



World View and Infrastructure building for countries embarking on a Nuclear Power Programme

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IAEA

International Atomic Energy Agency

Outline

Introduction – World View

IAEA support to new countries considering embarking on NP

Infrastructure building in new countries

Rising expectation

- ✓ **More than 50 Member States have expressed an interest in considering / planning their first Nuclear Power Plant**
 - ✓ **12 Member States : are in a relatively advanced stage of planning**
 - ✓ **2008 IAEA Projection (RDS-1) by 2030**
 - 748 (691 in 2007) GWe in operation in Hi-projection from 372 GWe**
 - 473 (447 in 2007) GWe in operation in Lo-projection**
 - ✓ **Nuclear Power is an option in meeting future needs due to:**
 - **Fossil fuel price increases**
 - **Energy supply security issues for Member States**
 - **Environmental concerns**
 - **Confidence of stable, competitive and reliable operation in many places around the world**
- Expected role for NE to play**

Challenges of expansion

(IAEA status and prospect report on nuclear power)

1. **Safety and reliability**
2. **Economic competitiveness and financing**
3. **Public acceptance**
4. **Uranium resources**
5. **Fuel and waste management**
6. **Human and industrial resources**
7. **Proliferation risk and security**
8. **Infrastructures, especially in new countries**

Outline

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**IAEA support to new countries considering embarking
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IAEA's assistance countries considering embarking on NP

IAEA is providing;

- Guidance documents, review missions, workshops for support towards capacity building
- Workshops
 - Introduction of nuclear power(2006Dec), Milestone(2007Nov), Financing(2007Nov), Technology assessment(2007Oct, 2008 Nov) Assessment of Infrastructure(2008Dec) Role and responsibility of Suppliers (2008July)
 - Many regional & national workshops
- Support through Technical Cooperation Projects
 - Current in NE: 10 National + 2 Regional
 - Next TC cycle in 2009-11 in NE: 39 National + 5 Regional

Inter-departmental coordination (**NPSG**) to assure coordinated response to its member states' needs



IAEA's assistance

- In providing assistance, IAEA emphasizes
 - **Energy Planning** before considering nuclear programme
 - **Sound infrastructure** for safe, reliable and efficient use of Nuclear Power
 - **Safety culture and Ownership/responsibility of the Owner/Operator**
 - **Self-assessment** of infrastructure status
 - **Regional approach** for efficiency
 - **Importance of the role by the Government**
 - Use of **IAEA guidance documents & services**

Topical area of IAEA's support

By mobilizing international experts:

- Review of Feasibility Study
- ***Review of draft Nuclear law***
- ***Regulatory framework and organization***
- ***Site survey, site evaluation***
- ***Human resources development plan***
- Bid tendering and evaluation
- Technology assessment
- Owner/Operator's competence building
- Regulator's competence building
- Infrastructure status review missions and assist visits

Guidance documents published in 2006-7

- ❑ “Basic Infrastructure for a Nuclear Power Project”, TECDOC-1513, June 2006
- ❑ “**Potential for Sharing** Nuclear Power Infrastructure between Countries”, TECDOC-1522 October 2006
- ❑ “Managing the First Nuclear Power Plant Project”, TECDOC-1555, May 2007
- ❑ “**Consideration** to launch a nuclear power programme” , Brochure, March 2007
- ❑ “**Milestones** in the Development of a National Infrastructure for Nuclear Power, NE series guide NG-G-3.1, September 2007

TECDOC 1522 “Sharing nuclear power infrastructure” (2006 October)

Potential exists for;

- Grid system
- Human resources development
by establishing regional training centre
by utilizing under-utilized RR
- Localization of industrial capacity
- Maintenance and In-service inspection
- Models for national legal framework
- Research and development
- FC, Waste management and disposal etc

*Regional/international cooperation
will be a key to successful expansion of NP*



Guidance documents being prepared

- [Infrastructure assessment guide](#) using Milestone Document
- Improving Prospects for [financing](#) NPP Projects
- [Workforce Planning](#) for new Nuclear Power programmes
- [NEPIO](#) (Nuclear Energy Policy Implementation Organization) and responsibilities and competences of the nuclear implementing organizations to initiate a nuclear program
- Update of [grid-interface](#) guidance, as a part of Siting Document [Alternative Approaches](#) for Contracting and Ownership

Outline

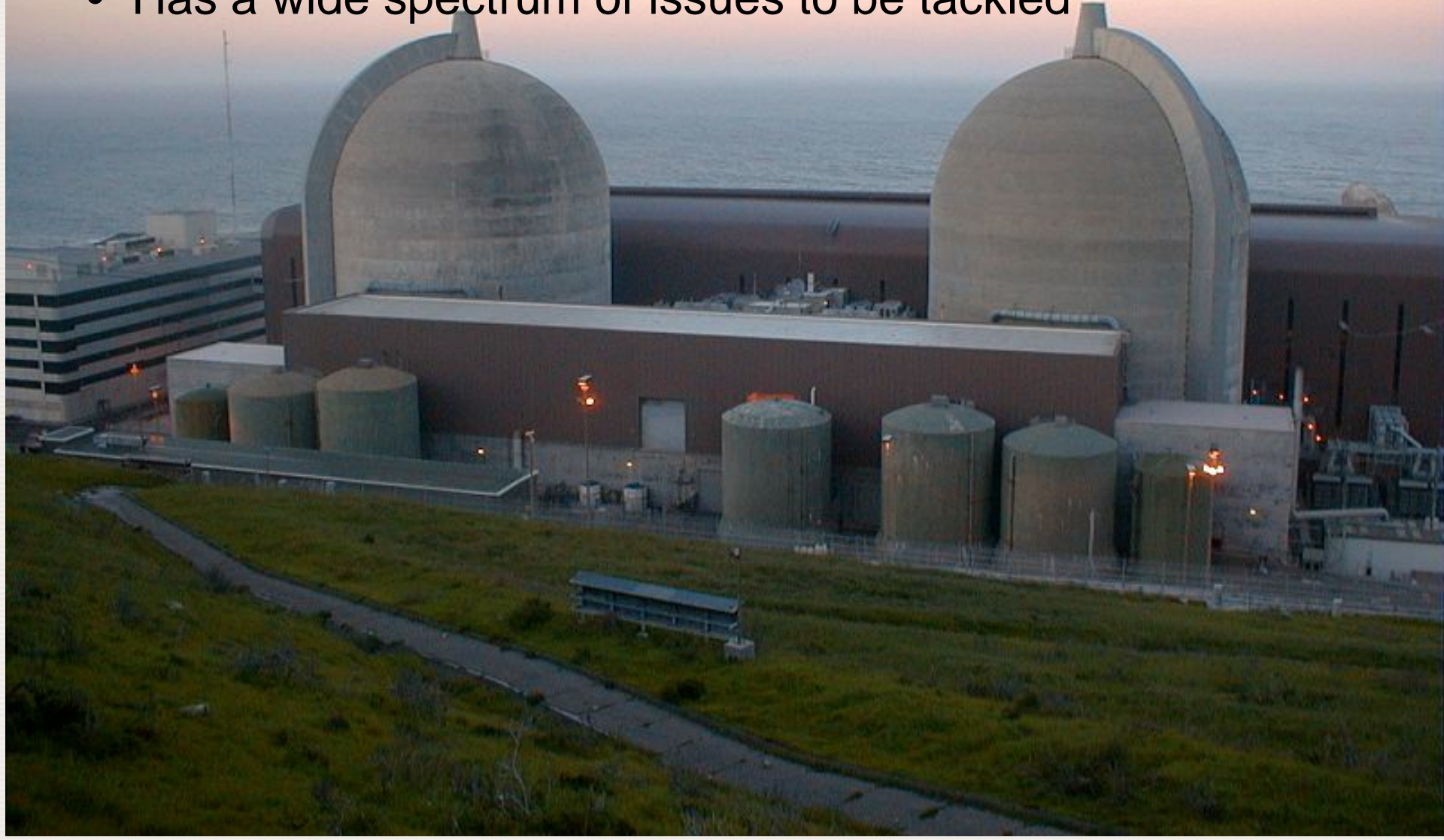
Introduction

**IAEA support to new countries considering embarking
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Infrastructure building in new countries

Sound nuclear infrastructure

- Is a key to successful construction/operation of NP
- Has a wide spectrum of issues to be tackled



Phased approach using Milestones

Initial declaration of interest in nuclear as an option
“ENERGY PLANNING”

Phase 1: 1-3 years

Development of knowledge and commitment/obligation, including strong assessment and self assessment approach

Milestone 1

Phase 2: 3-7 years

Start implementation of INFRASTRUCTURE BUILDING PLAN

Milestone 2

Phase 3: 4-6 years

CONSTRUCTION of the FIRST NPP

Milestone 3

Milestones in the development of infrastructure

IAEA Nuclear Energy Series

No. NG-G-3.1

Basic Principles

Objectives

Guides

Reports

Milestones in the Development of a National Infrastructure for Nuclear Power

National Position
 Regulatory Framework
 Financing
 Safeguards
 Emergency Planning
 Nuclear Waste
 Nuclear Safety
 Stakeholder Involvement
 Management
 Procurement



Clarifies:

- 19 major issues to consider in infrastructure building
- Conditions to achieve the milestone for each issues

Legal Framework
 Radiation Protection
 Human Resource Development
 Security and Physical Protection
 Nuclear Fuel Cycle
 Environmental Protection
 Sites & Supporting Facilities
 Electrical Grid
 Industrial Involvement



(Nuclear Energy Series NG-G-3.1)

Infrastructure review

- **Self-assessment** against milestone document
 - to identify what improvement opportunities exists and needed support from external organizations
- **Assessment guide is on the IAEA web site**
- **The IAEA 's involvement could provide:**
 - a) an objective view on the status of infrastructure
 - b) to clarify areas of further assistance from the Agency
 - c) **confidence building in the country and internationally**

Activities by the Department of Nuclear Safety and Security

IAEA Safety / Security Review Services

Regulatory Framework and Activities

- **IRRS** – Integrated Regulatory Review Service

Operational Safety

- **OSART** – Operational Safety Review Team
- **SEDO** – Safety Evaluation of FC Facilities During Operation
- **SCART** – Safety Culture Assessment Review Team

Research Reactors

- **INSARR** – Integrated Safety Assessment of Research Reactors

Engineering and Technical Safety

- **DESAR** – Design/Engineering/Safety Assessment Review Services

Security

- **INSServ** – International Nuclear Security Advisory Services
- **IPPAS** – International Physical Protection Advisory Services

Human Resources development

- ❑ Time consuming
- ❑ Need from phase I (20-30 staff in NEPIO)
- ❑ Technology specific support : by Supplier of reactor system
- ❑ IAEA assist in;
 - Providing guidance in education & training
 - Creation of HR development plan
 - Facilitate support to regional network (ANENT)
 - Training course, training material, and distance learning
<http://www-ns.iaea.org/training/ni/materials.asp#trainthetrainers>
<http://entrac.iaea.org/ELibrary.aspx>
 - Launching a programme to **use underutilized RR for training** of experts for newcomers (supported by RR coalitions and networks)

Networking for Nuclear Knowledge Management

ANENT (Asian Network for Education in Nuclear Technology)

- Since 2004
- Networking regional educational institutions
- Fostering cooperation: harmonize curricula, prepare teaching material, enable Distance Long
- 28 member institutions from 12 countries, and 5 collaborating organizations.



<http://www.anent-iaea.org>

Australia



China



India



Indonesia



Korea



Malaysia



Mongolia



Pakistan



The Philippines



Sri Lanka



Thailand



Vietnam



ARCCNM



ASNM



ENEN



WNU



MEPhI



Summary

1. Global rising expectation to the role of NP
2. More than 50 countries approached the IAEA for assistance
3. Key challenges in the expansion of nuclear power: identified
4. Infrastructure status review
5. HR development: one of the key challenges
6. Regional/international cooperation will be the key for successful expansion of NP

