



**IAEA**

*60 Years*

*Atoms for Peace and Development*

# The IAEA Approach to Establishing New Nuclear Power Programmes

**Sean Dunlop**

**Nuclear Infrastructure Development Section**

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ATOMS FOR PEACE

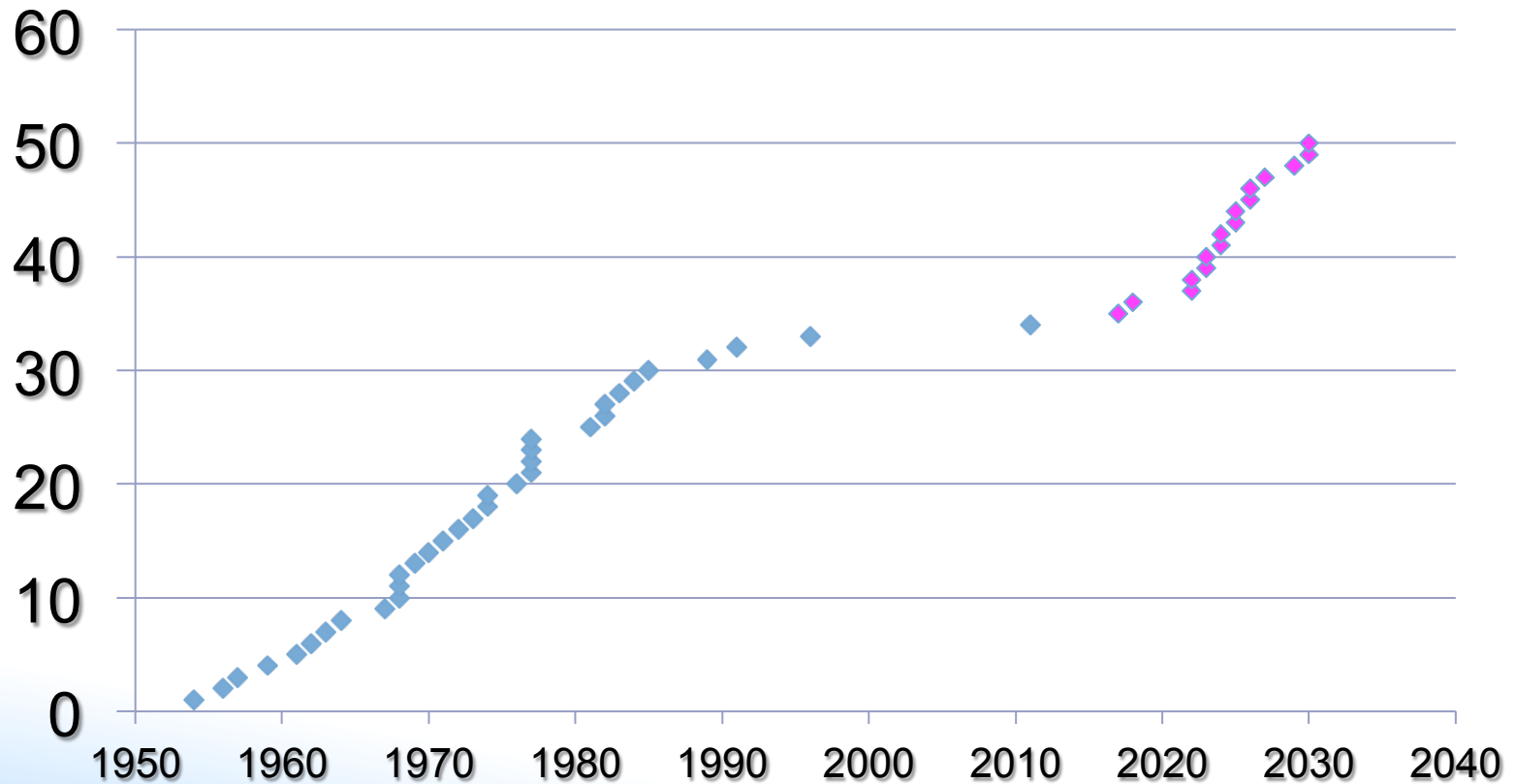


# Presentation Outline

- Status of Nuclear Power Development
- Why Nuclear Power?
- Introduction to the IAEA Milestones Approach
- Management Evaluation Methodology
- IAEA Assistance to Newcomers
- Conclusions

# Commissioning Projections

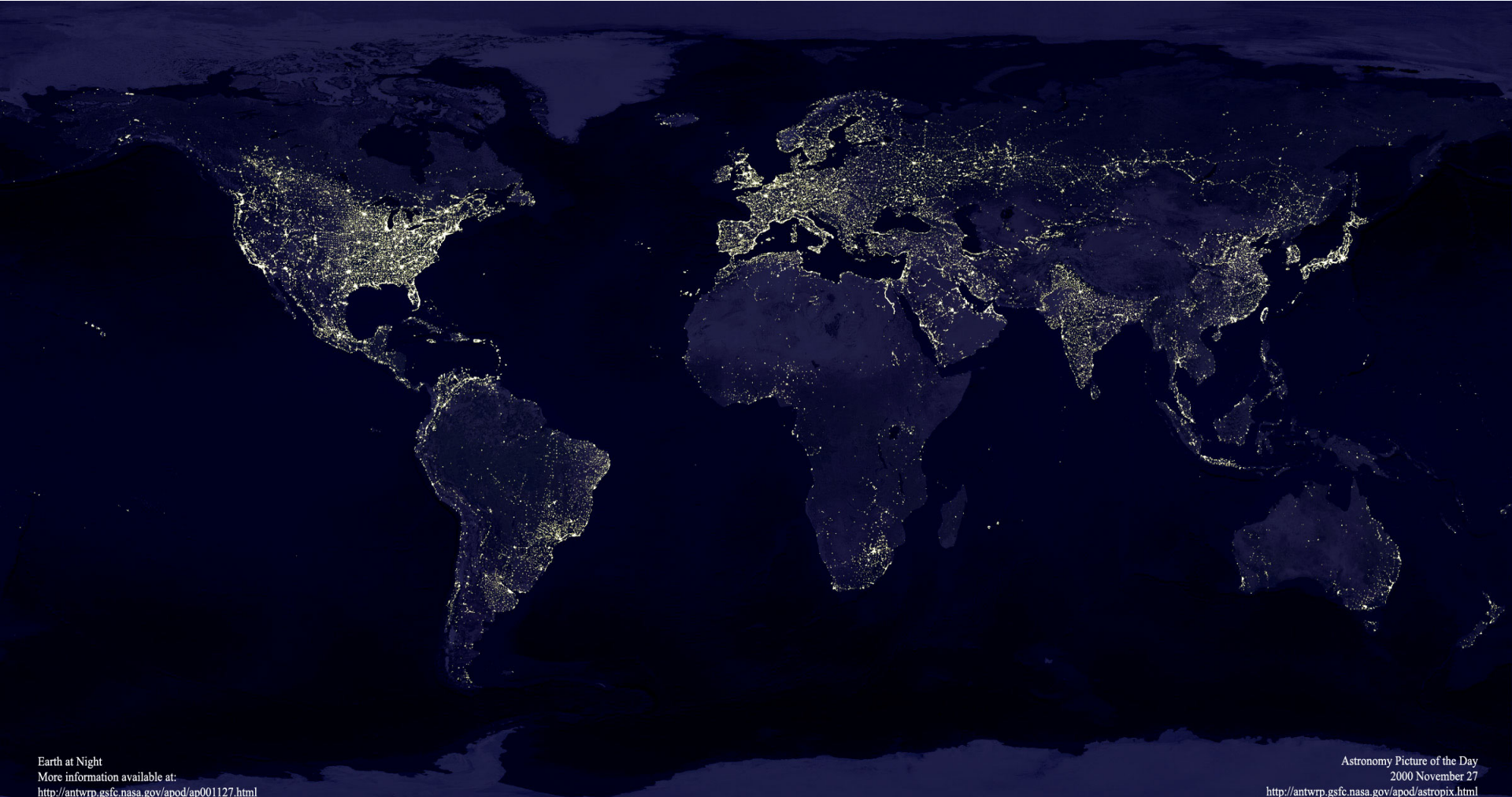
## Year of 1st NPP Commissioning by Country



# Embarking Country Overview

		2010	2011	2012	2013	2014	2015	2016
Phase 3	First nuclear power plant started construction/under construction	1	0	1	2	2	2	2
Phase 3	First nuclear power plant ordered	2	3	2	1	1	2	2
Phase 2	Decided to introduce nuclear power and started preparing the appropriate infrastructure	10	6	6	6	7	7	6
Phase 1	Active preparation for a possible nuclear power programme with no final decision	7	6	6	5	5	7	6
Phase 1	Considering nuclear power programme	14	14	13	19	17	10	11

# Why Nuclear Power?



# Why Nuclear Power?

- Improved energy security;
- Access to affordable, predictable energy services;
- Reliability of electricity supply; and
- Environmental protection, including climate change.

**Energy planning is a key component of developing a national position.**

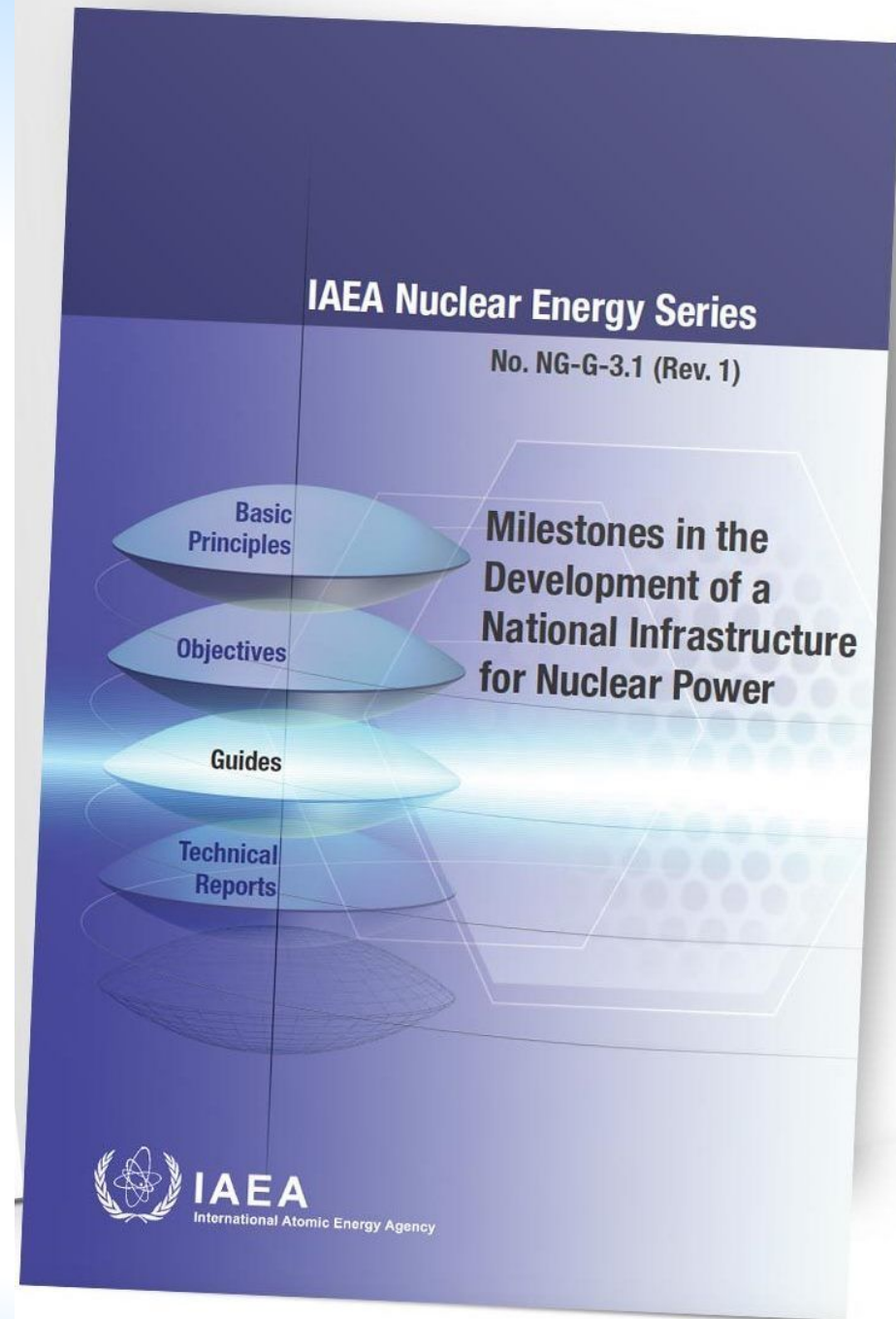


# IAEA Milestones Approach

- 450
  - Nuclear Power Reactors in Operation worldwide
- 60
  - Nuclear Power Reactors Under Construction
- 33
  - Countries are operating or have operated nuclear power plants
- 16,855+
  - Reactor-Years of Operation worldwide

# Milestones Guide

- Comprehensive framework for IAEA guidance to newcomers
- Adopted by Newcomers as well industry
- 2007 edition based on 40 years of experience
- Revised in 2015






# IAEA Milestones Approach: Infrastructure Development Phases


Introducing  
Nuclear Power

**Phase 1  
Consider**



**Milestone 1  
Decide**

**Phase 2  
Prepare**




**Milestone 2  
Contract**

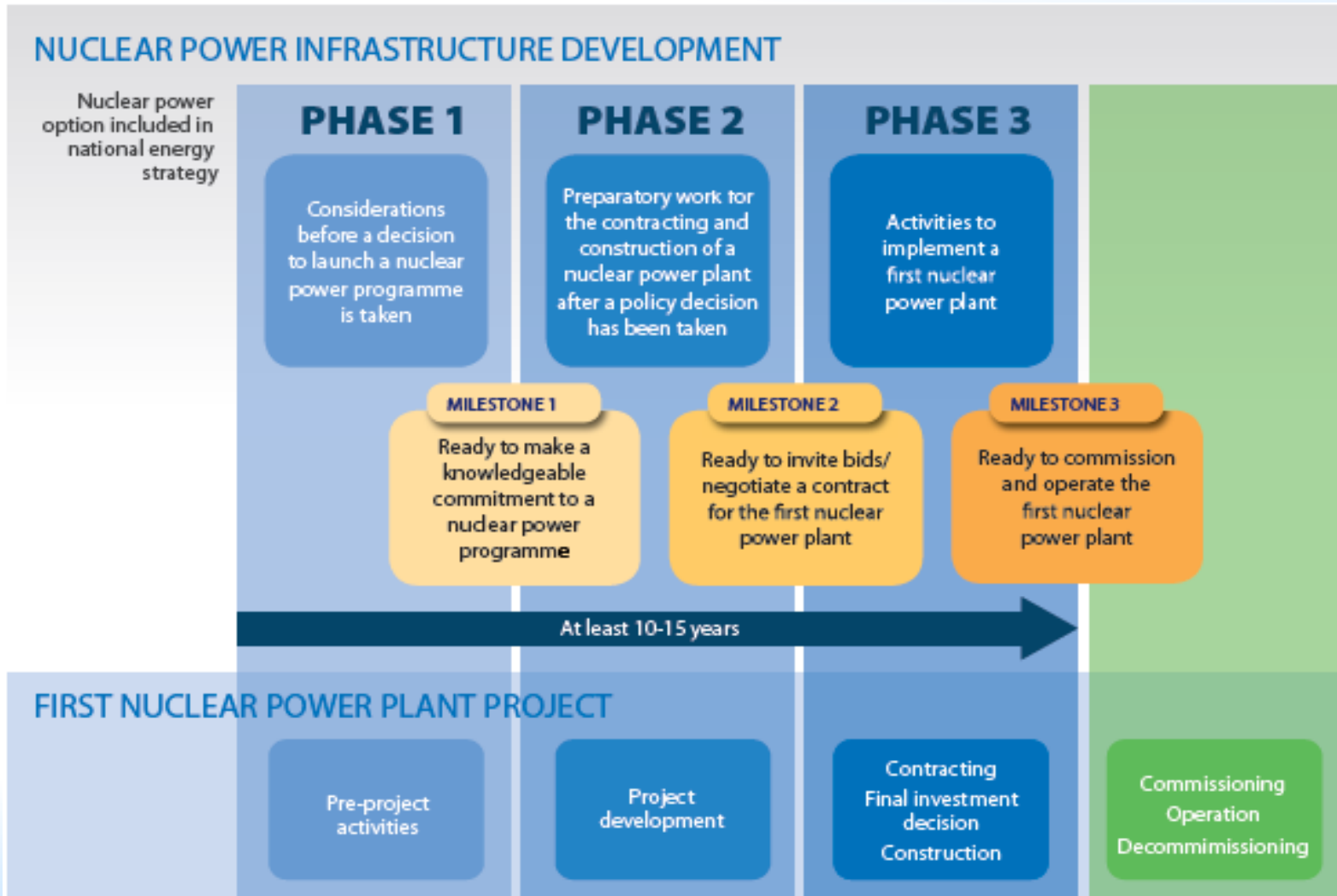
**Phase 3  
Construct**



**Milestone 3  
Commission**



# IAEA Milestones Approach: Milestones



# IAEA Milestones Approach: Infrastructure Issues



National Position



Nuclear safety



Management



Funding and Financing



Legislative Framework



Safeguards



Radiation protection



Regulatory Framework



Electric grid



Human resources development



Stakeholder involvement



Site and supporting facilities



Environmental protection



Emergency planning



Security and physical protection



Nuclear fuel cycle



Radioactive waste



Industrial involvement



Procurement

**The Milestones Approach is holistic and considers 19 specific infrastructure issues.**

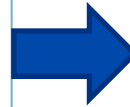
# Self-Evaluation

- Revised Guidelines being published, available as a working document: NG-T-3.2 (Rev.1)
- Essential for assessing the status and progress of infrastructure development
- Comprehensive tool to determine the status of infrastructure conditions for all of the 19 issues
- Can be used by a country to establish what additional work needs to be completed to develop the required infrastructure
- Self-Evaluation Report basis for INIR missions

# Management: Milestone 1

## Condition

- Need for appropriate leadership and management systems recognized



## Basis for evaluation

- Commitment to leadership and managements systems to ensure success, promote culture for safety, security and safeguards
- Plans to ensure knowledge gained by NEPIO is transferred to future regulatory body and owner/ operator

# Management: Milestone 2

## Condition

- Contract specs and evaluation criteria determined.



## Basis for evaluation

- BIS for competitive bidding completed (or requirements for customer negotiations with a sole supplier)

- Owner/operator competence for procuring and managing the NPP contract evident.



- Owner/operator team competent to verify project progress/quality requirements (may include owners engineer), procedures for knowledge management.

- Management systems established.

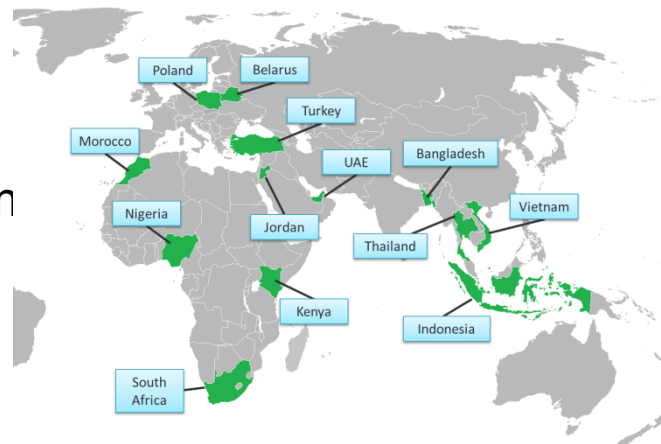


- Management systems covering safety, security and safeguards defined for 3 key organizations, mechanism to monitor infrastructure development.



# Integrated Nuclear Infrastructure Review (INIR)

- Based on Self-Evaluation of the Status of 19 Infrastructure Issues
- International expert review led by a high level IAEA manager
  - Identifies areas for further action makes suggestions and recommendations
  - Requested by Member State government



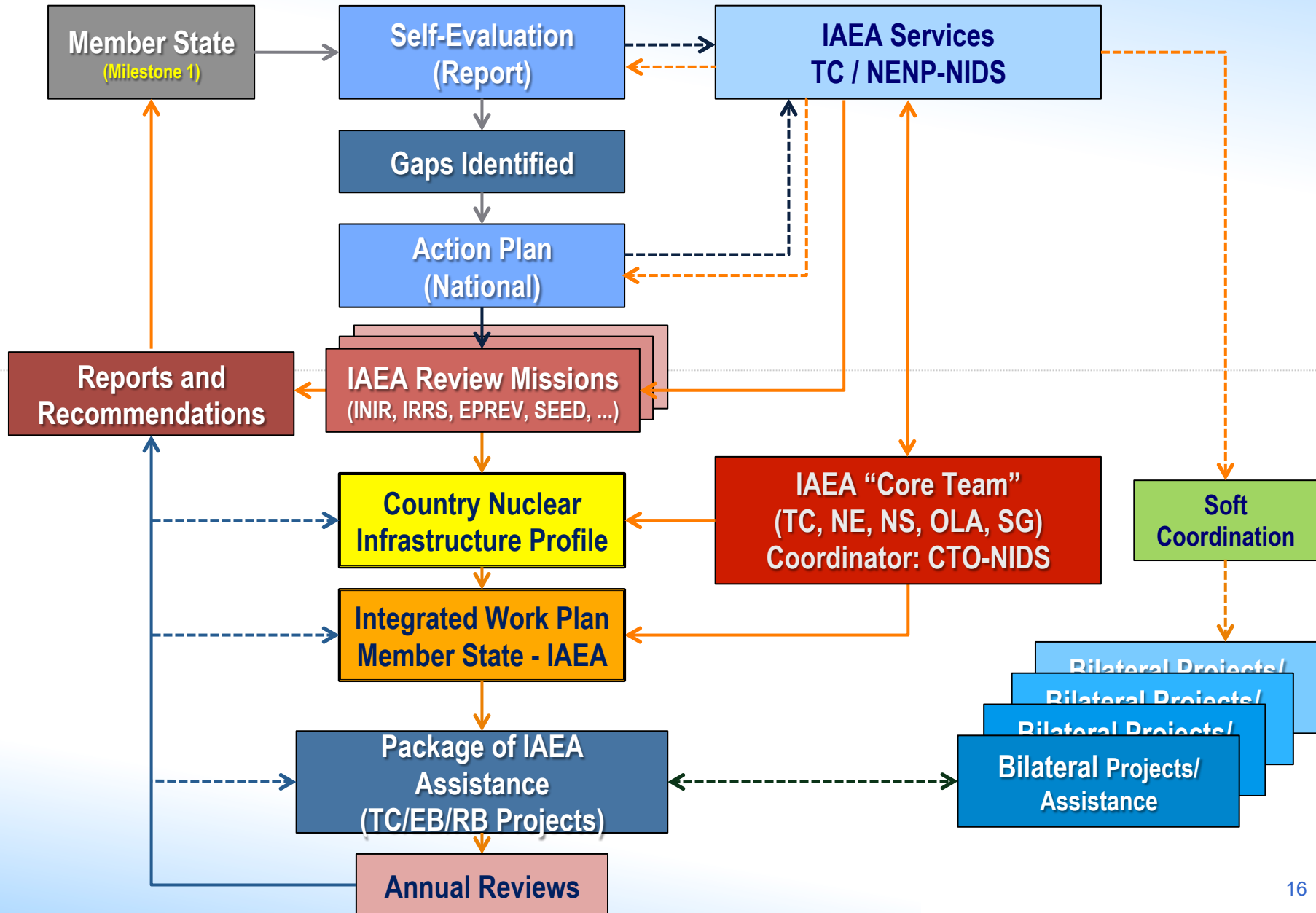
• Jordan	2009
• Indonesia	2009
• Vietnam	2009
• Thailand	2010
• UAE (Phase 2)	2011
• Bangladesh (Phase 1&2)	2011
• Jordan follow-up	2012
• Belarus (Phase 1&2)	2012
• Vietnam (Phase 2)	2012
• Poland	2013
• South Africa (Phase 2)	2013
• Turkey (Phase 2)	2013
• Jordan (Phase 2)	2014
• Vietnam follow-up	2014
• Nigeria (Phase 2)	2015
• Kenya	2015
• Morocco	2015
• Bangladesh follow-up	2016
• Poland follow-up	2016
• Malaysia (phase 1) planned	2016
• Kazakhstan (Phase 1) planned	2016

2009 – 2016: 19 INIR missions  
in 13 Member States  
(Plus two more in Oct/Nov 2016 in 2 new countries)



Lessons learned from first 6-years  
of INIR missions published in  
IAEA TECDOC-1779

# IAEA Assistance to Newcomers



# Country Nuclear Infrastructure Profile (CNIP) Objectives

- Develop an up-to-date and validated database on **status of nuclear power infrastructure** in newcomer Member States based on
  - ✓ IAEA Milestones Approach
  - ✓ Self-Evaluation
  - ✓ Recommendations of Review Missions

# Integrated Work Plan (IWP) Objectives

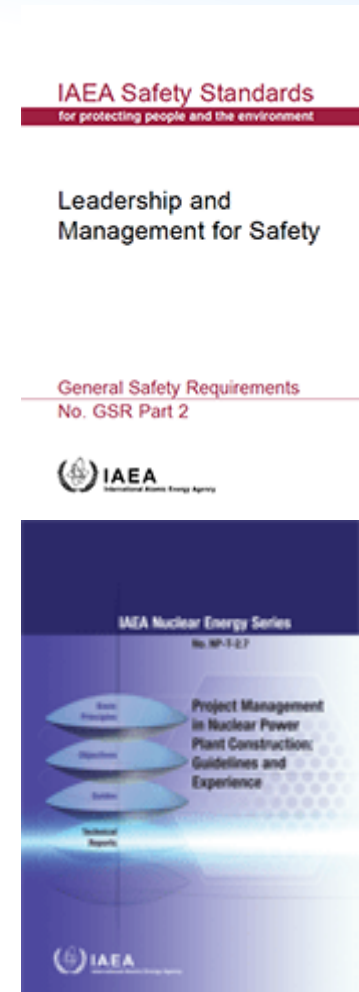
- Joint working document for
  - ✓ Planning
  - ✓ Reviewing or extending assistance
  - ✓ Agreed timeline and funding
  - ✓ Reference for determining required national resources or bilateral support

# IAEA Guidance Related to Management

- **Key Publications**

- Leadership and Management for Safety ([IAEA Safety Standards Series GS-R-2](#)), 2016

- Project Management in Nuclear Power Plant Construction: Guidelines and Experience ([IAEA Nuclear Energy Series NP-T-2.7](#)), 2012



# IAEA Guidance Related to Management

- **Other Relevant Publications**

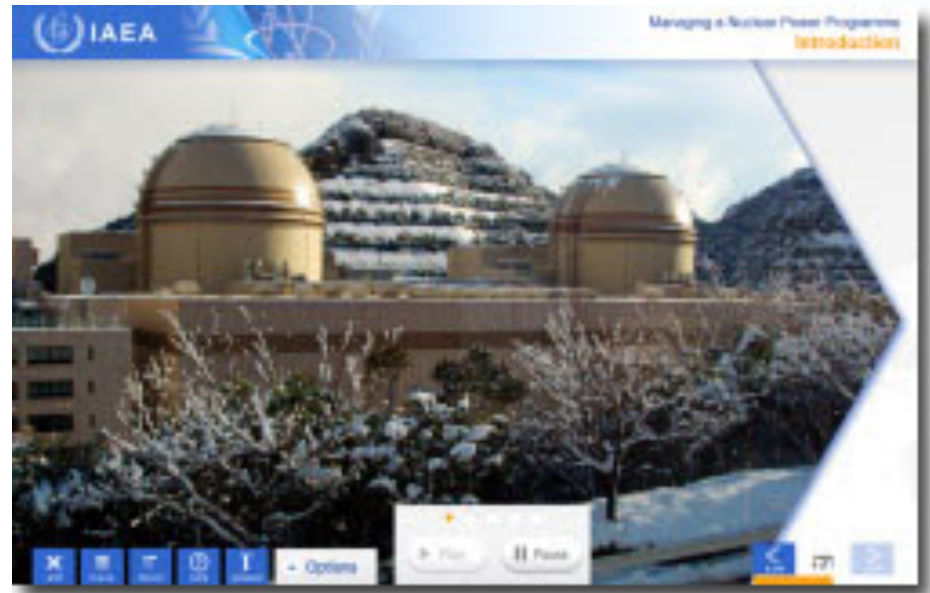
- Development and Implementation of a Process Based Management System ([IAEA Nuclear Energy Series No. NG-T-1.3](#)), 2015
- Use of a Graded Approach in the Application of the Management System Requirements for Facilities and Activities ([IAEA TECDOC 1740](#)), 2014
- Management System Standards: Comparison between IAEA GS-R-3 and ISO 9001:2008 ([Safety Reports Series 69](#)), 2012
- Management Systems Standards: Comparison between IAEA GS-R-3 and ASME NQA-1-2008 and NQA-1a-2009 Addenda ([Safety Reports Series 70](#)), 2012
- The Management System for Nuclear Installations ([IAEA Safety Standards Series GS-G-3.5](#)), 2009
- Managing the First Nuclear Power Plant Project ([IAEA TECDOC 1555](#)), 2007
- The Management System for Facilities and Activities ([IAEA Safety Standards Series GS-R-3](#)), 2006
- Application of the Management System for Facilities and Activities ([IAEA Safety Standard Series GS-G-3.1](#)), 2006



# IAEA Guidance Related to Management

- **Training Materials**

- Management of a Nuclear Power Programme ([IAEA E-learning Module 4](#)), 2013
- Management Systems ([IAEA E-learning Module 8](#)), 2014



Link to full IAEA Nuclear Power Infrastructure Bibliography:  
(<https://www.iaea.org/NuclearPower/Infrastructure/Bibliography/index.html>)

# Mechanisms for IAEA Support

- Workshops/Training Courses
- Expert Missions/Advisory Services
- Review Missions/Peer Reviews
- Training Tools and Networks



Link to IAEA Catalogue of Services for Nuclear Power Infrastructure Development:  
(<https://www.iaea.org/NuclearPower/Infrastructure/catalogue.html>)

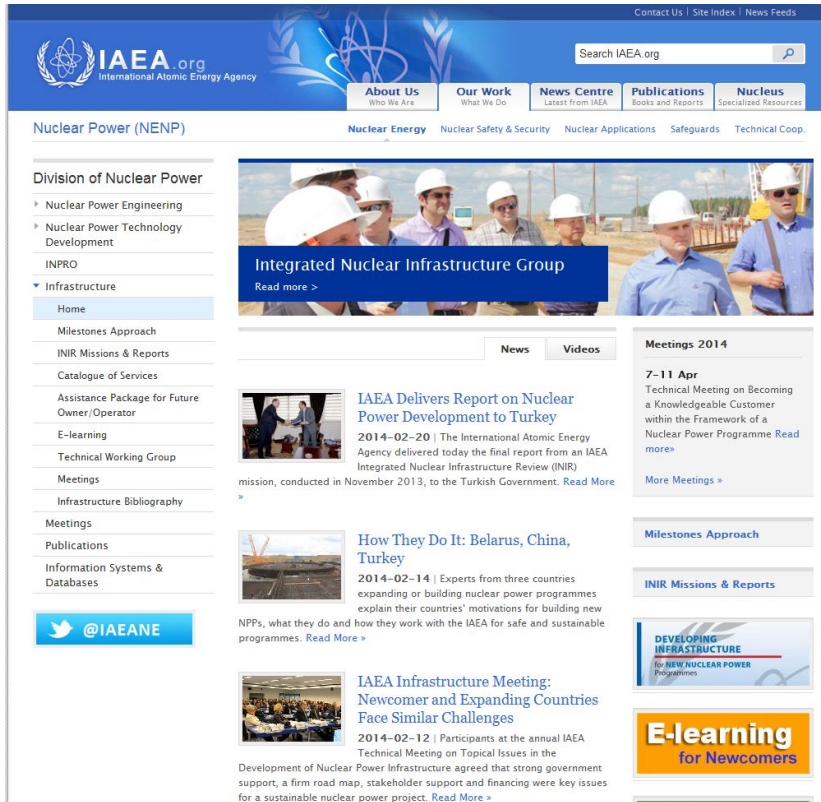
# Conclusions

- Embarking countries are moving ahead with their plans for nuclear power introduction and IAEA continues to work closely with them.
- IAEA has developed the Milestones Approach to help guide those countries through this process.
- Our key products are guidance documents, training, review missions, and expert advice.
- The “Evaluation Methodology” provides Member States with a mechanism for evaluating their national nuclear infrastructure across the 19 issues.
- NIDS coordination work and its essential tools including Self-Evaluation, INIR missions, CNIPs and IWPs ensure that Agency support is relevant, timely and of high quality.

# Additional Information

## Website: IAEA and Newcomers

<http://www.iaea.org/NuclearPower/Infrastructure>



The screenshot shows the IAEA website's 'Nuclear Power (NENP)' section. The header includes the IAEA logo and navigation tabs for 'About Us', 'Our Work', 'News Centre', 'Publications', and 'Nucleus'. The main content area features a large image of a group of men in hard hats, with a blue overlay reading 'Integrated Nuclear Infrastructure Group' and a 'Read more >' link. Below this, there are three news items: 'IAEA Delivers Report on Nuclear Power Development to Turkey' (dated 2014-02-20), 'How They Do It: Belarus, China, Turkey' (dated 2014-02-14), and 'IAEA Infrastructure Meeting: Newcomer and Expanding Countries Face Similar Challenges' (dated 2014-02-12). A sidebar on the left lists various navigation options like 'Division of Nuclear Power', 'Home', 'Milestones Approach', and 'Meetings'. A social media button for '@IAEANE' is also visible.

## Milestones Video

<https://www.iaea.org/NuclearPower/videos/2016-02-15-milestone.html>



The screenshot shows a video player interface. The video title is 'Nuclear power can help meet energy needs'. The video content features a stylized atomic symbol on a blue background with clouds. A play button is overlaid on the video. The video player includes a progress bar at the bottom showing '00:00' and a volume control icon.

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Sean Dunlop  
[s.dunlop@iaea.org](mailto:s.dunlop@iaea.org)



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*60 Years*

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*Thank you!*

