

Increasing non-power peaceful uses applications in developing countries:

Can this create an enabling environment for nuclear power in these countries?

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Contents

1. Introduction
2. IAEA Milestones Approach and nuclear power infrastructure
- countries interested in nuclear power
3. Non-power applications and infrastructure
4. Enabling environment for nuclear power
5. Hypothesis
6. Way forward

1. Introduction

Energy poverty:

- a challenge for many LMICs

Novel / Advanced Reactors, including SMRs:

- an opportunity for LMICs

Application of nuclear science and technology:

- power and non-power applications, both require infrastructure for safe, secure, sustainable deployment

Increasing non-power applications:

- will improve health and food security
- creates an enabling environment for nuclear power

Improving infrastructure to expand non-power applications

- contributes to nuclear power infrastructure
- will make it easier to embark on nuclear power

2. IAEA Milestones Approach

- infrastructure needed for nuclear power

- Comprehensive framework for nuclear infrastructure development.
- Adopted by embarking Member States, as well the nuclear industry in general.
- 3 Phases (Consider – Prepare – Construct)
- 3 Milestones (Decide – Contract – Commission)



- 19 “Infrastructure Issues”



IAEA Nuclear Energy Series No. NG-G-3.1 Milestones in the Development of a National Infrastructure for Nuclear Power rev.2 [IAEA Preprint] (2023), https://preprint.iaea.org/search.aspx?orig_q=RN:54091862

Countries interested in or already embarking on new nuclear power programmes



- 24 countries are still in a pre-decision phase (pre-Phase 1):
 - expressed interest in nuclear power.
 - have not yet commenced all the activities necessary to make an informed and knowledgeable commitment to nuclear power.

Source: <https://www.iaea.org/sites/default/files/gc/gc67-inf4.pdf>

Pre-decision and early-Phase 1 countries

Review of: [IAEA Research Reactor Database](#)
[IAEA Accelerator Knowledge Portal](#)
[IAEA Directory of Radiotherapy Centres \(DIRAC\):](#)

| Pre-decision and Early-Phase 1 countries | RRDB | ACCELERATOR KNOWLEDGE PORTAL | | | | | DIRAC |
|--|---------------------------|------------------------------------|--|--|--|---------------------------------------|----------------------------------|
| | Research Reactor Facility | One or more Accelerator facilities | One or more Cyclotrons for radionuclide production | One or more Industrial Gamma Irradiators | One or more Industrial e-Beam facilities | One or more Research X-Ray facilities | One or more Radiotherapy Centres |
| 37 | 10 | 7 | 19 | 8 | 3 | 23 | 35 |

3. Non power applications and Infrastructure

- Peaceful uses of nuclear science and technology for non-power applications is based on the use of ionising radiation.
- Many of the nuclear power areas of infrastructure development identified by the IAEA Milestones Approach are also relevant, albeit at a different level, for non-power applications.
- For example:

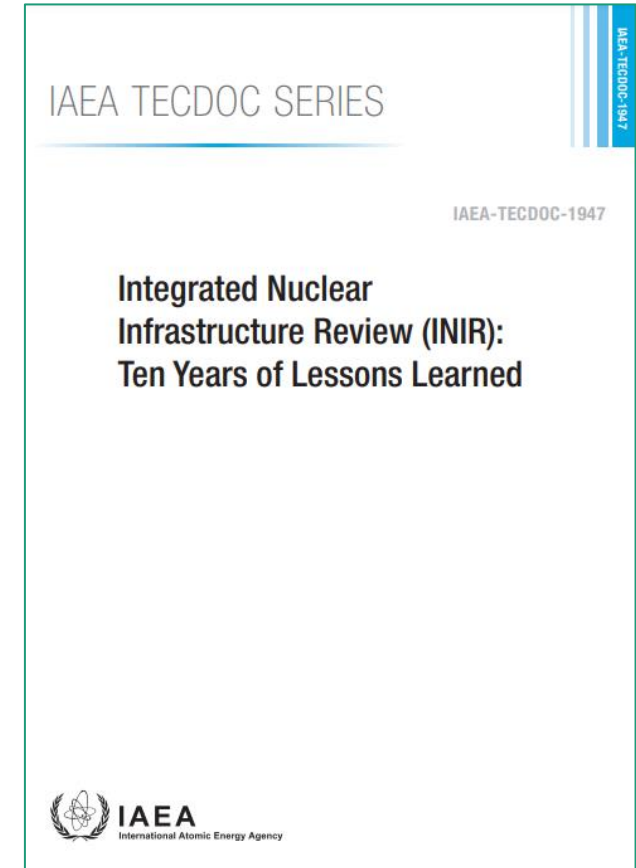


4. Enabling environment for nuclear power₁

Lessons learned from INIR missions

For example:

- delays or difficulties enacting new or amended legislation.
- delays or difficulties establishing independent regulatory body with sufficient human resources and funds.
- delays or difficulties in developing regulations.
- development of the required infrastructure often takes longer than envisaged.



<https://www.iaea.org/publications/14809/integrated-nuclear-infrastructure-review-inir-ten-years-of-lessons-learned>

Enabling environment for nuclear power₂

Review: INIR mission reports

Some Phase 1 countries have expanded the infrastructure that is already in place for non-power applications.

Examples of existing infrastructure:

- A regulatory body for radiation safety.
- Regulations for the management and security of radioactive sources.
- Human resource development and training programmes on radiation, applications of nuclear science and technology.

The following reports are currently available:

- [United Arab Emirates \(2011\)](#)
- [Belarus \(2012\)](#)
- [South Africa \(2013\)](#)
- [Poland \(2013\)](#)
- [Jordan \(2014\)](#)
- [Kazakhstan \(2016\)](#)
- [Ghana \(2017\)](#)
- [Niger \(2018\)](#)
- [United Arab Emirates \(2018\)](#)
- [Sudan \(2018\)](#)
- [Philippines \(2018\)](#)
- [Ghana \(2019\)](#)
- [Egypt \(2019\)](#)
- [Belarus \(2020\)](#)
- [Uganda \(2021\)](#)
- [Uzbekistan \(2021\)](#)
- [Sri Lanka \(2022\)](#)

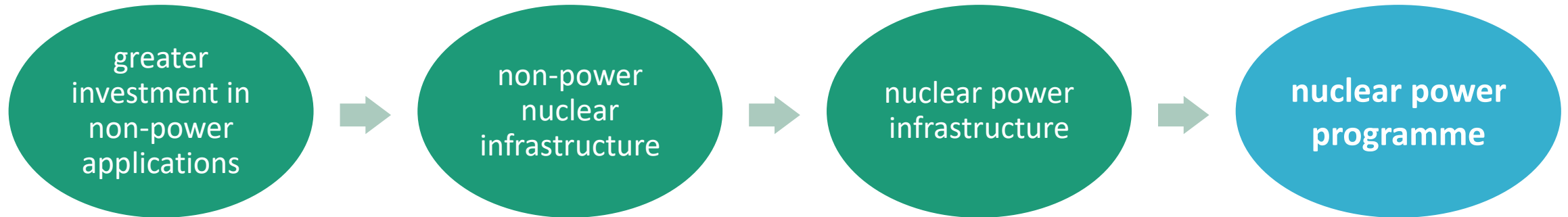
<https://www.iaea.org/services/review-missions/integrated-nuclear-infrastructure-review-inir>

Analysis: Having infrastructure in place for non-power applications has been beneficial in several countries for developing the infrastructure needed for their nuclear power programme.

5. Hypothesis

Improving infrastructure to expand non-power applications

contributes to the development of nuclear power infrastructure



and will make it easier for a country to embark on a future nuclear power programme.

6. Way forward

IAEA:

- Evaluate the status of infrastructure in the Pre-decision / early Phase 1 countries to determine the full extent of support required

LMICs interested in nuclear power:

- Invest in non-power applications, and pave the way for nuclear power

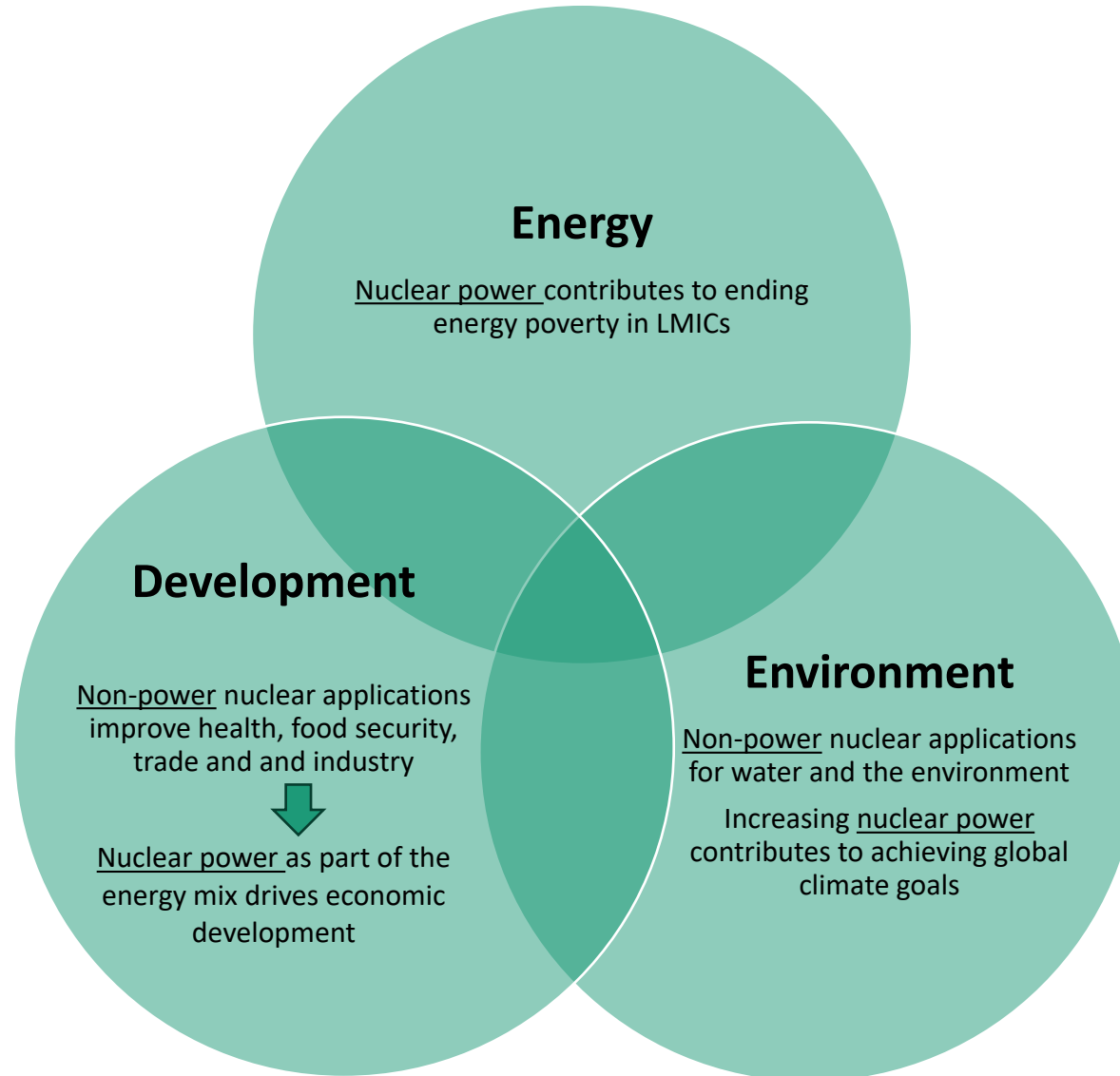
Other organisations:

e.g. International financial institutions, philanthropic organisations, reactor vendors

- invest in developing non-power infrastructure in LMICs for future expansion into nuclear power

Nuclear

At the nexus of
- energy
- development
- environment



Thank you

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