



60 Years

IAEA

Atoms for Peace and Development

IAEA SUPPORT ON INFRASTRUCTURE DEVELOPMENT FOR A NEW NUCLEAR POWER PROGRAMME

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**Nuclear Energy Forum
22 August 2017**

IAEA and Newcomer Countries

“It is each country’s sovereign decision whether to add nuclear power to its energy mix”



“The Agency has a key role to play in ensuring that expansion in nuclear power takes place in an efficient, responsible and sustainable manner.”

“Assistance to newcomers, especially those which are most advanced on the road to having operational reactors, will remain a high-priority issue.”

Yukiya Amano
IAEA Director General

Countries Embarking on Nuclear Power

Number of Member States at different stages of decision making and planning for nuclear power in 2012–2016 according to their official statements

	2012	2013	2014	2015	2016
First nuclear power plant started construction/under construction	1	2	2	2	2
First nuclear power plant ordered	2	1	1	1	2
Decided to introduce nuclear power and started preparing the appropriate infrastructure	6	6	7	7	6
Active preparation for a possible nuclear power programme with no final decision	6	5	5	6	6
Considering nuclear power programme	13	19	18	11	11*

* Another 17 countries expressed interest in nuclear power during 2015 at the IAEA General Conference or in high level bilateral meetings

Drivers for Nuclear Energy

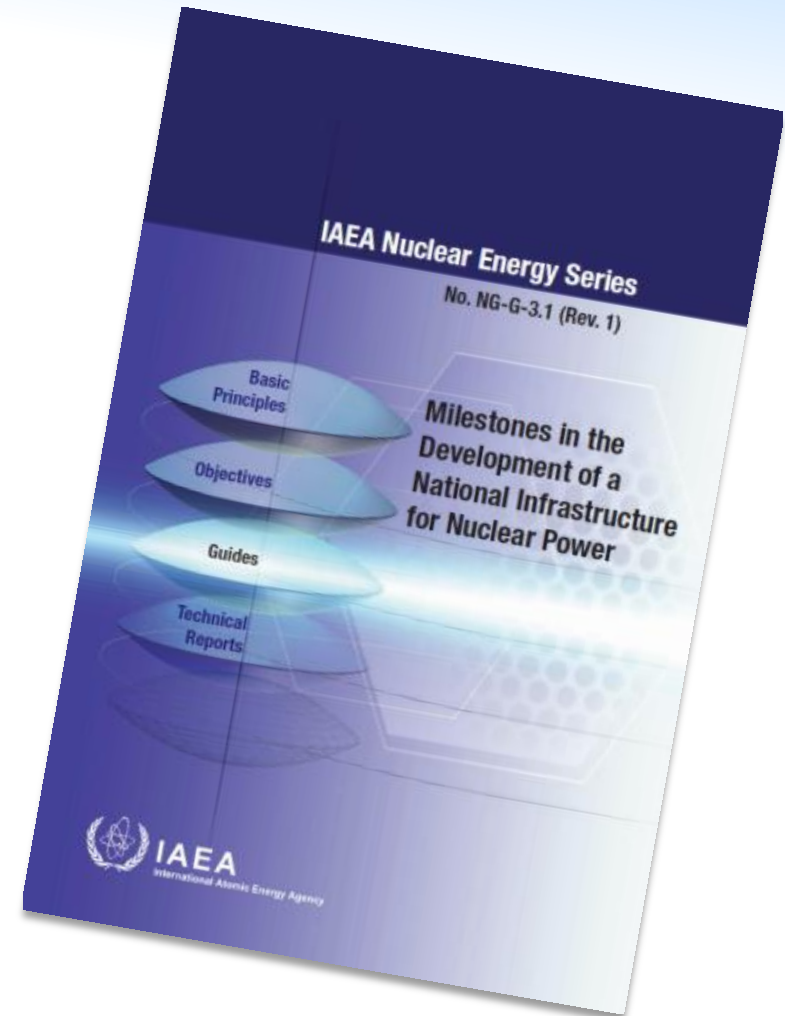
Drivers for consideration of nuclear have not changed:

- Energy independence
- Volatile fossil fuel prices
- Climate change
- Increased demand for energy



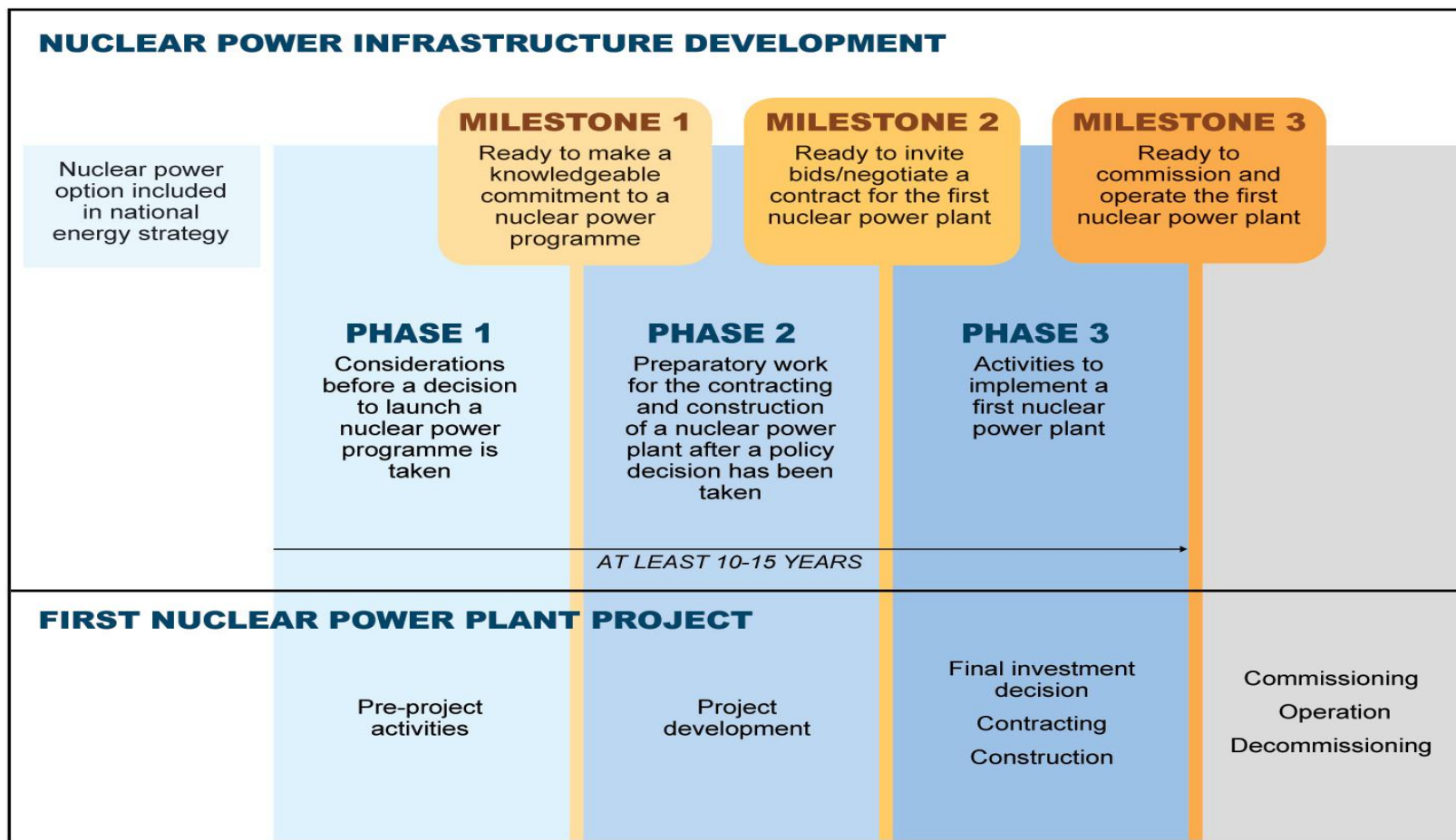
The IAEA Milestones Approach for Nuclear Power Infrastructure Development

The Milestones Approach is holistic and considers 19 specific infrastructure issues



NG-G-3.1 issued in 2007
Updated in 2015

Milestones in the Development of a National Infrastructure for Nuclear Power (NG-G-3.1 Rev 1)



Milestones in the Development of a National Infrastructure for Nuclear Power (NG-G-3.1 Rev 1)

1. National position
2. Nuclear safety
3. Management
4. Funding and financing
5. Legal framework
6. Safeguards
7. Regulatory framework
8. Radiation protection
9. Electrical grid
10. Human resource development
11. Stakeholder involvement
12. Site and supporting facilities
13. Environmental protection
14. Emergency planning
15. Nuclear security
16. Nuclear fuel cycle
17. Radioactive waste management
18. Industrial involvement
19. Procurement

The Milestones Approach

Phase 1: Decide!



Phase 2: Prepare!



Phase 3: Construct!



Milestone 1: Ready to Make a Knowledgeable Decision

Prefeasibility study

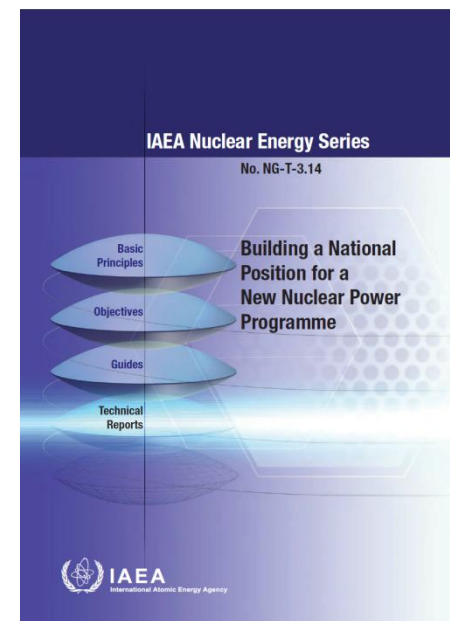
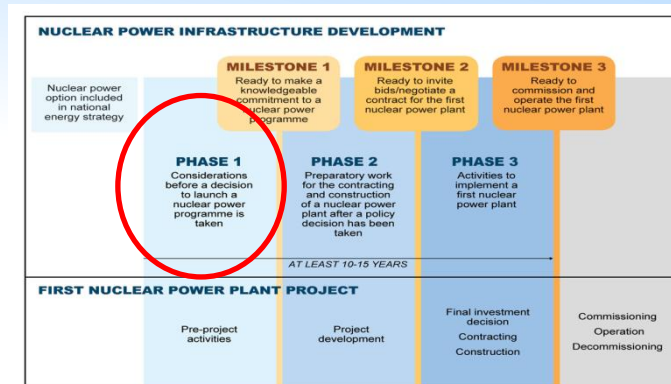
- Reviews required infrastructure and feasibility of a nuclear power programme

Comprehensive report

- Comprehensive examination of all 19 infrastructure issues

National Strategy

- Should the comprehensive report recommend a positive national decision, a national strategy is defined





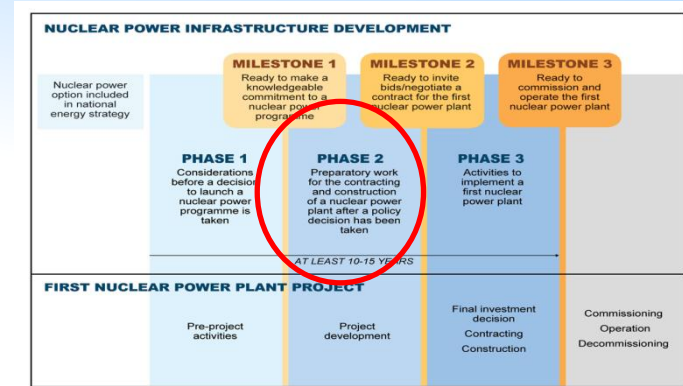
Phase 1: Coordination

Nuclear Energy Programme Implementing Organization (NEPIO) →

“ ...a mechanism (which may involve high level and working level committees) to coordinate the development of the nuclear infrastructure development within a Member State.”



Milestone 2: Ready to Invite Bids or Negotiate a Contract



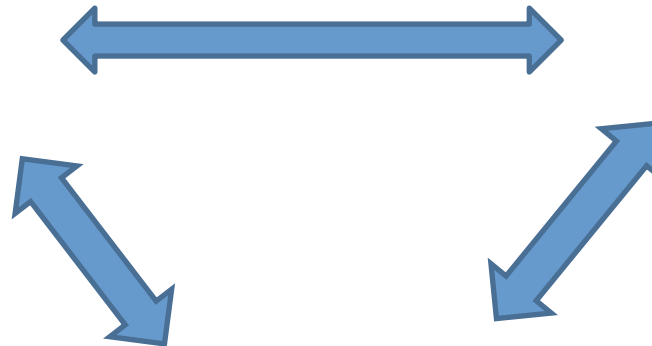
Owner-Operator



Regulatory Body (ies)



Government (NEPIO)





Phase 2: Building Institutions

Ready to make a knowledgeable commitment to a nuclear power programme

Phase 1
1~3 years

Ready to invite bids/negotiate a contract for the 1st NPP

Phase 2
3~7 years

Ready to commission and operate the first NPP

Phase 3
7~10 years



Involvement of the Regulatory Body

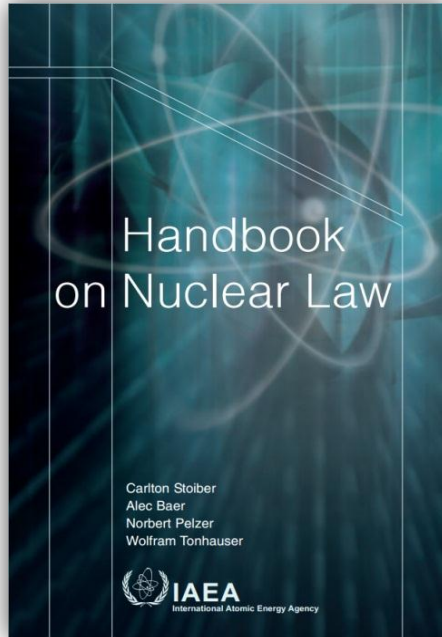
establishment

Involvement of the Operating Organization

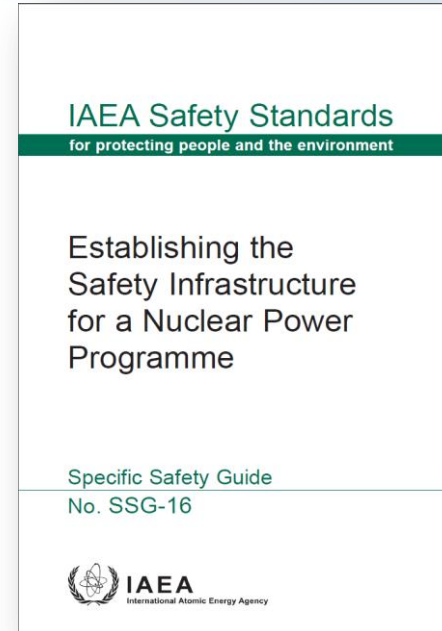
establishment



Phase 2: Establishing the Legal and Regulatory Framework



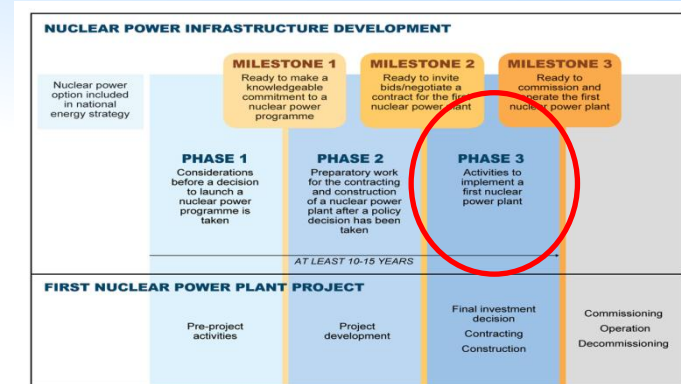
**The Legal Framework
is the foundation of
the nuclear power
programme**



Regulatory body

- ✓ **Strong**
- ✓ **Independent**
- ✓ **Competent**

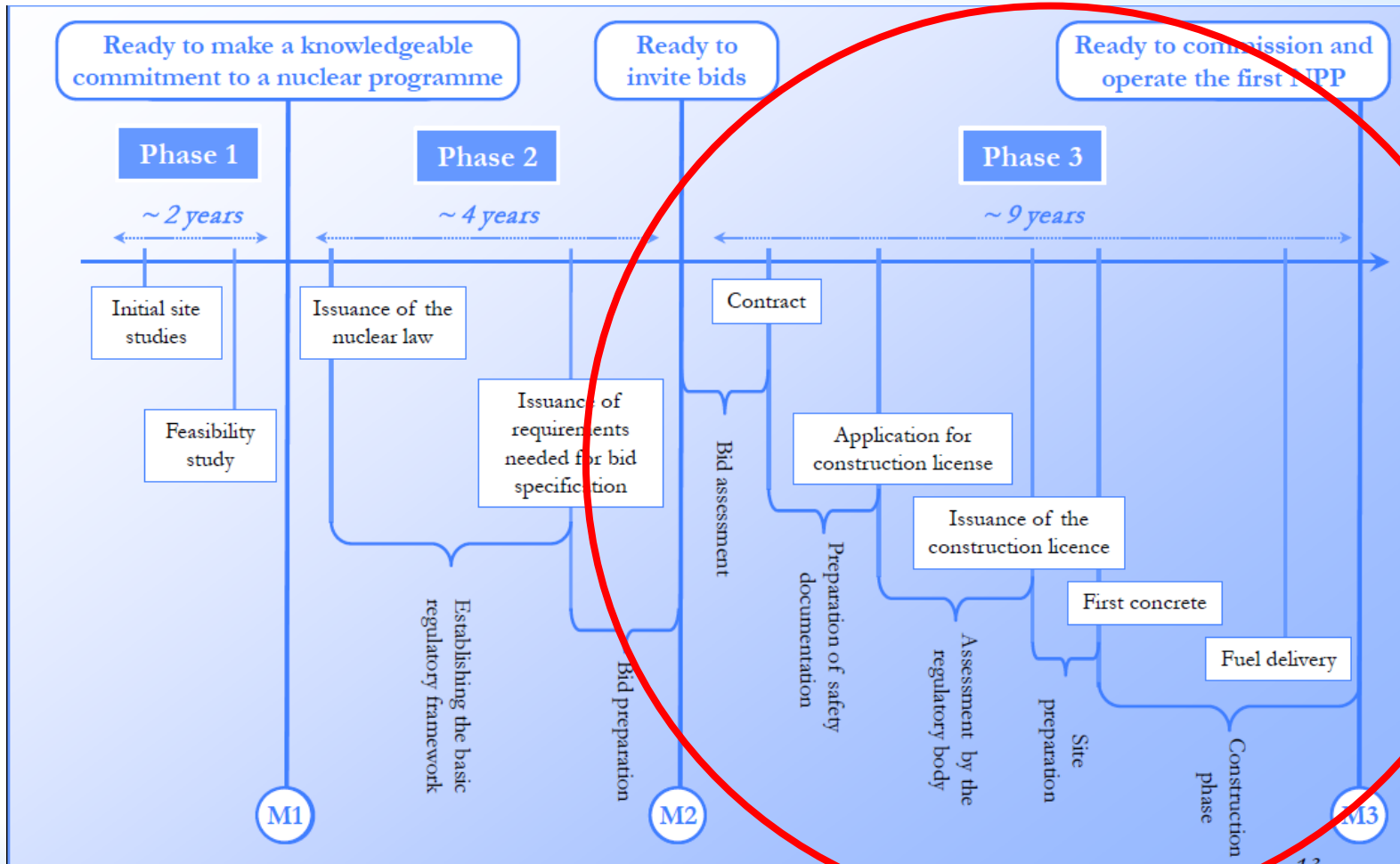
Milestone 3: Ready to Commission and Operate the 1st NPP



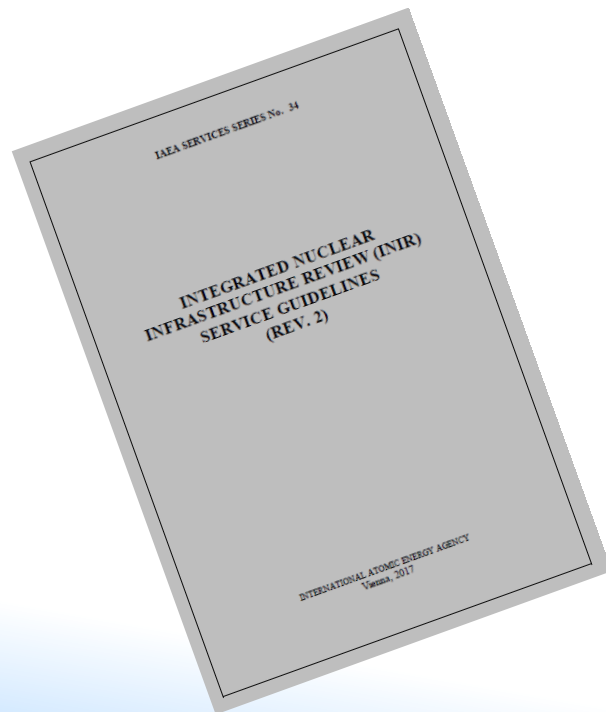
UAE, Barakah (2017)



Phase 3: Licensing and Construction



INTEGRATED NUCLEAR INFRASTRUCTURE REVIEW (INIR)



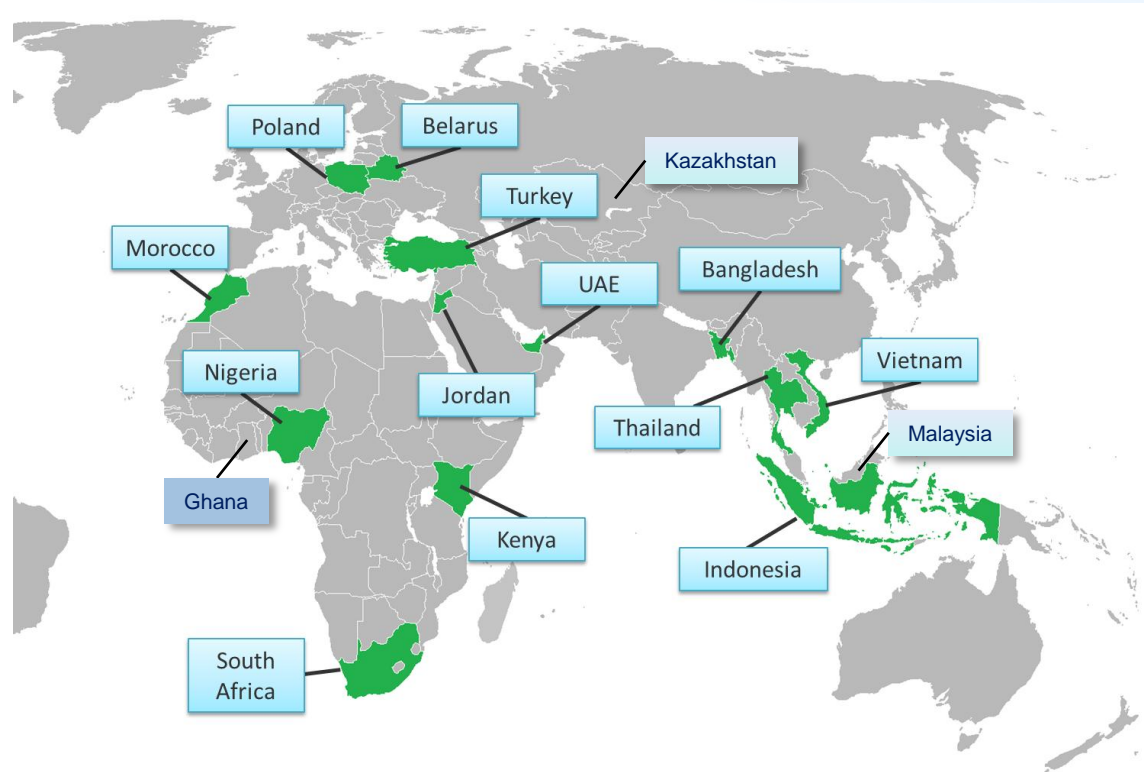
Integrated Nuclear Infrastructure Reviews (INIR)

- Based on the Milestones Approach:
19 Infrastructure Issues
3 Phases, 3 Milestones
- International expert peer review led by a high level IAEA manager
- Identifies areas for further action and makes suggestions and recommendations
- Requested by Member State government results are delivered to government

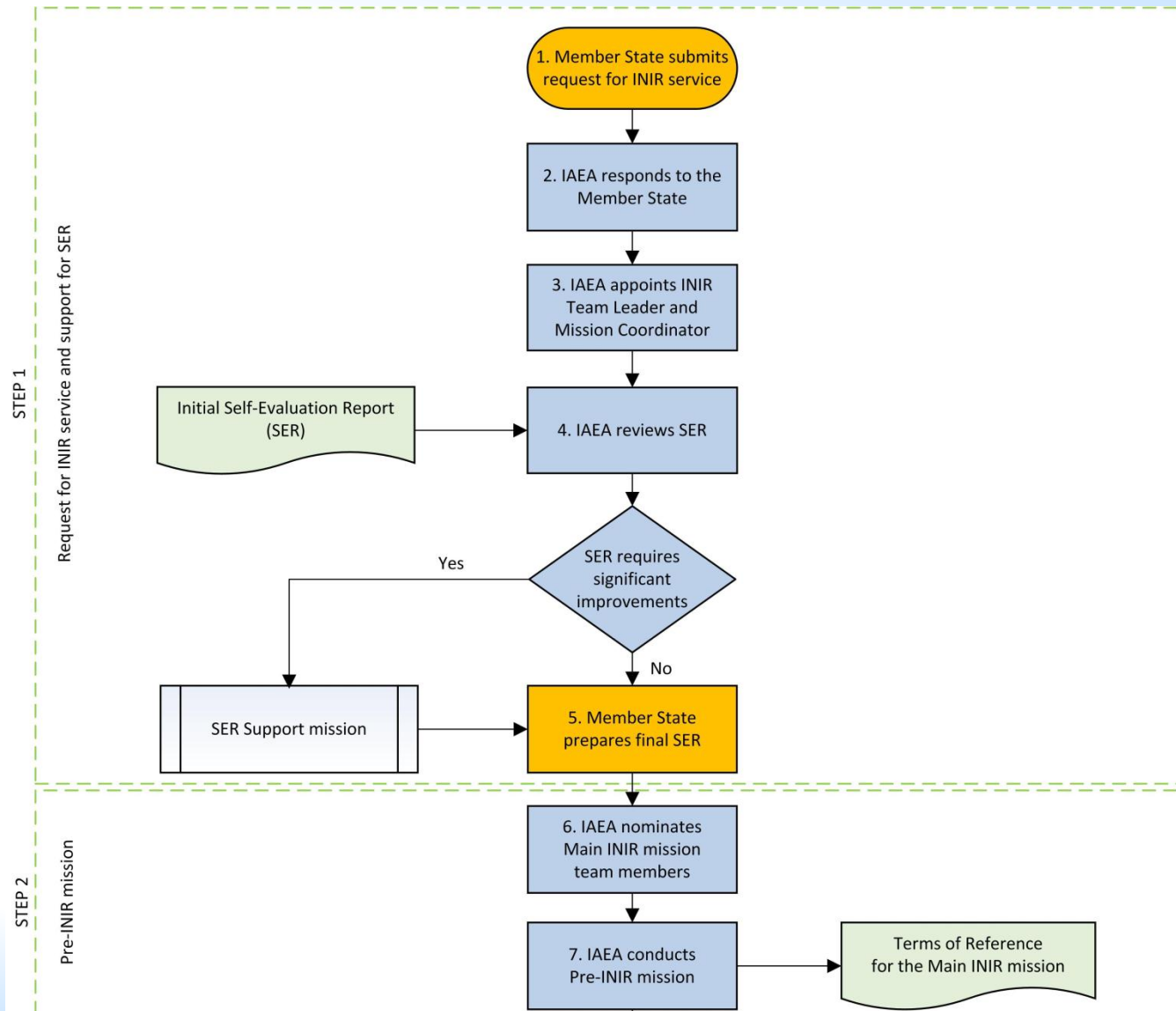


INIR Missions 2009-2016

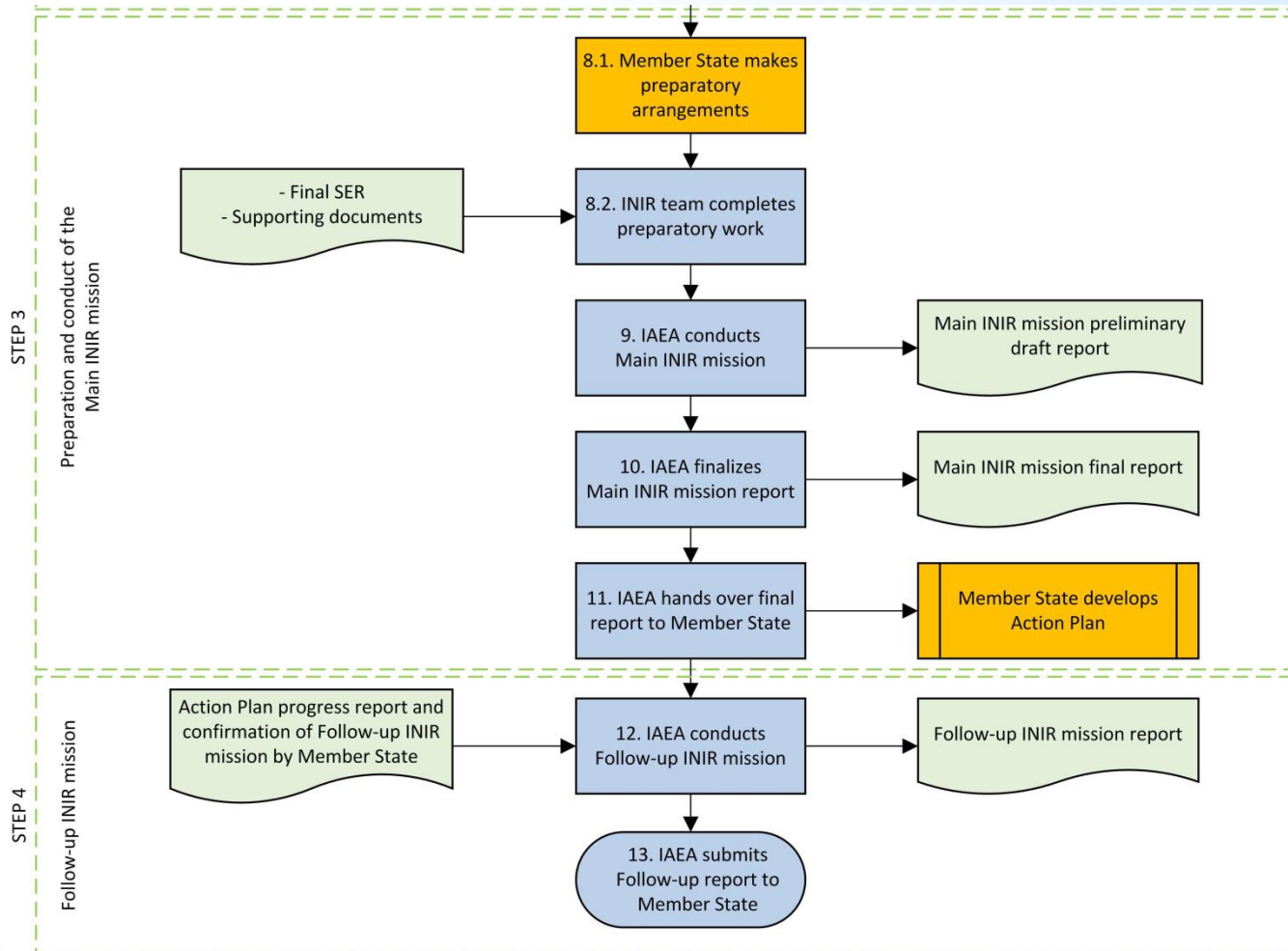
- | | |
|----------------------------|------|
| 1. Jordan | 2009 |
| 2. Indonesia | 2009 |
| 3. Vietnam | 2009 |
| 4. Thailand | 2010 |
| 5. UAE (Phase 2) | 2011 |
| 6. Bangladesh (Phase 1&2) | 2011 |
| 7. Jordan follow-up | 2012 |
| 8. Belarus (Phase 1&2) | 2012 |
| 9. Vietnam (Phase 2) | 2012 |
| 10. Poland | 2013 |
| 11. South Africa (Phase 2) | 2013 |
| 12. Turkey (Phase 2) | 2013 |
| 13. Jordan (Phase 2) | 2014 |
| 14. Vietnam follow-up | 2014 |
| 15. Nigeria (Phase 2) | 2015 |
| 16. Kenya | 2015 |
| 17. Morocco | 2015 |
| 18. Bangladesh follow-up | 2016 |
| 19. Poland follow-up | 2016 |
| 20. Malaysia (phase 1) | 2016 |
| 21. Kazakhstan (Phase 1) | 2016 |
| 22. Ghana (phase 1) | 2017 |



INIR Process for Philippines



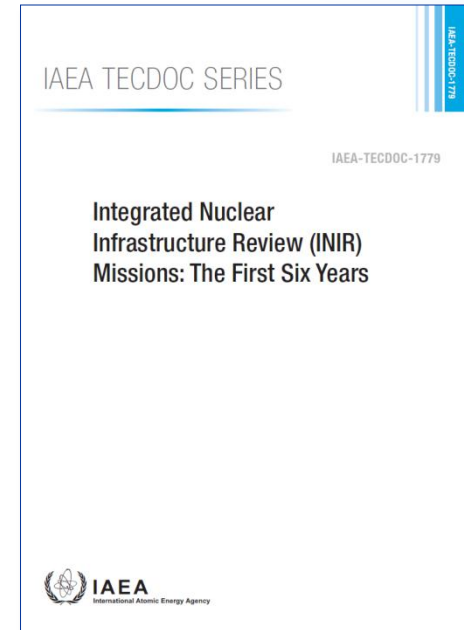
INIR Process for Philippines



INIR missions: The First Six Years

Phase 1 and Phase 2 missions
The infrastructure issues where deficiencies were identified more frequently are:

- 1. National Position
- 3. Management
- 5. Legal Framework
- 7. Regulatory Framework
- 10. Human resource development



IAEA Assistance to Newcomer Countries

Small but strategic: wide range of IAEA products and services to support the introduction or expansion of nuclear power:

- Documentation; e-Learning modules; Networks
- Technical Workshops; Technical Meetings; Training Courses
- Review and Expert missions; Peer Reviews; Advisory Services



Nuclear Power Infrastructure Bibliography

- Key and supporting documentation exists for the 19 Infrastructure Issues



Nuclear Power (NENP)

Nuclear Infrastructure Bibliography

The IAEA guidance publication "Milestones in the Development of a National Infrastructure for Nuclear Power" (IAEA Nuclear Energy Series No. NG-G-3.1, Rev 1) outlines 19 infrastructure issues that need to be addressed in developing a new nuclear power programme. This bibliography is categorised according to these issues, listed below.

Click on any of the topics below to see the list of relevant IAEA publications. Further technical publications can be found at the IAEA Publications website.

1. National Position
2. Nuclear Safety
3. Management
4. Funding and Financing
5. Legislative Framework
6. Safeguards
7. Regulatory Framework
8. Radiation Protection
9. Electrical Grid
10. Human Resource Development
11. Stakeholder Involvement
12. Site and Supporting Facilities
13. Environmental Protection
14. Emergency Planning
15. Nuclear Security
16. Nuclear Fuel Cycle
17. Radioactive Waste Management
18. Industrial Involvement
19. Procurement

Relevant Publication		
Integrated Nuclear Infrastructure Review (INIR) Missions: The First Six Years	IAEA-TECDOC-1779	2015
Developing Infrastructure for New Nuclear Power Programmes: IAEA Services for Member States	Brochure	2014
Considerations to Launch a Nuclear Power Programme	GOV/INF/2007/2/Colour	2007
Evaluation of the Status of National Nuclear Infrastructure	IAEA Nuclear Energy Series NG-T-3.2	2008

www.iaea.org/NuclearPower/Infrastructure

E-Learning Modules

1. Introduction and overview
2. Human resource development
3. Stakeholder involvement
4. NP programme management
5. Construction management
6. Systematic approach to training
7. Feasibility study
8. Management systems
9. Safety infrastructure
10. Emergency preparedness and Response
11. Safeguards
12. Spent Fuel and Radioactive Waste Management
13. Siting
14. Legal framework – coming soon
15. National position



IAEA.org
International Atomic Energy Agency

Nuclear Power (NENP)

E-learning for Nuclear Newcomers

Is your country considering nuclear power?

The IAEA is here to help!

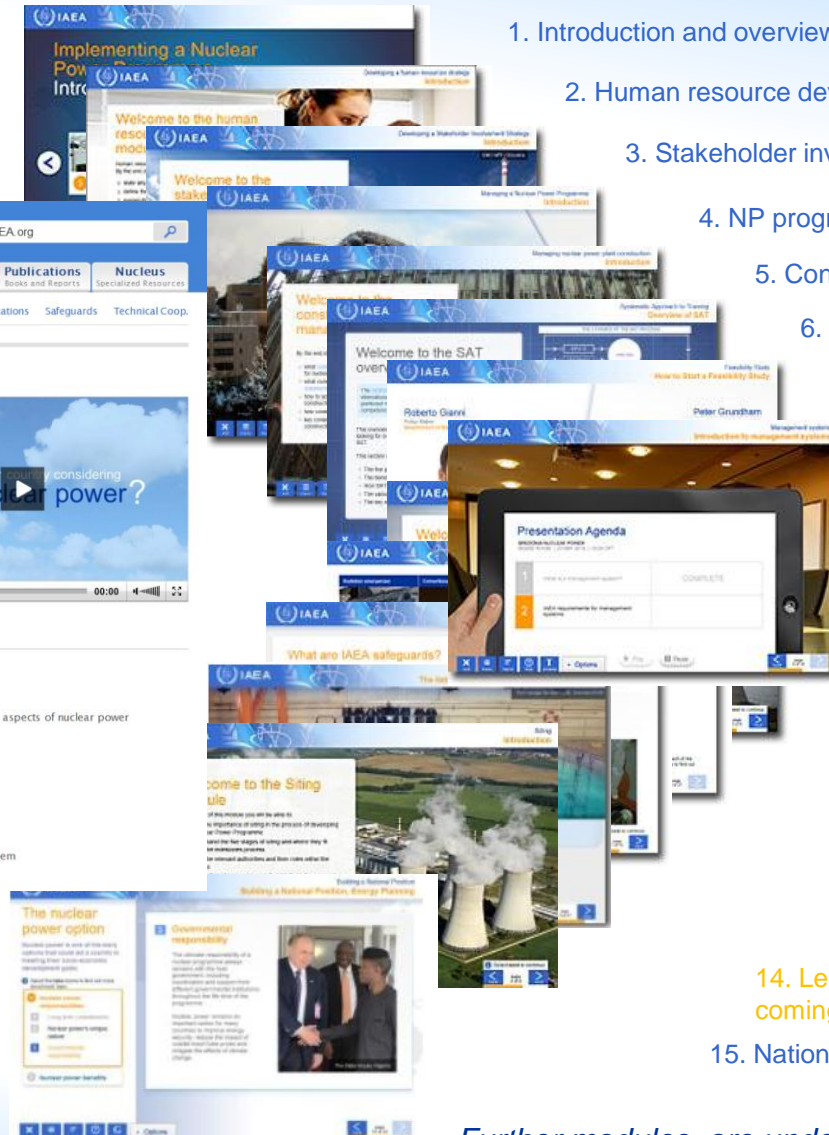
We have created an interactive e-learning series explaining the IAEA's Milestones Approach to introducing a nuclear power programme. This approach is based on three phases and covers the 19 infrastructure issues that need to be addressed, and brings decades of expertise to life. Both newcomers and those expanding their nuclear power programmes may benefit from the e-learning series.

E-learning Modules

We have developed interactive and engaging e-learning modules explaining various aspects of nuclear power infrastructure development, which are listed below.

NEW: All modules can now be downloaded

1. Register on the IAEA Open Learning Management System CLP4NET
2. Then you can:
 - start a module
 - download a module to your device, network or learning management system
 - send feedback on your e-learning experience to the IAEA.



Further modules are under development

Competency Framework

IAEA



IAEA Competency Framework

About

Database

Phase

Issue

Organization

Reference

Activities

Competences

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PDF

▼ Phase 1

▼ 01. National Position

- 1.1 Elaborate a clear statement to be adopted by the government, which will c...
- 1.2 Establish a mechanism (NEPIO) from a high level in the government to coor...
- 1.3 Define clear terms of reference which call for a comprehensive review of ...
- 1.4 Select a Director and establish working groups/departments for each major...
- 1.5 Define NEPIO processes and procedures, as well as working relationships w...
- 1.6 [Develop a roadmap, including a timeline, with major activities to be impl...](#)
- 1.7 Coordinate the development of the pre-feasibility study (PFS) required fo...
- 1.8 Prepare a comprehensive report that defines and justifies a national stra...

▶ 02. Nuclear Safety

▶ 03. Management

▶ 04. Funding and Financing

▶ 05. Legislative Framework

▶ 06. Safeguards

▶ 07. Regulatory Framework

▶ 08. Radiation Protection

▶ 09. Electrical Grid

▶ 10. Human Resource Development

▶ 11. Stakeholder Involvement

▶ 12. Site and Supporting Facilities

▶ 13. Environmental Protection

N.	1.6
Phase	Phase 1
Issues	01. National Position
Organization(s)	NEPIO
Activity	Develop a roadmap, including a timeline, with major activities to be implemented until the end of Phase 3.
Competency	Ability to list the key steps required in the implementation of a nuclear power programme and define the organizations responsible to implement them.
References	NG-T-3.6, Section 3.1; NG-T-3.14, Section 4.2; SSG-16, Action 2, 25, 146
Lessons	
Remarks	

<https://nucleus.iaea.org/competency-framework/>



IAEA

60 Years

Atoms for Peace and Development

Thank you!

