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# **The Role of TINT in Supporting the 19 IAEA Nuclear infrastructure Issues: A Technical Support Organization (TSO) Perspective**

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# Outline

Thailand's Vision toward SMR Deployment

Thailand's INIR Journey

TINT as the Technical Support Organization

Way forward and conclusions

## **| Thailand's Vision toward SMR Deployment**

## Thailand's Vision & Drivers for SMRs

### Policy Inclusion (draft PDP2024)

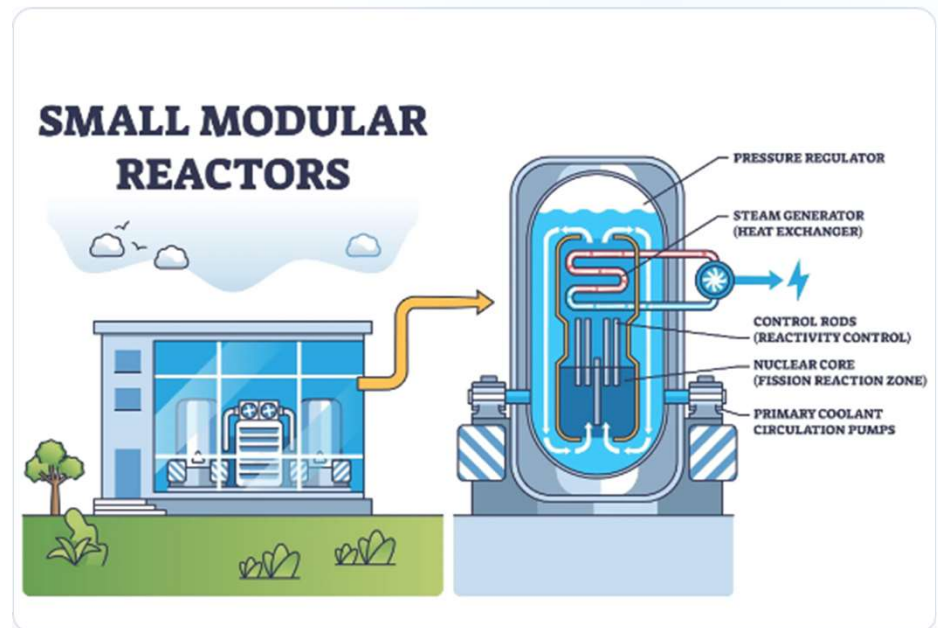
Nuclear technology is included as an option into Thailand's national Power Development Plan (draft PDP2024).

### Decarbonization Commitments

Accelerating national momentum toward Carbon Neutrality by 2050 and Net Zero GHG emissions by 2050 through clean baseload power generation.

### Beyond Power Generation

Unlocking non-electric applications including industrial process heat, green hydrogen production, and enhancement of regional energy security.



## National Readiness: IAEA Infrastructure Milestones



### Integrated National Nuclear Ecosystem

Achieving national readiness across all **IAEA 19 Nuclear Infrastructure Issues** requires synchronized collaboration across primary pillars:

  
**Government**  
Policy & Treaties

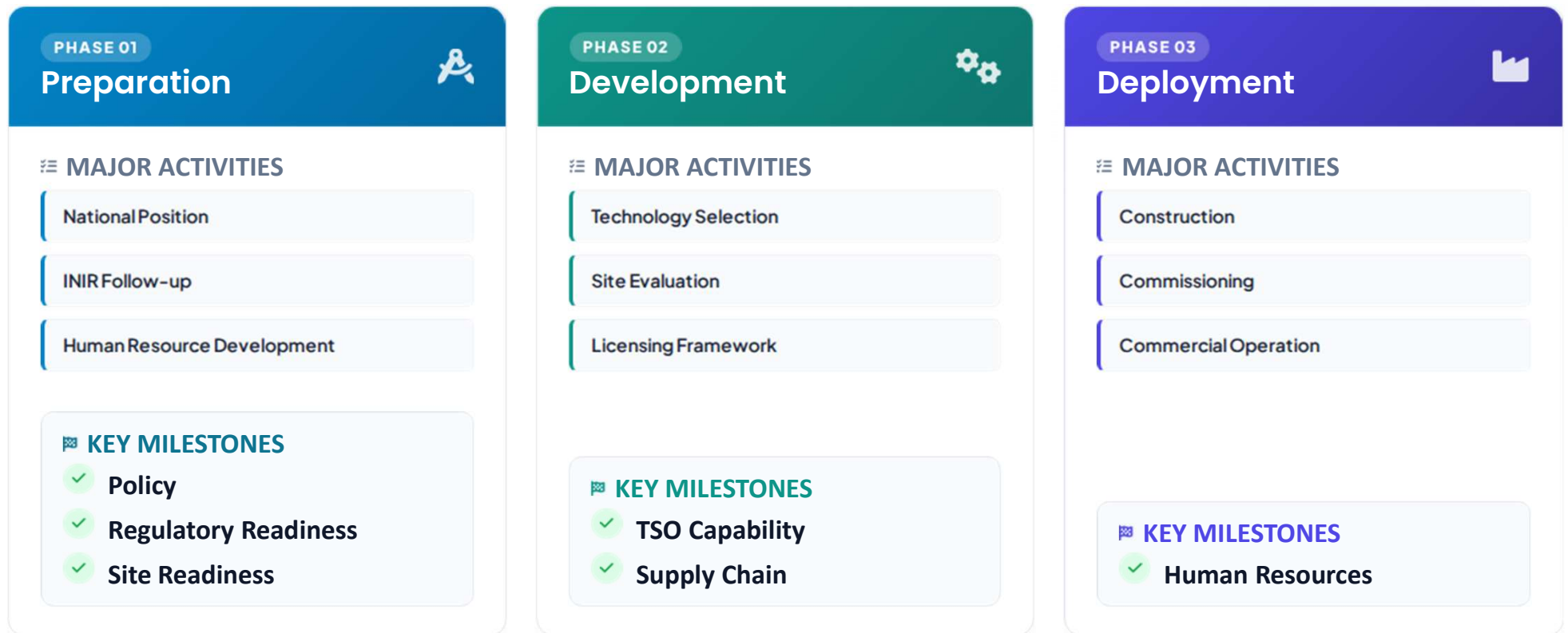
  
**Regulator (OAP)**  
Licensing & Safety

  
**Operator (EGAT)**  
Owner & Utility

  
**TSO (TINT)**  
Technical Support

  
**Industry/Academia**  
Supply & Human Capital

# Proposed Thailand SMR Deployment Roadmap



## **| Thailand's INIR Journey**

## Thailand's INIR Journey



### **INIR Mission Objective**

Benchmarking Thailand's national nuclear infrastructure against IAEA international standards across all 19 infrastructure issues.

### **Primary Findings**

Detailed gap analysis completed, leading to the formulation of a structured National Action Plan for nuclear readiness.

### **Concrete Progress Made**

Enhanced self-evaluation methodologies, updated technology-neutral regulatory pathways, and strengthened core technical competence.

# IAEA Infrastructure Issues: Establishing National Readiness for SMR Deployment

| Infrastructure Issue           | Importance for SMR                                                | Thailand Status                                                                        |
|--------------------------------|-------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| 1. National Position           | Government policy, long-term commitment, national strategy        | Nuclear included in draft PDP2024; national policy under development                   |
| 2. Nuclear Safety              | Safety-first approach, adoption of IAEA Safety Standards          | OAP developing regulatory framework; TINT supports technical expertise                 |
| 3. Management                  | Establishment of NEPIO, project governance and coordination       | National coordination among Ministry of Energy, OAP, EGAT and TINT                     |
| 4. Funding & Financing         | Financial model, investment strategy and risk sharing             | Financing model for first SMR remains under evaluation                                 |
| 5. Legislative Framework       | Nuclear law, liability, international conventions                 | Nuclear Energy for Peace Act enacted; additional SMR-specific regulations needed       |
| 6. Safeguards                  | Compliance with IAEA safeguards and non-proliferation obligations | Thailand has Comprehensive Safeguards Agreement and Additional Protocol implementation |
| 7. Regulatory Framework        | Independent regulatory authority with licensing capability        | OAP strengthening licensing capability for advanced reactors                           |
| 8. Radiation Protection        | Protection of workers, public and environment                     | National radiation protection system established and operational                       |
| 9. Electrical Grid             | Grid stability, load following, integration of SMRs               | Grid assessment required for regional deployment scenarios                             |
| 10. Human Resource Development | Engineers, operators, regulators and TSO experts                  | Existing expertise through TINT, universities and IAEA capacity building               |

## IAEA Infrastructure Issues: Establishing National Readiness for SMR Deployment

| Infrastructure Issue                          | Importance for SMR                                                    | Thailand Status                                                                        |
|-----------------------------------------------|-----------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| <b>11. Stakeholder Involvement</b>            | Public acceptance, transparent communication and local engagement     | Public communication strategies continue to be strengthened                            |
| <b>12. Site and Supporting Facilities</b>     | Site evaluation, seismic, environmental and supporting infrastructure | Candidate site assessment methodology under development                                |
| <b>13. Environmental Protection</b>           | Environmental Impact Assessment and monitoring programme              | National environmental regulations available; nuclear-specific implementation required |
| <b>14. Emergency Planning</b>                 | Integrated emergency preparedness and response                        | National emergency arrangements exist and require adaptation for SMRs                  |
| <b>15. Security &amp; Physical Protection</b> | Physical protection, cybersecurity and insider threat mitigation      | Nuclear security framework established and continuously enhanced                       |
| <b>16. Nuclear Fuel Cycle</b>                 | Fuel supply, spent fuel management and backend strategy               | Long-term fuel supply and spent fuel policy require further development                |
| <b>17. Radioactive Waste Management</b>       | Waste treatment, storage and disposal throughout plant lifetime       | National radioactive waste management infrastructure available through TINT            |
| <b>18. Industrial Involvement</b>             | Local supply chain, manufacturing and quality assurance               | Opportunities exist to expand Thai industrial participation                            |
| <b>19. Procurement</b>                        | Vendor selection, contracting strategy and quality management         | Procurement framework will depend on selected SMR technology and delivery model        |

## **| TINT as the Technical Support Organization**

## Stakeholder Roles in SMR Infrastructure

### Government

- Formulating SMR deployment strategies & energy policies.
- Establishing state financing & investment frameworks.
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### Regulatory Body (OAP)

- Developing technology-neutral licensing frameworks.
- Providing independent nuclear safety oversight.
- Enforcing environmental & radiation protection standards.

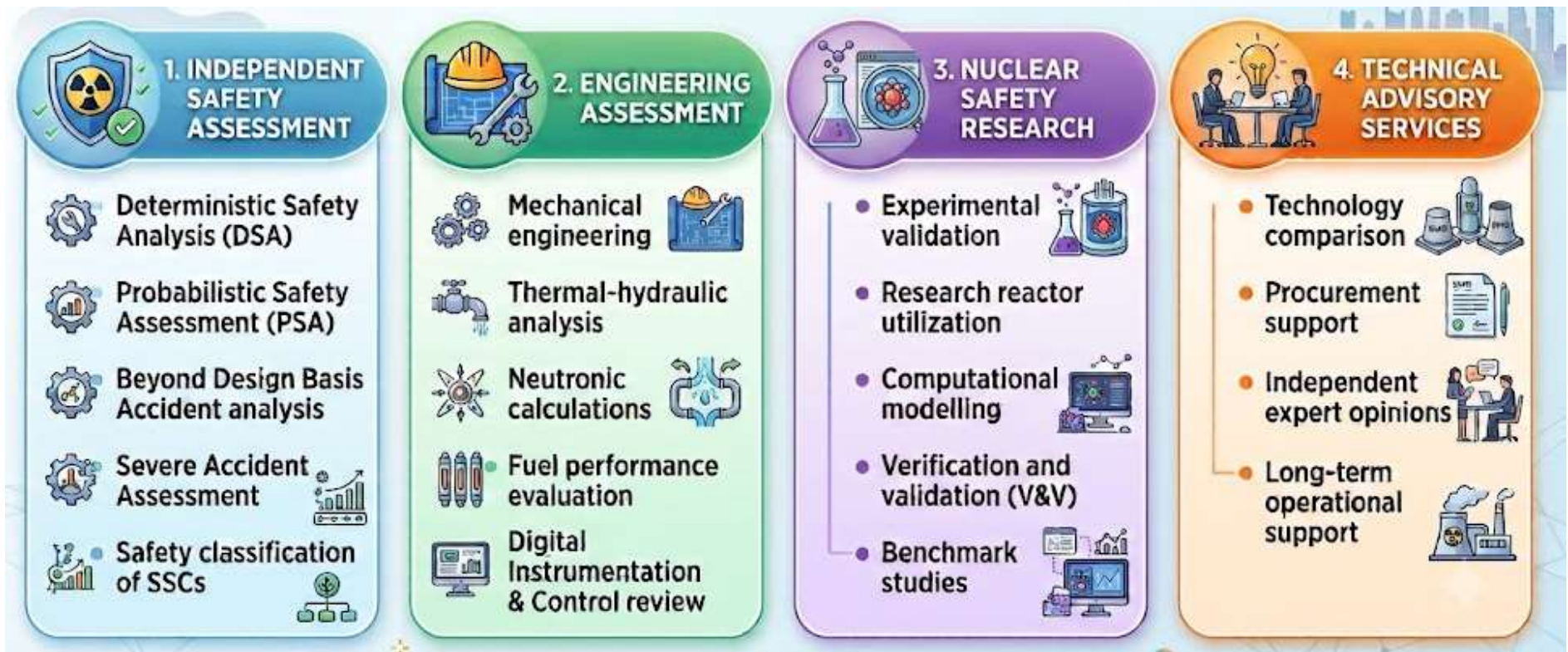
### TINT (Technical Support Organization)

- Performing independent safety & severe accident assessments.
- Evaluating SMR technology designs & core physics
- Conducting R&D and serving as national technical advisor.

### Industry & Academia

- Qualifying local industrial supply chains for nuclear codes.
- Expanding university degree programs in nuclear engineering.
- Developing skilled national workforce & specialized labor.

## TINT Strategic Core Functions as TSO



# Existing Technical Infrastructure & Expertise

## TRR-1/M1 Research Reactor

Decades of operational track record providing hands-on experience in core physics, neutronics, reactor fuel management, ageing management, and operator training.

## Safety & Licensing Support

Proven technical capability in reviewing Safety Analysis Reports (SAR), executing Periodic Safety Reviews (PSR), and evaluating site seismic/environmental safety.

## Security & Safeguards

Established radiation protection programs, state nuclear material accounting (SSAC), cybersecurity for nuclear facilities, and radioactive waste characterization.

## Radiation Science

Existing capabilities in radiation protection, monitoring and measurement, dosimetry, environmental monitoring, radioactive waste characterization, and radioisotope applications..

## Human Resource Development

reactor operator training, university education, professional development, IAEA fellowships and regional workshops, and Train-the-Trainer programmes. These activities contribute to building and sustaining the skilled workforce required throughout the SMR lifecycle.

# Long-Term Vision for TINT as TSO



TINT will evolve into a **Regional Centre of Excellence** for SMR Technical Support



01

## National TSO

Serving as Thailand's national Technical Support Organization specifically for advanced reactor technologies and deployment.



Governance & Oversight



02

## Lifecycle Scientific Advice

Providing independent, rigorous scientific advice throughout the complete lifecycle of SMR nuclear facilities.



Full Lifecycle



03

## Regulatory Decision Support

Supporting regulatory decision-making through validated technical, safety, and deterministic analyses.



Validated Analysis



04

## National Safety Expertise

Developing specialized national expertise in advanced reactor safety standards, licensing codes, and technical reviews.



Capacity Building



05

## IAEA Collaborating Institution

Acting as an IAEA collaborating institution for SMR technology, safety frameworks, and capacity building in Southeast Asia.



Regional Excellence

## Challenges for SMR Deployment

| No. | Challenge                                                                                                                                                 | Measures                                                                                                                                                          |
|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1   |  <b>Establish a national SMR deployment strategy.</b>                    | <ul style="list-style-type: none"> <li>Define clear vision, roles, governance, roadmap and milestones to guide SMR development and deployment.</li> </ul>         |
| 2   |  <b>Develop technology-neutral licensing approaches.</b>                 | <ul style="list-style-type: none"> <li>Implement risk-informed, performance-based and technology-neutral regulatory frameworks.</li> </ul>                        |
| 3   |  <b>Strengthen vendor assessment capability.</b>                         | <ul style="list-style-type: none"> <li>Build technical expertise and processes to evaluate SMR designs, vendors and supply chains effectively.</li> </ul>         |
| 4   |  <b>Enhance financing and business models.</b>                          | <ul style="list-style-type: none"> <li>Develop viable financing mechanisms and innovative business models to attract investment and reduce risk.</li> </ul>       |
| 5   |  <b>Expand domestic industrial participation.</b>                      | <ul style="list-style-type: none"> <li>Strengthen local supply chains, build industrial capability and maximize socioeconomic benefits.</li> </ul>                |
| 6   |  <b>Increase public confidence and stakeholder engagement.</b>         | <ul style="list-style-type: none"> <li>Communicate transparently, engage stakeholders early and build trust through openness and collaboration.</li> </ul>        |
| 7   |  <b>Develop long-term spent fuel and radioactive waste strategies.</b> | <ul style="list-style-type: none"> <li>Establish safe, sustainable and responsible solutions for spent fuel management and radioactive waste disposal.</li> </ul> |

## **| Way forward and conclusions**

# Key Takeaways & Way Forward



## 1. National Infrastructure Readiness

Government & Sectoral Policy Recommendations

### 1 Complete IAEA Milestone Infrastructure Activities

Accelerate national readiness across grid evaluation, environmental impact assessments, and public involvement frameworks required prior to nuclear contracting.

### 2 Strengthen SMR regulatory framework

Enhance the Nuclear Energy for Peace Act to incorporate streamlined SMR licensing, passive safety system validation, and factory-fueled transport guidelines.

### 3 Expand international cooperation

Institutionalize bilateral and multilateral ties with IAEA, vendor countries, and ASEAN regional partners.



## 2. TINT TSO Transformation

Technical Support Organization Capability Roadmap

### 1 Formalize National TSO Advisory Mandate

Position TINT as Thailand's primary independent Technical Support Organization, providing scientific verification and safety expertise to national regulators.

### 2 Deploy SMR Digital Twin & Simulation Platform

Establish advanced thermohydraulic test loops and deterministic safety modeling tools to independently evaluate vendor safety claims.

### 3 IAEA INPRO Integration & HRD Development

International collaboration with IAEA INPRO

## Conclusions

**1** Thailand has substantially strengthened its nuclear infrastructure since the 2010 INIR mission and is now focusing on capabilities required for advanced reactors and SMRs.

**2** The next step is to strengthen national infrastructure and technical capabilities to support future SMR deployment.

**3** TINT is well positioned to serve as Thailand's Technical Support Organization, providing independent technical expertise, research, training, and scientific support throughout the SMR lifecycle.



**Thank you very much for your attention**

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