

# **Summary of the Common User Considerations (CUC) by Developing Countries for Future NE Systems**

*(IAEA NES No NP-T-2.1, May 2009)*

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**IAEA**

International Atomic Energy Agency

# Outline

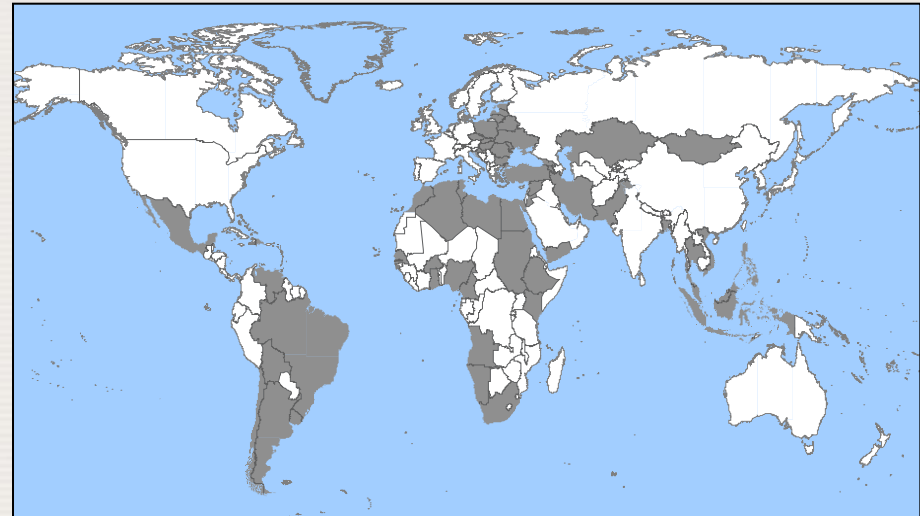
- Background on CUC
- CUC Process
- CUC the “Requirements” – Features Desired by Technology Users
- CUC the “Insight” – Summary of Users Rationales for the “Requirements”

# Background on CUC

- In response to a GC resolution;
- Objective: to develop common user criteria by developing states for SMR, including infrastructure development, domestic legal/regulatory frameworks, disposal of spent fuel and flexible financing.
- Two stages: (1) Establishing the CUC; (2) Refining it and defining possible actions;
- User countries are defined as:
  - IAEA MSs;
  - GDP per capita < US\$10 725/year;
  - Expressed interest to build new/additional NPP, but without on-going large scale NPP projects.

# Background on CUC *(continued)*

- Study:
  - 54 countries identified
  - 7 countries interviewed
  - 200 experts from 35 countries participated in report development
- Observations:
  - High degree of commonality
  - Some areas of divergence
  - Strategic planning process varied but existing technology tended to drive options



*54 countries addressed by the project have 2 attributes – they are developing countries and are interested in potential use of nuclear energy systems*

# CUC Process

- Dec 2006 - Action Plan endorsed by SCM;
- Jan 2007 - Defined user countries, Prepared questionnaire;
- Feb 2007 - 1st CM: Reviewed the above, identified representative (+ alternative) countries to be interviewed;
- Feb to Jun 2007 - Organized visits to representative countries;
- May to Aug 2007 - Visits to representative countries: Indonesia, Belarus, Lithuania, Egypt, Bangladesh, Mexico and Malaysia;
- Sep 2007 - Drafted Sections 3 & 4 of CUC report;
- Sep 2007 - 2nd CM: Reviewed results, discussed workshop plan including short questionnaire, discussed Stage 2
- Oct 2007 - Collect filled questionnaires, completed CUC draft report;
- Nov 2007 - CUC Workshop participated by 33 user countries and 8 'friends of nuclear' countries (Canada, China, France, India, Japan, Korea, Russia, USA);
- Dec 2007 to Apr 2008: Finalized CUC report;
- Mar 2008: 3rd CM: Reviewed CUC report being finalized, discussed Stage 2.

# Features Desired by Technology Users

## *Components of CUC “Requirements”:*

1. Economics and Financing;
2. Infrastructure and Implementation;
3. Nuclear Safety;
4. Environment, Resources and Waste Management;
5. Proliferation Resistance;
6. Physical Protection;
7. Technical Requirements.

# Features Desired by Technology Users

## *Some Key Points:*

- Opportunity to improve national capability
- Proven technology
- Take advantage of operating experience in Technology-Holder Countries
- Same level of safety, security and proliferation resistance as in Technology-Holder countries
- Support for financing, risk allocation
- Less uncertainty in cost data;
- Help from vendor countries' regulators, support organizations

# Features Desired by Technology Users

*Some Key Points (continued):*

- Sustained operation (availability of fuel, parts, service, know-how)
- Spent fuel:
  - Join Technology-Holders in the process of addressing the issues associated with the back-end of the fuel cycle
  - Fuel take-back option



# General Rationales for “Requirements”

- Majority of requirements are driven by similar concerns and general desires;
- Most important one is **minimization of risks** associated with nuclear power program:
  - Major investment;
  - Long-term commitment
- Also important are:
  - Be treated **equally/access to same** technologies;
  - Continued improvement of **national capabilities**

# Desire to Rely on Established Experience

- Risks due to 'inexperience' in technology;
- Desire to have those with more experience (supplier) to share more risk:
  - Turnkey contract in 1<sup>st</sup> project;
  - NPP product proven prior to introduction:
    - Proven design: systems, components, methodology/codes and licensing;
  - Assistance to establish experience timely

# Desire to Improve National Capabilities

- A common need to have **more confidence** in technology through **participation + gradual improvement in capabilities**:
  - Utilization of local infrastructure and skill-sets;
  - Involvement in project execution;
  - Training of essential staff for running the plants;
  - Information to help understand the technology;
  - Systematic transfer of technology & know-how;
  - Step-wise increase in national participation.

# Desire to have Sustained Operation Over Lifetime

- Concern for possible interruption to NPP operation
  - Perturbation in international market or politics **perceived** to be **beyond the control** of the user country;
- Desire to have technology supplier to share responsibility for sustainable operation:
  - Assurance of fuel supply;
  - Assurance of critical components and spare-parts;
  - Assurance of service and supply of technical know-how;
  - Maximization of self-reliance to a practical limit.

# Concern Related to Safety and Public Acceptance

- Requirements mainly associated with unfamiliarity with technology;
- Willingness to rely on **supplier's** and **international assurance** that the current technologies are safe;
  - Design proven-ness is essential: no need to require 'safer' design;
  - Supplier has more experience and established practices and analysis approach/methodology
    - Have been licensed or licensable in country of origin;
    - Meet IAEA Nuclear Safety Standards and comply with national regulation.

# Concern Related to Economics, and associated Info.

- Minimum electricity generation cost is generally not the main nor the only objective for introducing NPP;
  - But must be competitive with best alternative sources of energy locally available
  - General perspective that nuclear electricity is competitive;
- Concern is more related to availability and credibility of **relevant information** for:
  - Detailed comparison with other energy sources;
  - Supporting decisions and selection of options;
  - **Need relevant cost breakdown;**
  - Desire to utilize local facilities and human resources.

# Concern Related to Spent Fuel Management

- An important concern but no strong requirement for ultimate solution in the short-term:
  - Realization that it is not feasible;
  - Most countries are willing to join the ‘expert’ countries to ‘wait and see’;
  - Effective intermediate spent fuel storage;
- Some are more concerned with viability of permanent storage in own country:
  - Spent fuel take-back option;
- Some believe in the right to pursue closed fuel cycle option in the future if/when necessary:
  - Flexible fuel in future.

# Other Concerns and Desires

- Mainly common-sense type. Examples:
  - Short/certain project duration;
  - Support for financing;
  - Good performance and ease of operation/maintenance;
  - Maximum size within constraints of grid characteristics and national capability.



# Final Remarks - Personal Observations

- Risks can probably be minimized with the introduction of SMR without users' involvement in non-power-generation fuel cycle activities:
  - Risk due to **large size of investment** - SMR's smaller sizes may reduce/eliminate many concerns;
  - Risk due to **long-term commitment** - can be minimized with 'Without On-site refuelling' feature and without enrichment, fuel fabrication and spent fuel management
- Lack of understanding by the vendors/designers on the aspiration & priorities of user countries. Example:
  - Micro-economic decision approach (low unit energy cost) vs. Macro-economic decision approach (opportunity cost).

# Personal Observations *(continued)*

- Major challenges to user countries:
  - Current NPP products are too large and hence unaffordable;
  - Need to spend too much resource on infrastructure during a short-time (current nuclear countries established the infrastructure gradually over long time period);
  - These + proliferation concern have prevent them to enter the exclusive 'nuclear club';
- SMR will not be viable nor useful to user countries if continue to follow conventional NPP technology development approach - Need a shift in paradigm:
  - “Food for thought” presentation during coffee break, 15:30 - 15:50, Monday October 10, 2011



Thank  
You