hosting an SCM during the previous SCM), several Member States expressed their interest in hosting the future INPRO activities, namely Algeria, Armenia, France, India, Romania, and Mexico ...”

Armenia proposes:

- To organize a meeting in 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 submit their advanced technologies to Technology users that can be used by them for future assessments of sustainable development of national NES
- As the US DoE NNSA supported Training Center of Nuclear Emergency Preparedness in SEUA has already been established Armenia proposes to organize trainings in related fields for newcomer countries with site visits to ANPP and use of NPP Simulator.

Plans for Regional Collaboration



Specific Needs for Collaboration:

Armenia expects support from IAEA and interested Member States to organize the proposed activities

Thank you



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