

IAEA ACTIVITIES IN SUPPORT OF RISING EXPECTATION FOR THE ROLE OF NUCLEAR POWER AND ITS NON- ELECTRIC APPLICATIONS

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IAEA

International Atomic Energy Agency

1. Rising expectation to the role of nuclear power

2. Agency's Support to Infrastructure building

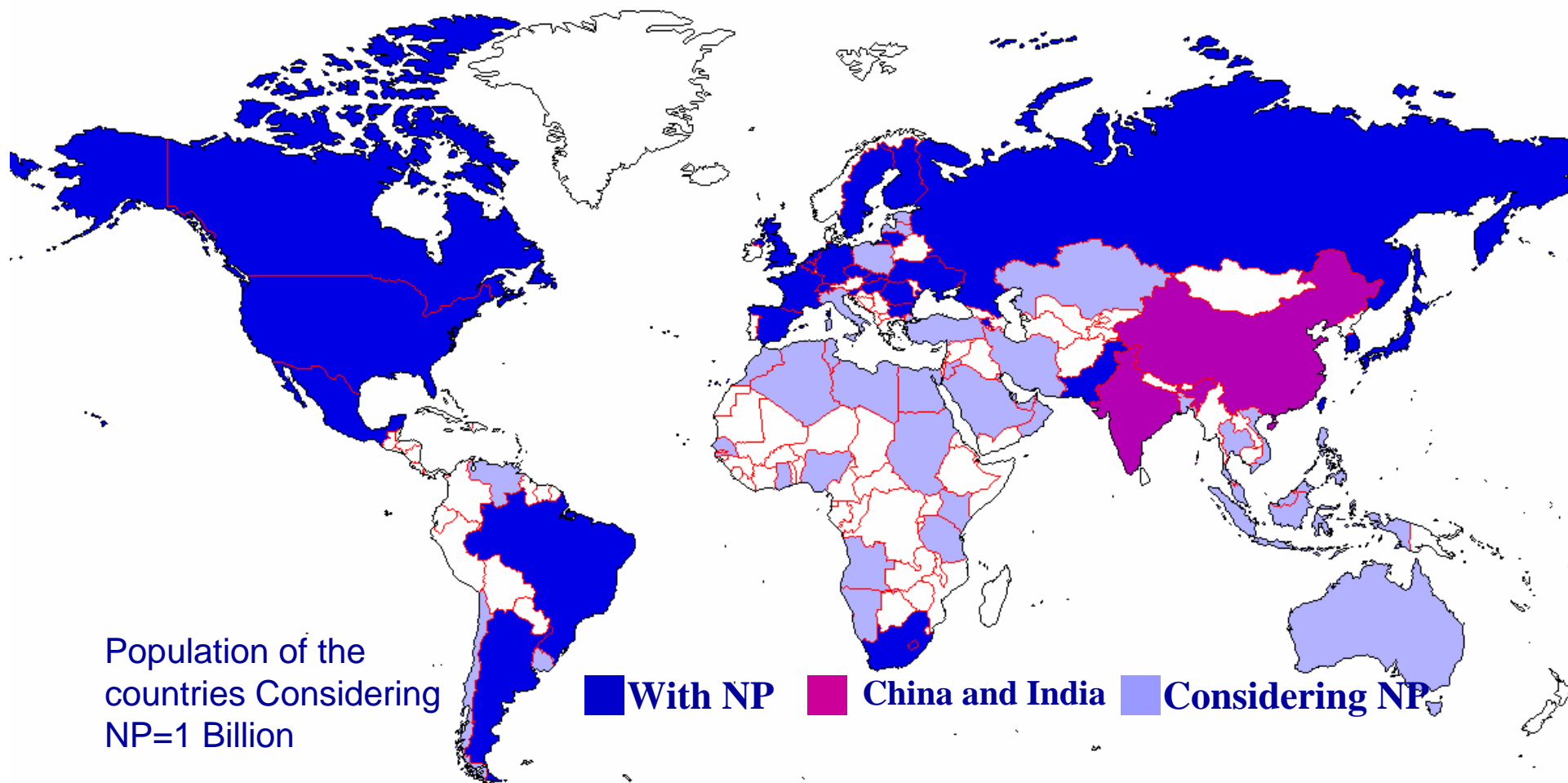
3. Agency's programmatic activities for non-electric applications

On-going trend on Nuclear Power

- ❑ **Current worldwide nuclear generating capacity**
 - ✓ Commercial NPPs in Operation 435 (~ 370 Gwe)
 - ✓ Share of nuclear electricity 16%
- ❑ **Observed slowdown of capacity addition since late 80's**
 - ✓ Electricity market deregulation
 - ✓ Slow growth of electricity demand in advanced countries
 - ✓ Public Perception
 - ✓ Economic reforms in Russia and EE countries
- ❑ **Current expansion in Asia**
- ❑ **Nuclear electricity increased due to availability increase**
 - ✓ Best practice prevailing
 - ✓ Consolidation to those who perform best
 - ✓ Risk-informed regulation
- ❑ **Rising expectation**



Increasing Nr. of countries thinking of introduction of nuclear power

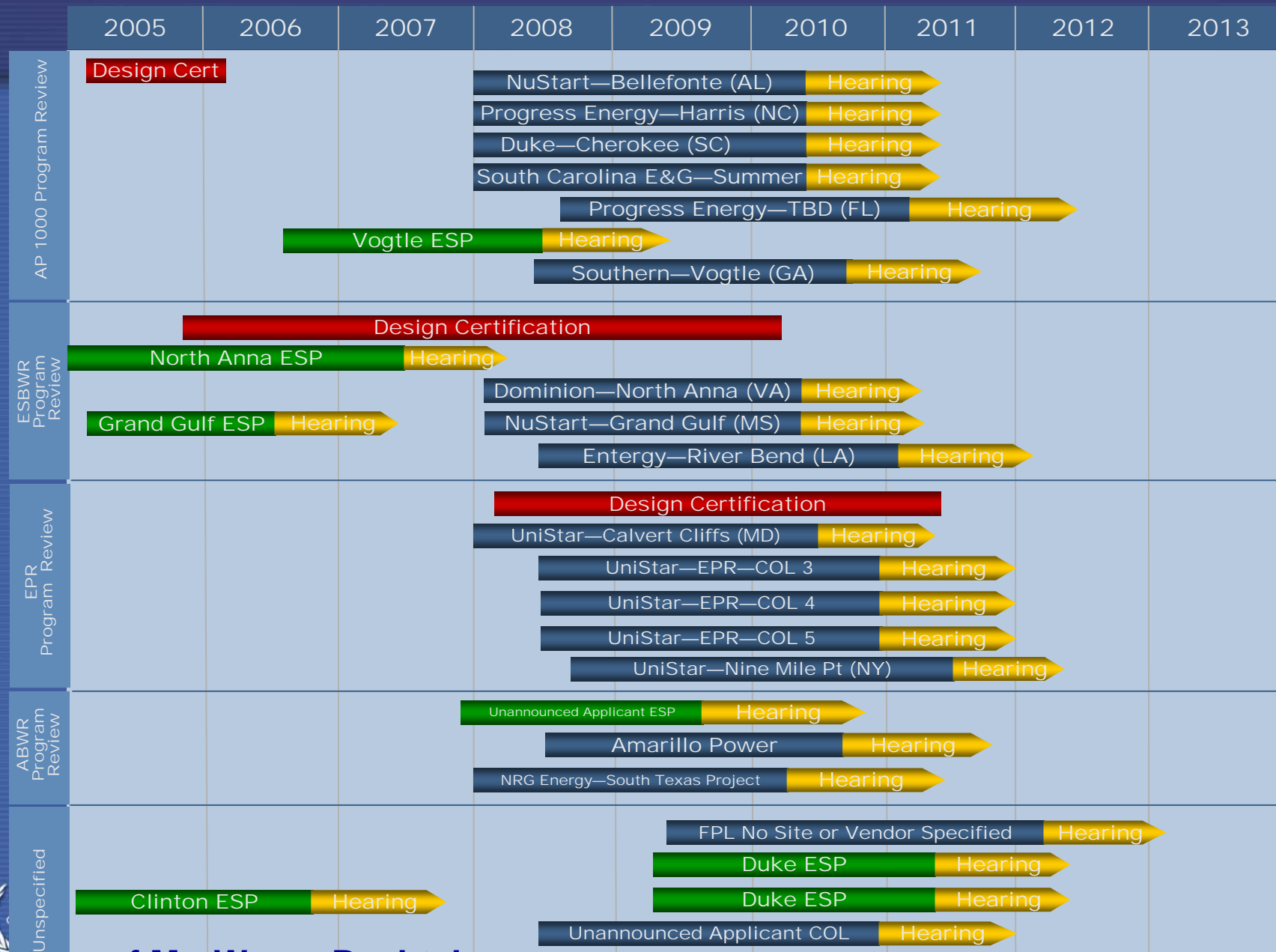


Ambitious near-term expansion plans

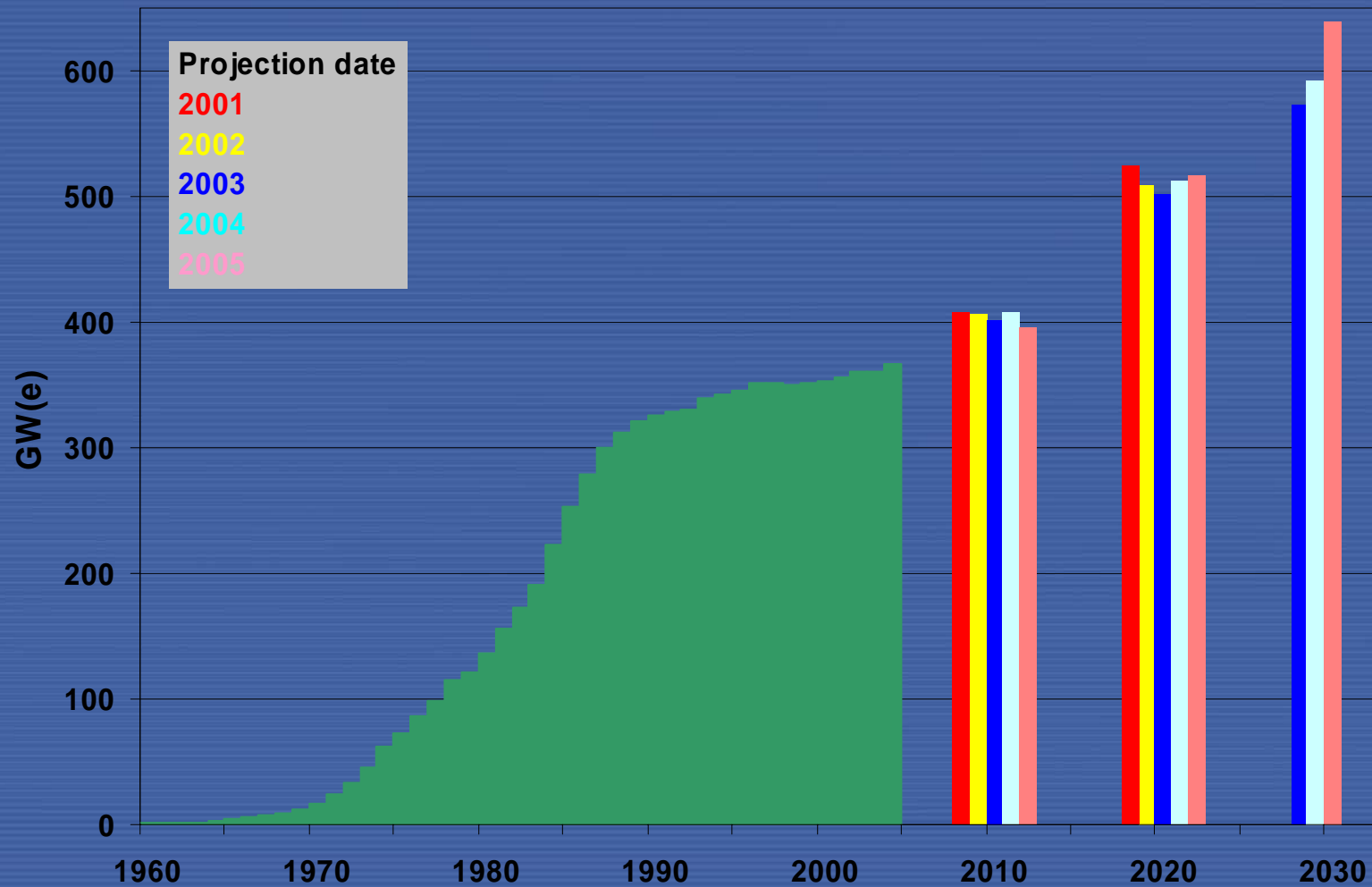
Declared near-term deployment plans (different in various sources)

	<u>CURRENT (% of total production)</u>	<u>NEAR-TERM EXPANSION PLAN</u>	
(Asia)			
China	7.6 GWe (2.0%)	40 GWe (4%) by 2020 ...2x 1000 MWe plant/year	x 5
India	3.5 GWe (2.8%)	29.5 GWe (10%) by 2022	x 8
ROK	16.8 GWe (44.7%)	26.6 GWe by 2015	x 1.6
Pakistan	0.4 GWe (2.8%)	8.5 GWe by 2030	x 20
(Eastern Europe)			
Russia	21.7 GWe (15.8%)	40 GWe (25%) by 2020	x 2
Ukraine:	13.1 GWe (48.5%)	20-22 GWe by 2030	x 1.5

US New Reactor Licensing Applications



IAEA's high projections

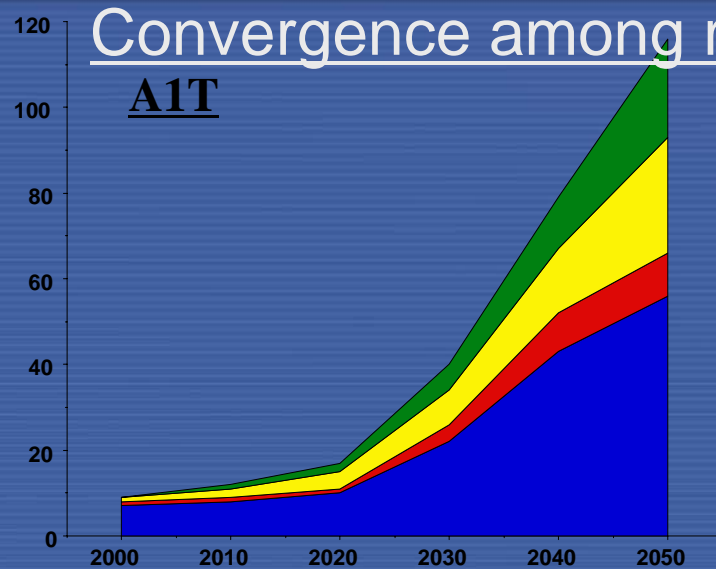


Nuclear Power in IPCC-SRES 4 storylines by 2050

(Special Report on Emission Scenarios)

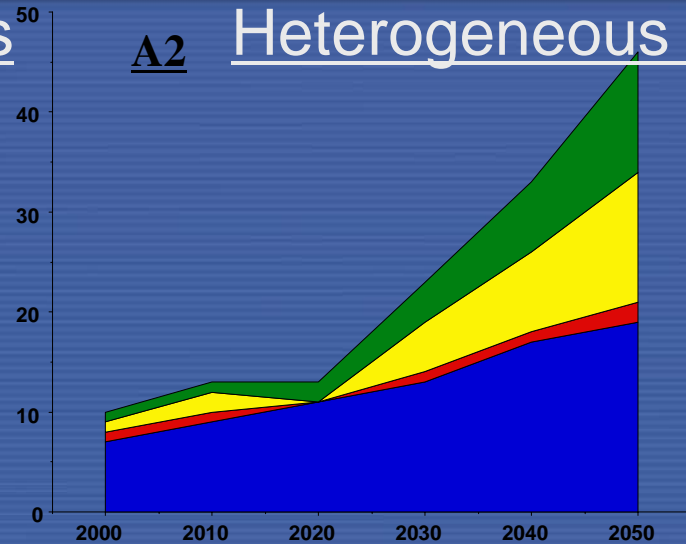
Convergence among regions

A1T



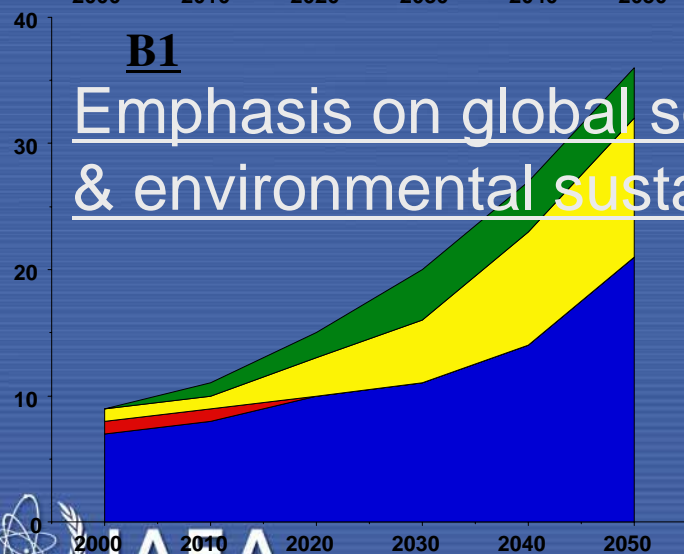
A2

Heterogeneous world



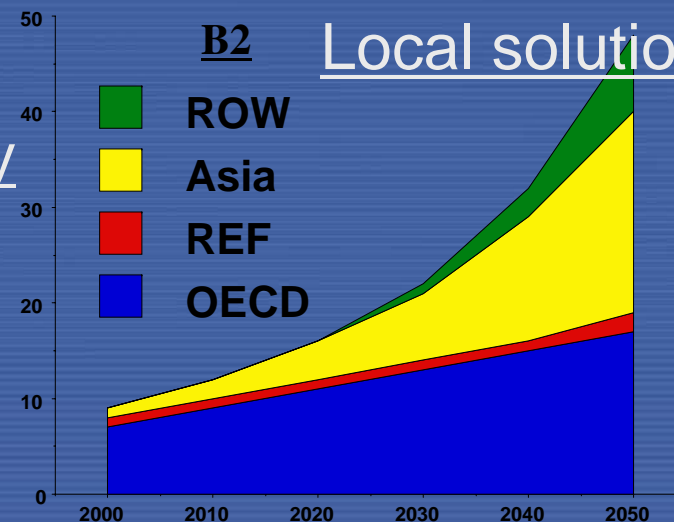
B1

Emphasis on global social & environmental sustainability



B2

Local solution



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Three pillars of IAEA's activity

- 1) Science & Technology
- 2) Safety & Security
- 3) Verification

← TC
(Technical
Corporation)

NE (Nuclear Energy)
NA (Nuclear Application)

IAEA's role

- 1) To ensure **protection**: that, wherever nuclear energy is used to produce energy , it is used:
 - Safely, Securely, and
 - With minimal proliferation risk.
- 2) To ensure continued **technological innovation** – for greater efficiency in energy production, for improved economic viability, and to support the first objective through enhanced designs.
- 3) To ensure that the needs of **developing countries** are taken into account:

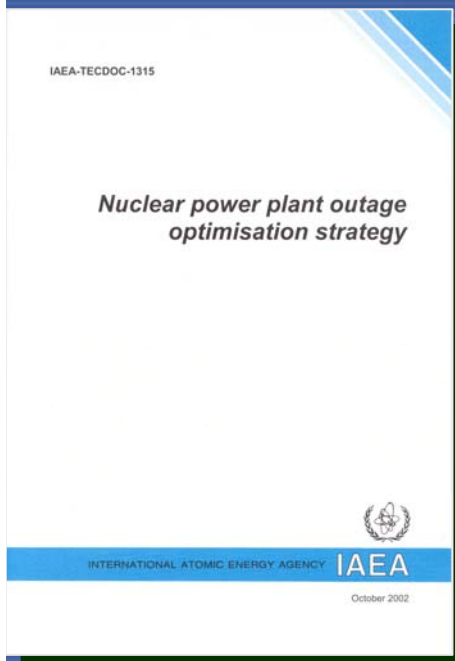
Activities by the Department of Nuclear Energy

Mission

- 1) Support to existing Nuclear Power for excellence & to new country for infrastructure development
- 2) Catalysing innovation for sustainable development
- 3) Build national capability (KM, capacity building etc)

Activities

- Develop methodology
- Information sharing (Documents, Database, tools) (workshop, conference)
- Coordinated research
- Technology transfer
- Review services



INTERNATIONAL ATOMIC ENERGY AGENCY
and
FORATOM Business Excellence Working Group
6th Joint Workshop



Managing an Aging Workforce
and Transfer of Knowledge
in Nuclear Installations and Regulatory Bodies

Менеджмент в условиях старения кадрового
состава и передача знаний на ядерных
установках и в регулирующих органах

October 5-7, 2004 Vienna, Austria

FORATOM IAEA

electric Application 16April2007

Support to infrastructure building

- ❑ Infrastructure is a key to successful introduction/expansion legal and regulatory framework, human and financial resources, industrial background etc
- ❑ Guidance for the introduction of nuclear power and for development of infrastructure
 - Numerous guidance documents
 - Filling in gaps & updating guidelines
- ❑ Institutional issues (Assurance of supply, Financing, Licensing)

Guideline documents in assisting the first NPP Plan

Published in the last 20+ years

- Handbook on Nuclear Law, IAEA (2003)
- Introduction of Nuclear Power: A Guidebook, TRS No. 217 (1982)
- Interaction of Grid Characteristics with Design and Performance of Nuclear Power Plants: A Guidebook, Technical Reports Series No. 224 (1983)
- Promotion and Financing of Nuclear Power Programmes in Developing Countries, (1987)
- Developing Industrial Infrastructures to Support a Programme of Nuclear Power: Guidebook, TRS No. 281 (1988)
- Policy Planning for Nuclear Power: An Overview of the Main Issues and Requirements (1993)
- Choosing the Nuclear Power Option: Factors to be considered (1996)
- Economic Evaluation of Bids for NPPs, TRS No. 396, 1999
- Nuclear Power Programme Planning: An Integrated Approach TRS No. 1259 (2001)



Agency's ongoing/planned activities

□ Guidance documents

- ✓ Released “Basic infrastructure for a nuclear power projects” (TECDOC 1513, June 2006)
- ✓ Preparing publication of new documents
 - Potential for sharing nuclear power infrastructure between countries (TECDOC 1522)
 - Planning for the first NPP (yet-to-be-published)
 - Milestone document (yet-to-be-drafted)
- ✓ Assessment of all previously developed Agency documentation & update : ongoing

Milestones in the matrix form

Milestones

Milestone 1: Understanding the commitment

Milestone 2: Ready to request bid for the first NPP

Milestone 3: Ready to commission and operate the first NPP

Expected preparedness and competency in key areas of

National Position

Electrical Grid

Stakeholder Involvement

Management

Legal Framework

Regulatory Framework

Financing

Human Resource Development

Safeguards

Security and Physical Protection

Emergency Planning

Radiation Protection

Nuclear Safety

Nuclear Fuel Cycle

Nuclear Waste

Environmental Protection

Sites & Supporting Facilities

Industrial Involvement

Procurement

Relevant ongoing/planned activities

□ Technical Cooperation Project for new build in response to specific request from Member States

- ✓ Current : 6 TCP including coupling with desalination
- ✓ 2007-8 : 12 countries plus regional projects
- ✓ IAEA team visits (NP, Energy Planning, Legal, Safety, TC) to establish coordinated work plan

□ Workshops and Conferences

- ✓ “Issues for the Introduction of Nuclear Power” (Dec2006)
- ✓ Relevant workshops being planned, including;
 - Design evaluation: October 2007
 - Milestone document: November 2007
 - Financing: 2007-8
- ✓ 2nd Ministerial Conference on Nuclear Power in the 21st Century: 2009 in China



Energy Indicator for Sustainable Development (EISD)

□ Many attributes of nuclear energy have potential to contribute to improve indicators of sustainable development

* **“development that meets the needs of the present without** compromising the ability of future generations to meet their own needs “, Brundtland, Our Common Future, 1987

□ Potential to improve EISD of a nation by having NE in the energy portfolio

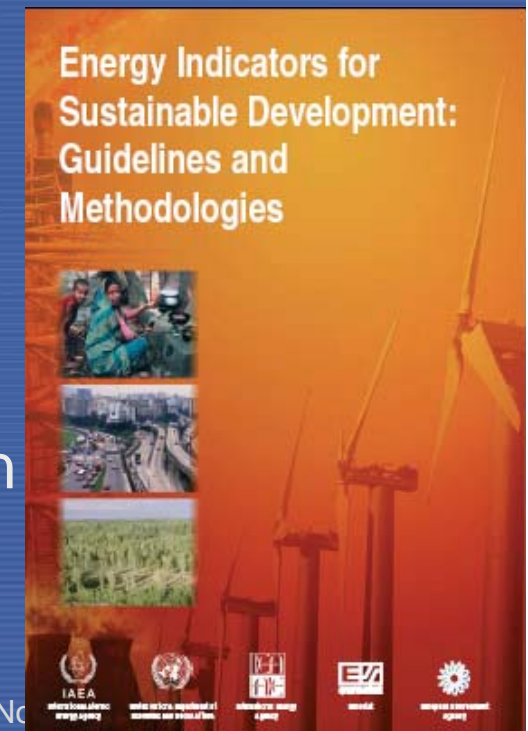
29 EISD indicators :

Society (4), Economy (15), Environment (10)

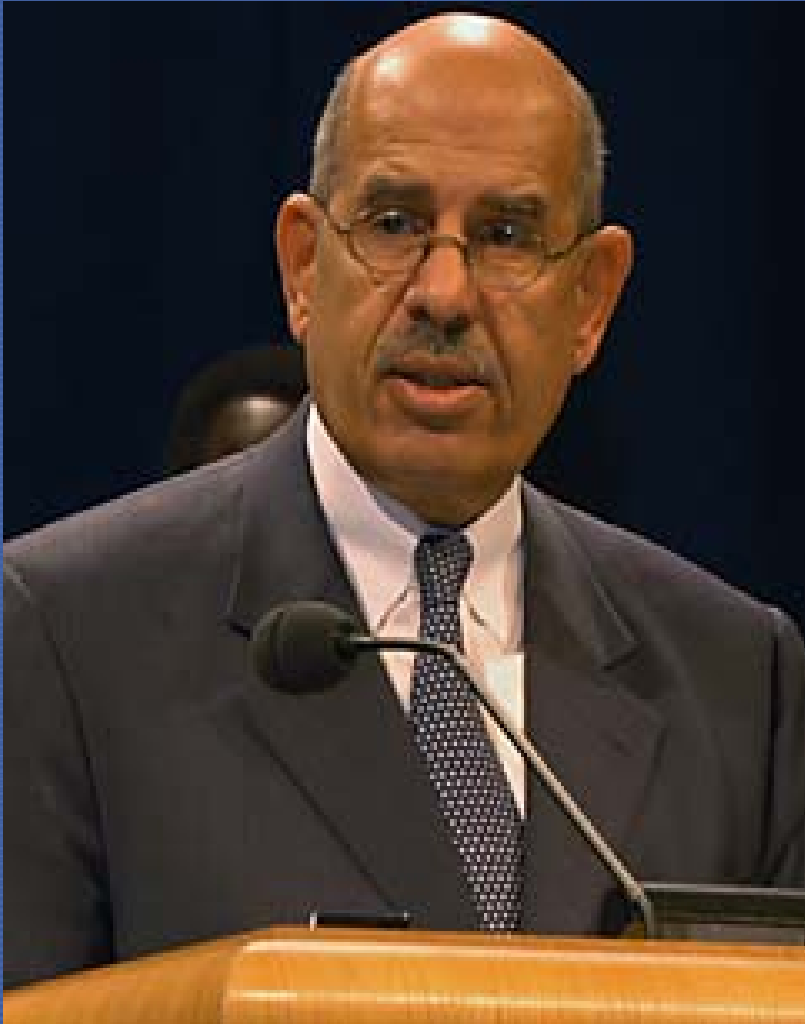
✓ Usable to

- Analyze past trends and current situation
- Measure distance to target

• Formulate strategy



Jointly consider innovation innovation - technology holder and users -



➤ *“Technological and institutional innovation is a key factor in ensuring the long-term sustainability of nuclear power”*

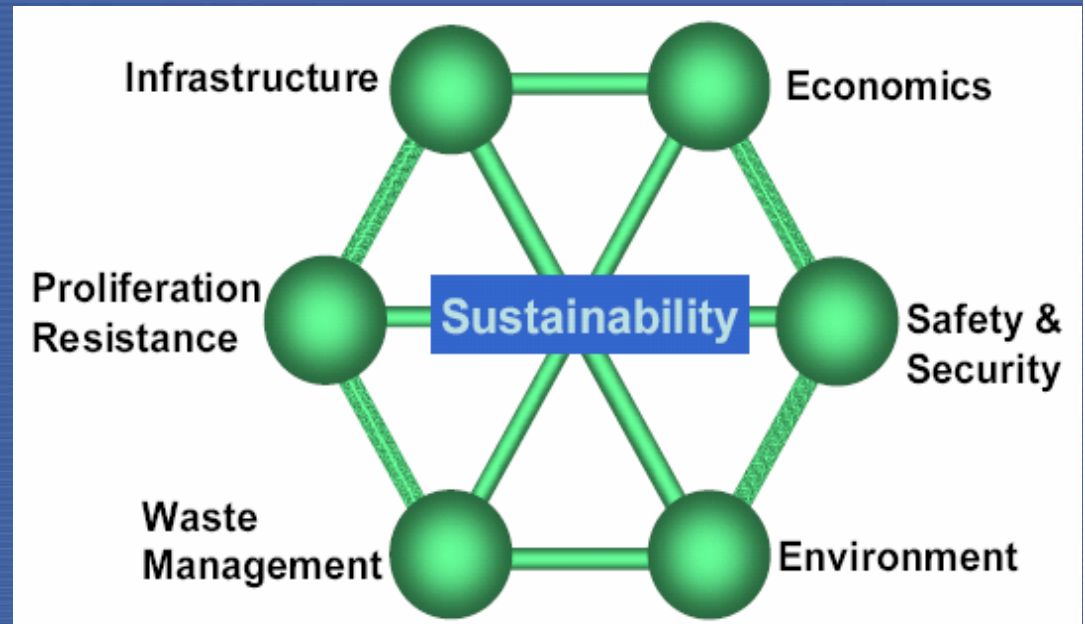
- DG statement at 50th GC, 2006

INPRO (International project on Innovative Nuclear Reactors and Fuel Cycles) activities

1. Methodology improvement

Methodologies/Indicators

- assessment of different systems and scenarios
- screening of reactor and fuel cycle system



2. Institutional/Infrastructure

3. Collaborative Project



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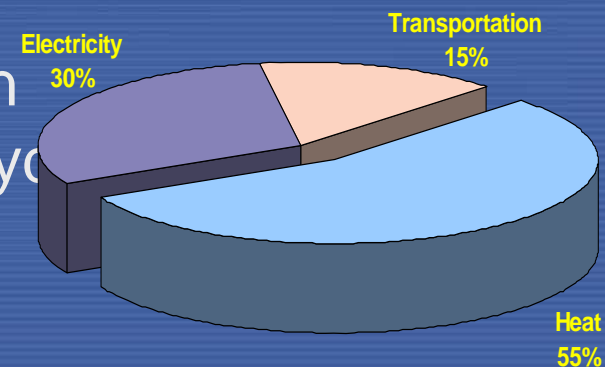
Non-electric applications

- ❑ Linkage between climate change and human activities : increasingly considered as more probable
- ❑ Use of nuclear energy: limited almost entirely to electricity production
- ❑ Production of oil may taper out in 20 years
- ❑ Global demand for portable water increases

Nuclear energy can help chemical energy production

- Recovery of oil from tar sand
- Sweetening by adding hydrogen
- Coal liquefaction with nuclear hydrogen

NPP can provide electricity, hydrogen, process heat, desalinated water



Non-electric applications

IAEA's programme A (Nuclear Power)

Focus more on key developing issues:

- Plant Life Management
- Response to rising expectation
- Technology innovation

Programme changes (planned for 2008-9)

A3 : Support to infrastructure building in Member States

A6 : Non-electric applications

(SOAR on technology, economic evaluation, issues of coupling with nuclear systems, CRP)

Dual use: also in other sub-programmes (ex. SMR)



SUMMARY

- ❑ **Globally growing interest to the role of nuclear power**
- ❑ **Growing interest from countries without NPP**
- ❑ **Support to developing country's infrastructure building, under inter-departmental coordination,**
- ❑ **Agency's programme for non-electric applications :**
 - ✓ **Driven by global trends and needs**



...Thank you for your attention