

# Background & Report of the Expert Group on Multilateral Approaches to the Nuclear Fuel Cycle

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*International Conference:*

*Multilateral, Technical and Organizational Approaches for the Nuclear Fuel  
Cycle Aimed at Strengthening the Non-Proliferation Regime*

*Moscow: 13 - 15 July 2005*



**IAEA**

International Atomic Energy Agency

## Past Efforts

Initiatives on multilateral approaches to the nuclear fuel cycle are not new:

- **Baruch Plan:** proposed an International Atomic Development Authority – 1946
- **Atoms for Peace:** speech to UNGA by US President Eisenhower – 1953 – proposed an IAEA
- **IAEA Statute (1956):** Article III.B.2 and Article XII.A.5 provide for Agency control over excess special fissionable materials
- **IAEA study project on regional nuclear fuel cycle centres (RNFC) – 1975 to 1977**
- **Committee on International Plutonium Storage (IPS) – 1978 – 1982**
- **International Fuel Cycle Evaluation Programme (INFCE) – 1977 to 1980**
- **United Nations Conference for the Promotion of International Co-operation in the Peaceful Uses of Nuclear Energy (UNCPICPUNE) - 1987**
- **Committee on Assurances of Supply (CAS) – 1980 to 1987**
- **International Symposium on Nuclear Fuel and Reactor Strategies: Adjusting to New Realities (1997)**
- **Technical, Economic and Institutional Aspects of Regional Spent Fuel Storage Facilities (RSFSF) – 2003 IAEA TecDoc**

# Problems identified by IAEA Director General Mohamed ElBaradei

## I. “NPT seems less than optimal”

- It has in some respects legitimized the arsenals of the 5 NWS
- It prohibited other signatories from developing such weapons, but had no strategy for persuading countries that refused to sign
- Many countries that have signed the NPT have never brought into force the required comprehensive safeguards agreement with the IAEA
- Fewer than 20% have implemented an additional protocol (58)
- NPT signatories have been able to operate legitimately very close to a nuclear-weapon capability by developing enrichment and reprocessing technologies

# Problems identified by IAEA Director General Mohamed ElBaradei

## II. Verification has grown increasingly difficult

- **The technical barriers to designing weapons and to mastering the processing steps have eroded with time**
- **Much of the hardware in question is “dual-use”**
- **Diversity of technology has made it harder to control both procurement and sales**
- **Intentions cannot be verified**

# Recent steps proposed by IAEA Director General

- **Stronger, more effective programmes and actions to secure nuclear materials and technology**
- **Universal acceptance and application of IAEA additional protocol, oversight and inspection of nuclear facilities**
- **Multilateral approaches to new uranium enrichment, reprocessing, and spent fuel**
- **Assurance that participating nations have reliable access to nuclear fuel at a reasonable cost**
- **Proliferation resistant nuclear fuel cycle**
- **End the existing “gentleman’s agreement” on export controls: tighten, formalize and universalize export control system**
- **“Pause” on construction of new enrichment & reprocessing facilities – 5 years, following which all such facilities under multilateral arrangement(s)**

# The Limitations of Denial

- **Denial of technology has always been a stop-gap solution**
- **NPT bargain has grown one-sided – all sticks and no carrots**
- **Post-1974, NNWS have taking on increasingly heavy burdens, without corresponding obligations on the part of NWS**
- **New Reality: NNWS unwilling to accept still more obligations without tangible benefits**
- **Multilateral options with regard to nuclear fuel cycle hold promise of reintroducing the balance upon which the regime was founded**

# Technology Transfer

- The opposite of denial is not necessarily unfettered access to sensitive elements of the nuclear fuel cycle
- Access to **benefits** of nuclear technology vs. access to proliferation-risk nuclear technology (NPT Article IV)
- All participants require legal/economic stake in success of project
- Multilateral fuel cycle is not “all-or-nothing”

# Why revisit this option?

## Back to the Future

- **End of the Cold War has resulted in rise of regional political security agendas**
- **Rise of an illicit market in nuclear technologies / items**
- **Possibility of “break out” from the NPT by non-nuclear-weapon States (NNWS) with advanced nuclear fuel cycle technology and/or stocks of enriched uranium or separated plutonium – intentions cannot be verified**
- **Increased threat of nuclear and/or radiological terrorism**

# Strengthening the Nuclear Non-Proliferation Regime

*"the wide dissemination of the most proliferation-sensitive parts of the nuclear fuel cycle...could be the 'Achilles' heel' of the nuclear non-proliferation regime. It is important to tighten control over these operations, which could be done by bringing them under some form of multilateral control, in a limited number of regional centers.... I am aware that this is a complex issue, and that a variety of views exist on the feasibility or possible modalities of such a multilateral approach. However, I believe that we owe it to ourselves to examine all possible options available to us."*

*-Introductory Statement to the  
IAEA Board of Governors by the  
Director General, March 2004*

# The Mandate of the Group

## Terms of Reference:

- Identify and provide an **analysis of issues and options** relevant to multilateral approaches to the front-end and back-end of the nuclear fuel cycle;
- Provide an **overview of the policy, legal, security, economic and technological incentives and disincentives** for cooperation in multilateral arrangements for the front and back ends of the nuclear fuel cycle; and
- Provide a **brief review of the historical and current experiences** and analyses relating to multilateral fuel cycle arrangements relevant to the work of the Expert Group.

# Structure of the MNA Report: INFCIRC/640

*In fulfilling its mandate, the MNA Group Report provided an overview of:*

- **The current political context** – contemporary and future issues in nuclear non-proliferation
- **The historical perspective** – past initiatives and previous studies on multilateral options
- **Cross-cutting factors** – policy, legal, security, economic and technological factors relevant to MNAs
- **Overarching issues** – affecting the desirability/feasibility of MNAs

# Structure of the Report: INFCIRC/640

*In identifying and providing an analysis of issues and options, the MNA Group focused on activities and facilities involving significant proliferation risks:*

- *Uranium enrichment*
- *Spent fuel reprocessing*
- *Spent fuel repositories (final disposal)*
- *Spent fuel storage (intermediate)*

# Method of Analysis

*The MNA Group adopted a template to analyse each of the technologies - uranium enrichment, fuel reprocessing, spent fuel disposal, and storage:*

*Type I: Assurances of services not involving ownership of facilities:*

- a) Suppliers provide additional assurances of supply.*
- b) International consortium of governments.*
- c) IAEA-related arrangements.*

*Type II: Conversion of existing national facilities to multinational.*

*Type III: Construction of new joint facilities.*

*MNA options span the whole spectrum between existing market mechanisms (of private ownership) and intergovernmental-ownership.*

# Assessment of the Options

Two primary factors dominate all assessments of multilateral nuclear approaches:

- **Assurance of non-proliferation** – measured by the various proliferation risks associated with a nuclear facility, whether national or multilateral.
- **Assurance of supply and services** – measured by the associated incentives (e.g supplier guarantees); the economic benefits that would be gained by participating countries; and better political and public acceptance for such projects.

# Assessment of the Options

As a means by which to take into account both the advantages and the drawbacks resulting from each possible MNA option explored, the Group decided to undertake its assessment by reviewing and listing the pros and cons associated with each option.

# Recommendations

- that **steps be taken to strengthen overall controls of the nuclear fuel cycle and the transfer of technology**, including safeguards and export controls: the former by promoting universal adherence to Additional Protocols, the latter through a more stringent implementation of guidelines and a universal participation in their development
- that **attention be given** - by the IAEA Member States, by the IAEA itself, by the nuclear industry and by other nuclear organisations - **to multilateral nuclear approaches in general** and to **five suggested approaches**

# Five Suggested Approaches - 1

1. Reinforcing **existing commercial market mechanisms** on a case-by-case basis through long-term contracts and transparent suppliers' arrangements with government backing.  
**Examples would be:** fuel leasing and fuel take-back offers, commercial offers to store and dispose of spent fuel, as well as commercial fuel banks.

# Five Suggested Approaches - 2

2. Developing and implementing **international supply guarantees** with IAEA participation. Different models should be investigated, notably with the **IAEA as guarantor** of service supplies, e.g. as administrator of a fuel bank.

# Five Suggested Approaches - 3

3. Promoting voluntary **conversion of existing facilities to MNAs**, and pursuing them as **confidence-building measures**, with the participation of NPT non-nuclear-weapon States and nuclear-weapon States, and non-NPT States.

# Five Suggested Approaches - 4

4. Creating, through voluntary agreements and contracts, **multinational, and in particular regional, MNAs for new facilities** based on joint ownership, drawing rights or co-management for front-end and back-end nuclear facilities, such as uranium enrichment; fuel reprocessing; disposal and storage of spent fuel (and combinations thereof). Integrated nuclear power parks would also serve this objective.

# Five Suggested Approaches - 5

5. The scenario of a further expansion of nuclear energy around the world might call for the development of a **nuclear fuel cycle with stronger multilateral arrangements** – by region or by continent - **and for broader cooperation**, involving the IAEA and the international community.

# Transcending National Sovereignty to Strengthen Global Non-Proliferation

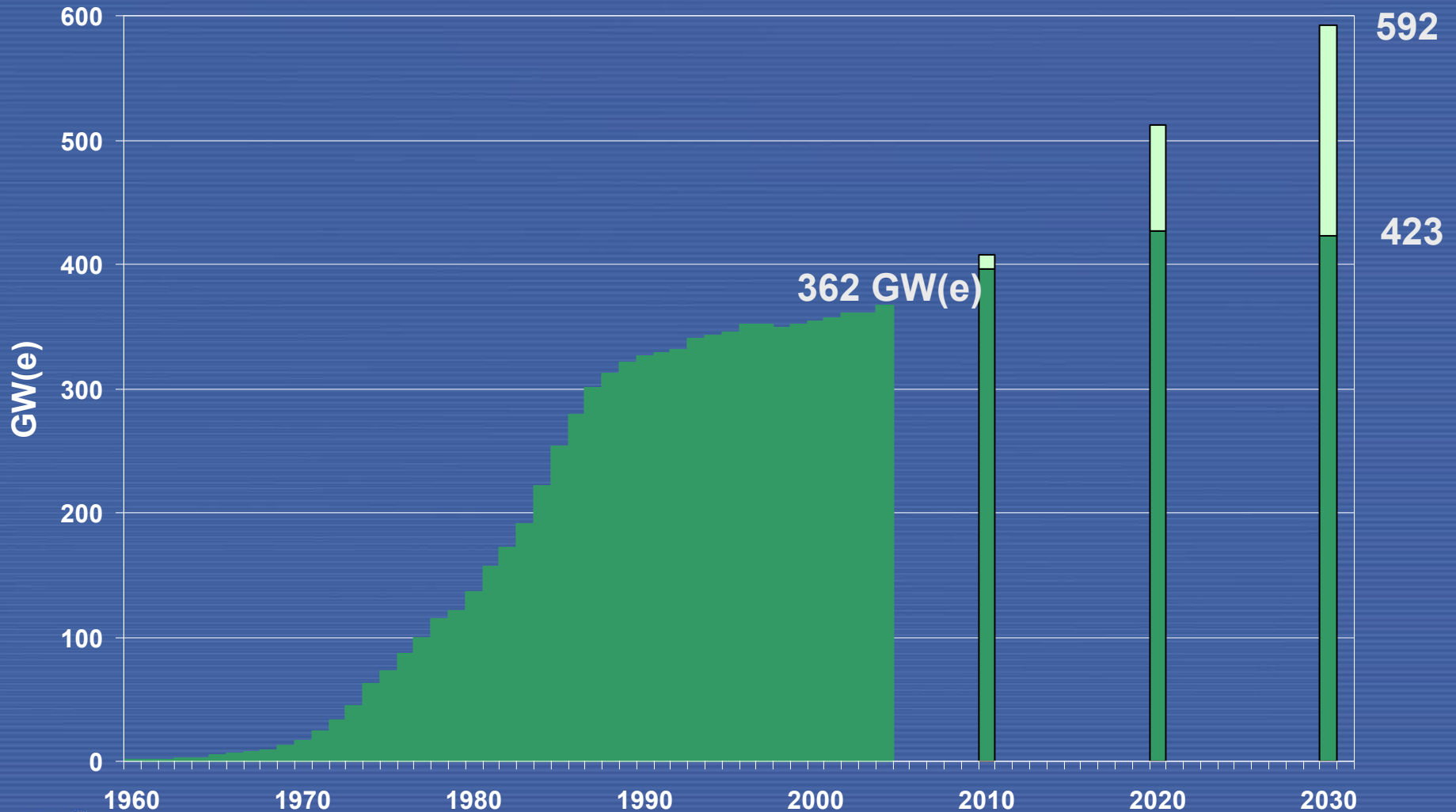
- ***“If the world does not change course, we risk self-destruction. Common sense and recent experience make clear that the regime based on the nuclear Non-Proliferation Treaty, which has served us well since 1970, must be tailored to fit 21st-century realities. Without threatening national sovereignty, we can toughen the non-proliferation regime.”***

– Director General ElBaradei

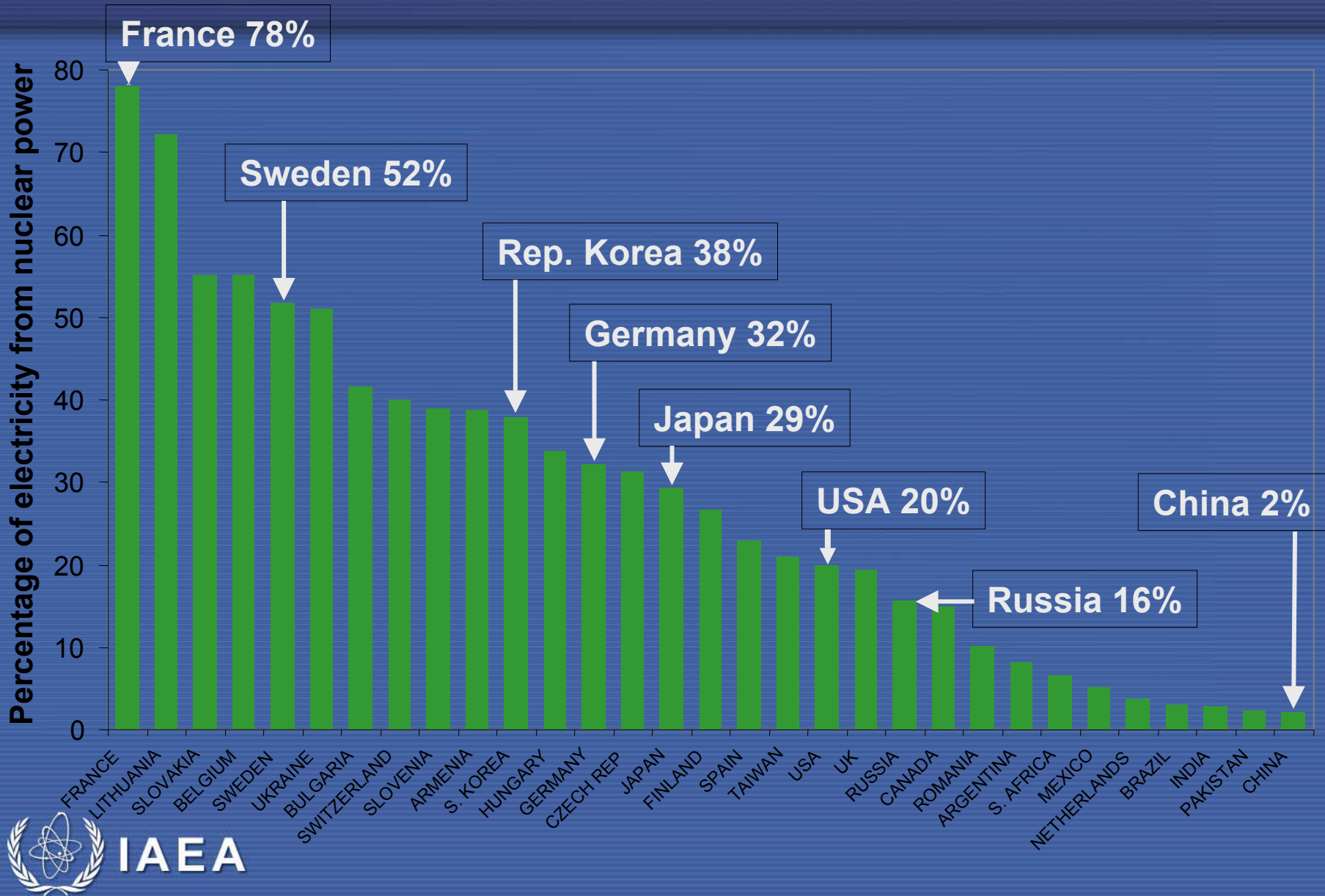
“Saving Ourselves From Self-Destruction”

*New York Times*, February 2004

# Medium-term Projections



# Nuclear share of electricity (2004)

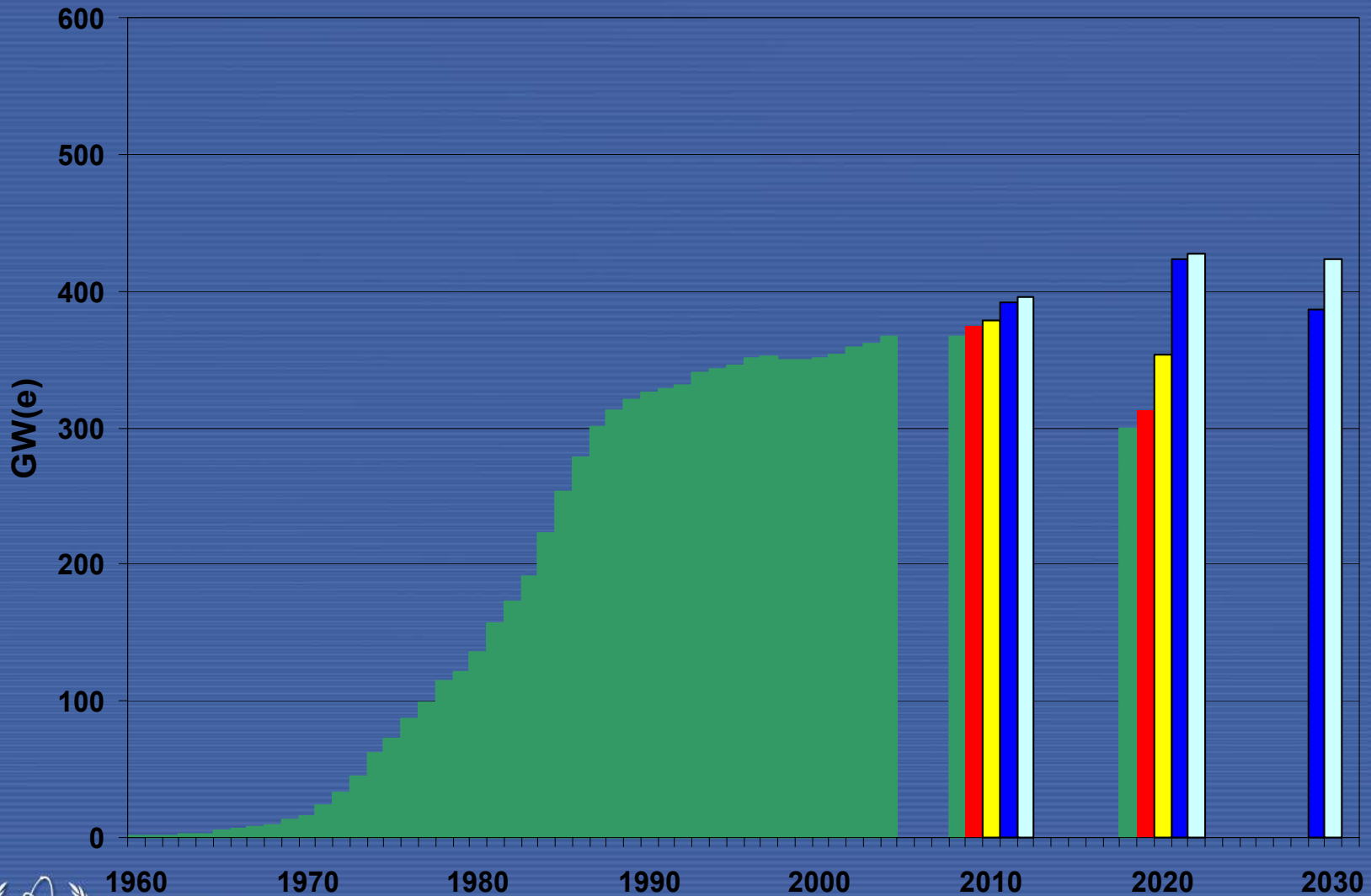


# Current status (as of 23 June 2005)

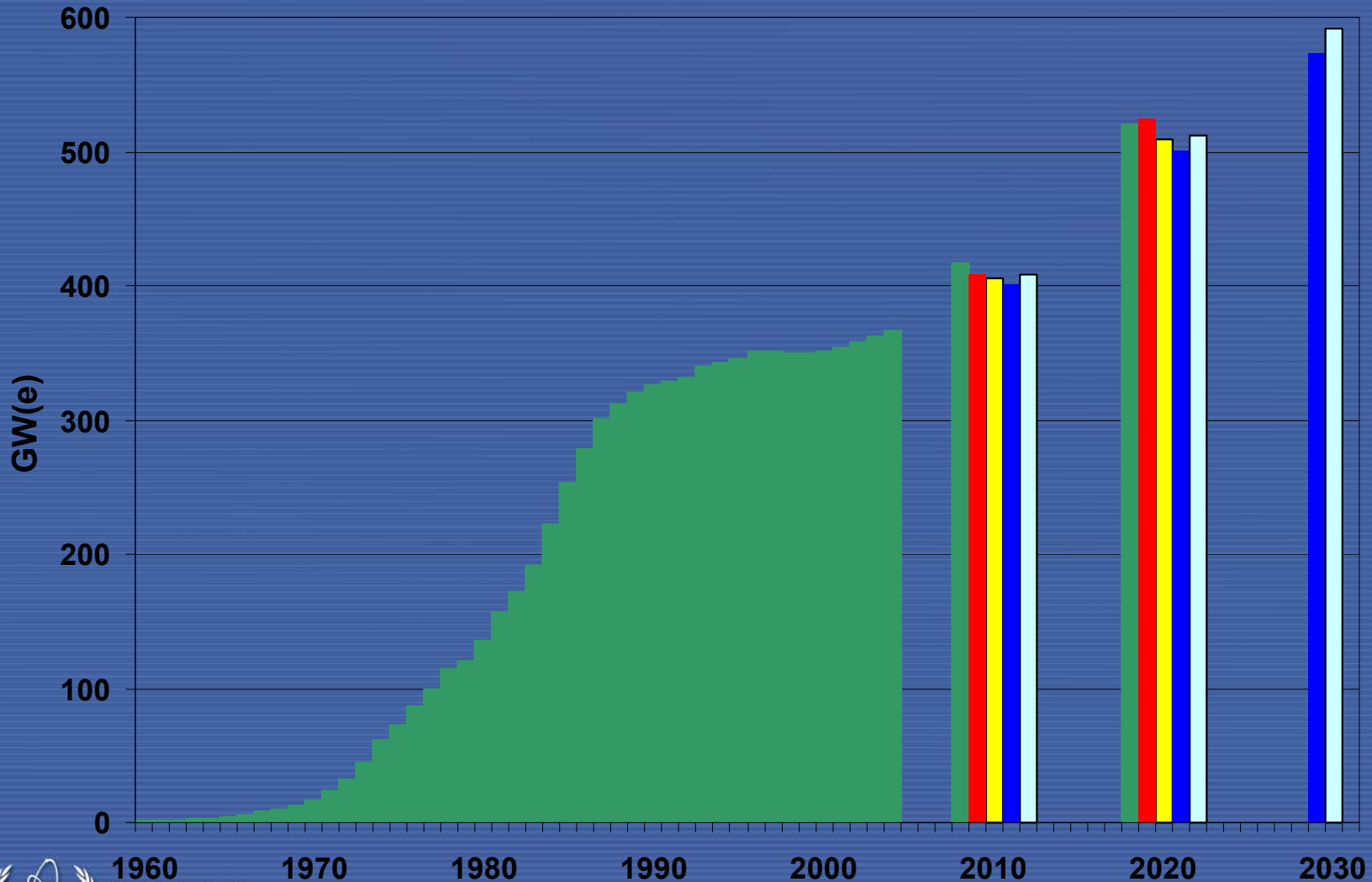
- 440 nuclear power plants
- 24 under construction
- expansion centered in Far East and South Asia



# Rising expectations – low projection



# Rising expectations – high projection



IAEA

# Transcending National Sovereignty to Strengthen Global Non-Proliferation

- ***"If the world does not change course, we risk self-destruction. Common sense and recent experience make clear that the nuclear Non-Proliferation Treaty, which has served us well since 1970, must be tailored to fit 21st-century realities. Without threatening national sovereignty, we can toughen the non-proliferation regime."***

– Director General ElBaradei

“Saving Ourselves From Self-Destruction”

*New York Times*, February 2004

# 2005 NPT Review Conference

***"We need better control over proliferation sensitive parts of the nuclear fuel cycle: activities that involve uranium enrichment and plutonium separation.***

***As experience has shown, effective control of nuclear materials is the "choke point" to preventing nuclear weapons development. Without question, improving control over facilities capable of producing weapon-usable material will go a long way towards establishing a better margin of security...***

– Director General ElBaradei

“Statement to the 2005 NPT Review Conference”  
New York, 2 May 2005



# 2005 NPT Review Conference

***"I cannot tell you what the optimum fuel cycle control mechanism should look like, but I am convinced it should be different from what we have today. And above all, it must be equitable and effective.***

***... the recent High-Level Panel on Threats, Challenges and Change urged negotiations without delay on an arrangement, under the IAEA Statute, for the Agency to serve as a guarantor of two fuel cycle related services: the supply of fissile material for fuel, and the reprocessing of spent fuel. The assurance of supply - the guaranteed provision of reactor technology and nuclear fuel to users that satisfy agreed non-proliferation requirements - is clearly a prerequisite for any additional controls on the fuel cycle to be accepted."***

–Director General ElBaradei

“Statement to the 2005 NPT Review Conference”

New York, 2 May 2005



# 2005 NPT Review Conference

***Argentina, Austria, Australia, Belgium, Canada, France, Hungary, Indonesia, Iran, Italy, Luxembourg (for EU), Malaysia, Mexico, New Zealand, Norway, Korea (RoK), Russian Federation, Singapore, Slovenia, South Africa, Spain, Switzerland, Turkey, UK, USA***

***– some 45 States made supportive comments on MNAs in one form or another***

# Contact Information

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