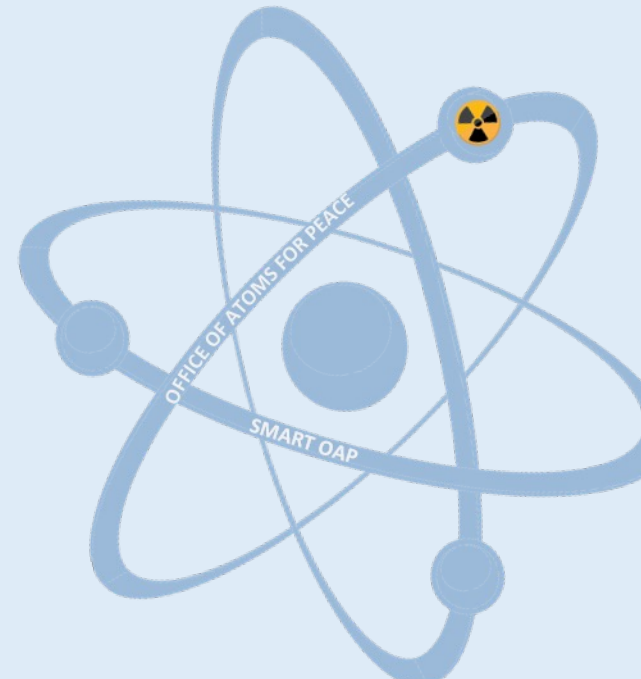


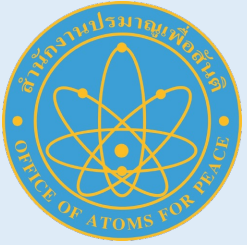
Office of Atoms for Peace(OAP)

Ministry of Higher Education, Science, Research and Innovation Thailand

NPP Programme, Regulatory Framework and Licensing Process for Nuclear Facilities in Thailand

Office of Atoms for Peace
Manila, Philippine
November 14, 2023



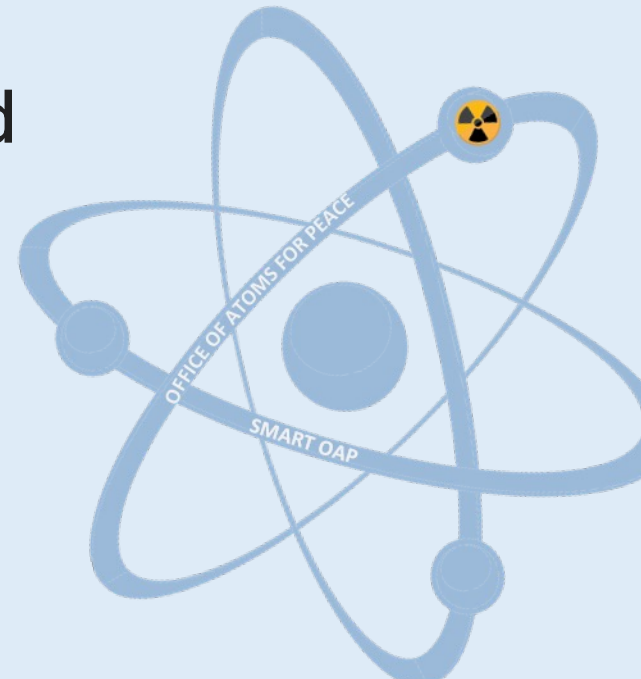


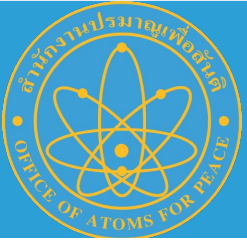
Office of Atoms for Peace(OAP)

Ministry of Higher Education, Science, Research and Innovation.Thailand

Content

1. Existing Nuclear Programme and Future Plans of Thailand
2. Governmental Infrastructure for Nuclear and Programme
3. Overview of Legal and Regulatory Framework
4. Licensing Process for Nuclear Facilities in Thailand

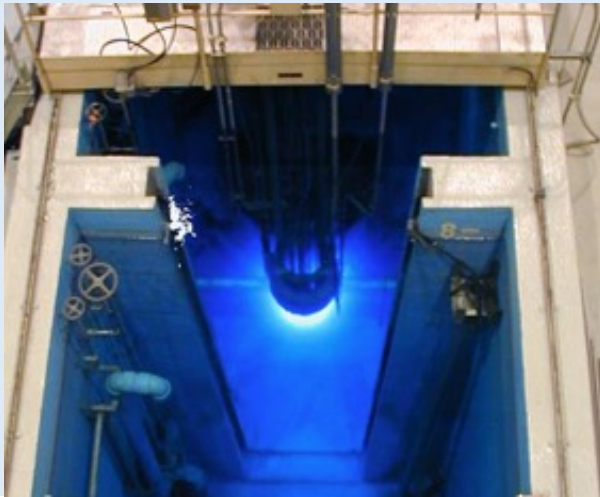


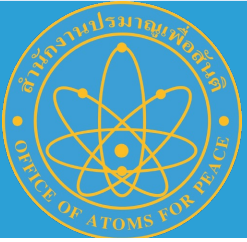


Existing Nuclear Programme and Future Plans of Thailand

Research reactors

1. **TRR-1/M1** (existing) 1.3 MW
2. **Suranaree University of Technology - MNSR** (future) 45 kW
3. **New research reactor (ONRC)** of Thailand Institute of Nuclear Technology (future) 15–20 MW

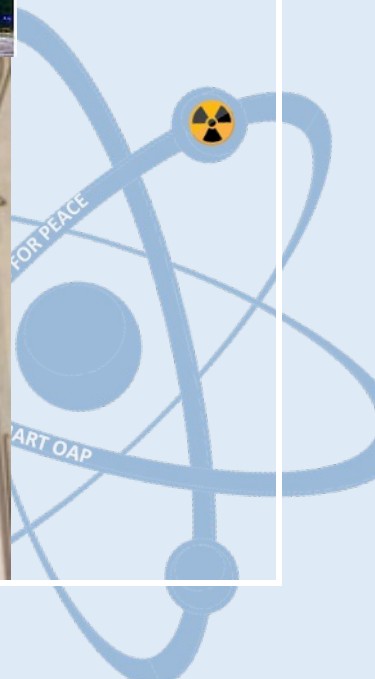
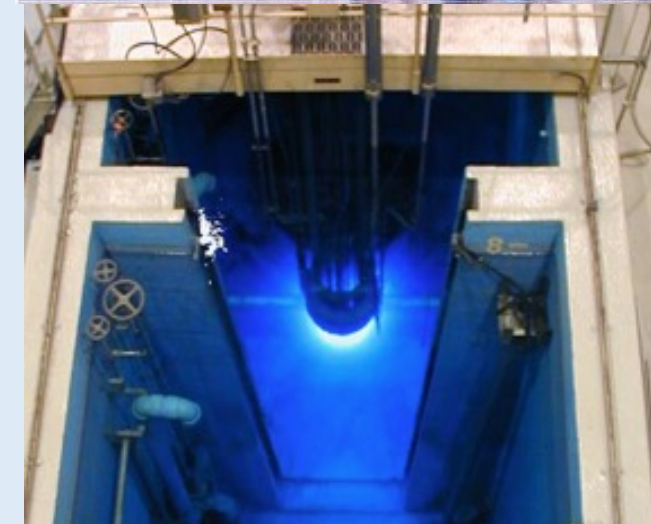


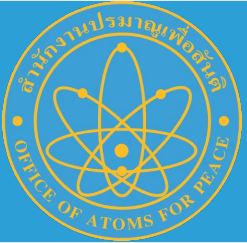


Existing Nuclear Facilities&Activities in Thailand

Existing Research reactors TRR-1/M1

- ❁ Operated by Thailand Institute of Nuclear Technology (TINT).
- ❁ Power 1.3 MWth (licensed).
- ❁ Thai Research Reactor (TRR-1) went first critical in 1962.
- ❁ Modified into TRIGA Mark III (HEU to LEU conversion) in 1977, called TRR-1/M1.
- ❁ Instrumental & Control Upgraded Program implemented in 2015.





Existing nuclear programme of Thailand and future plans and existing nuclear facilities&activities in Thailand

NEAR-FUTURE RESEARCH REACTOR PROJECTS IN THAILAND

SUT-RR

- ⚛ A 45 kW research reactor for Boron Neutron Capture Therapy(BNCT) of Suranaree University of Technology (SUT). Located in Nakorn-Rachsrma province.

Issued Site license in January 2021.

*Under the process of Construction License application
Plan to construct in 2024-2025*

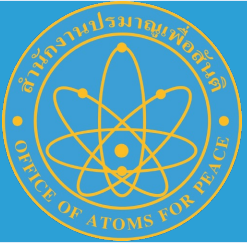


Ongkarak Nuclear Research Center (ONRC)

- ⚛ Approximately **15-20 MW**, a multipurpose research reactor of Thailand Institute of Nuclear Technology at Ongkarak site (Nakornnayok province).

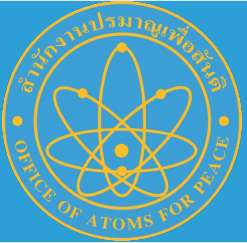
*Under process of approval from government
(preparations of feasibility study, EHIA, site license application)*



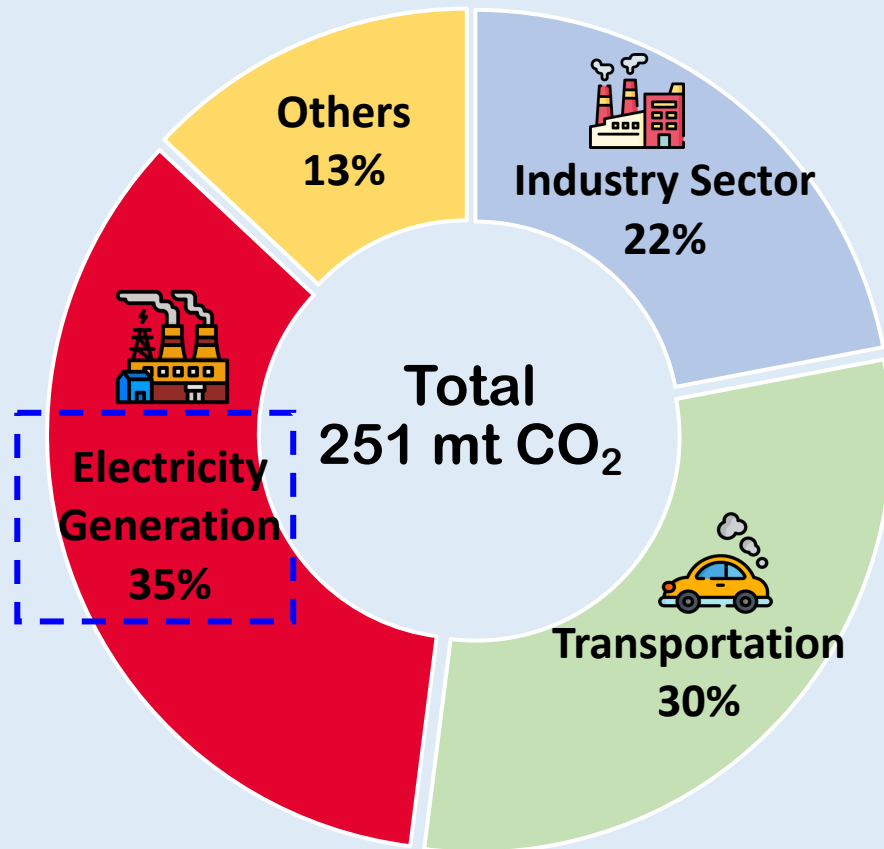


Nuclear power program in Power Development Plan (PDP)

Year	# Units	Capacity (MWe)	Operation year	Note
PDP 2007	4	1,000 – 1,350	2020, 2021	
PDP 2007 Rev. 2	3	1,000	2020	
PDP 2010	5	1,000	2010, 2012, 2024, 2025, 2028	
PDP 2010 Rev. 2	4	1,000	2023, 2024, 2027, 2028	Revised after the Fukushima accident in March, 2011
PDP 2010 Rev. 3	2	1,000	2026, 2027	
PDP 2015	2	1,000	2035, 2036	
PDP 2018	-	-		
PDP 2023 (revising)	➔ Ministry of Energy is considering to add Small Modular Reactor (SMR) to integrate into SMART grid.			

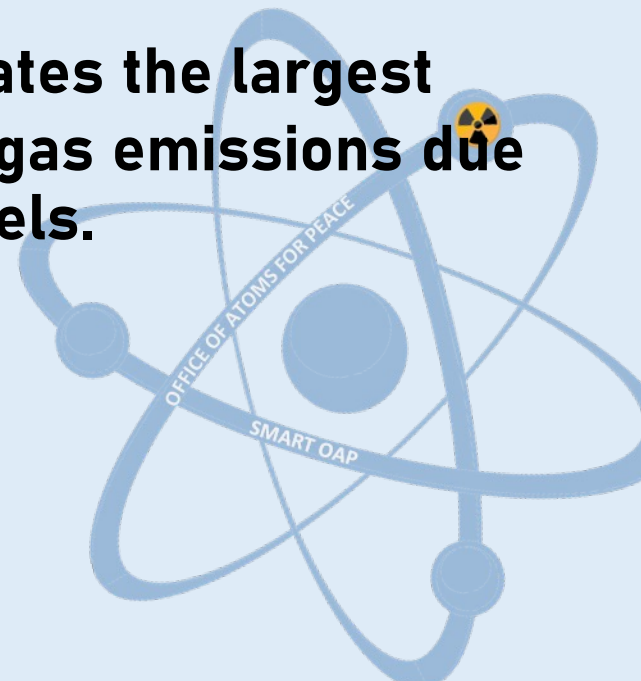


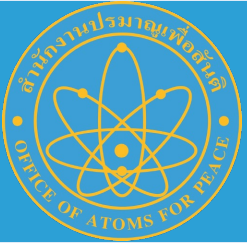
Thailand's CO₂ Emission by Sector



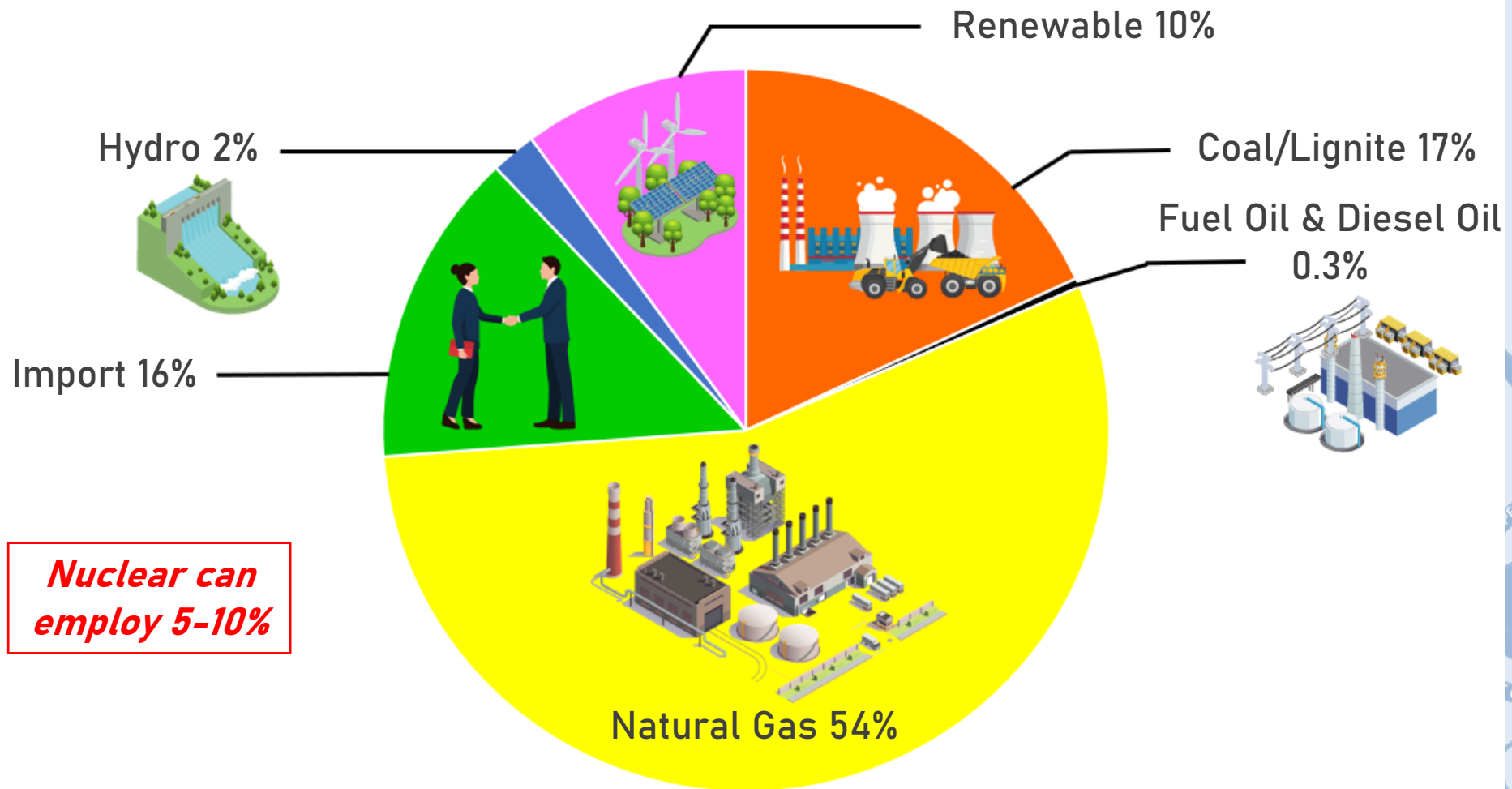
Total carbon dioxide(CO₂) emissions for Thailand in 2019 was **251** million ton carbon dioxide.

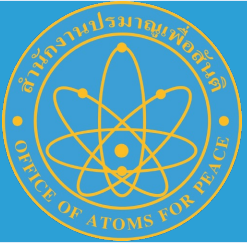
Electric power generates the largest share of greenhouse gas emissions due to burning of fossil fuels.



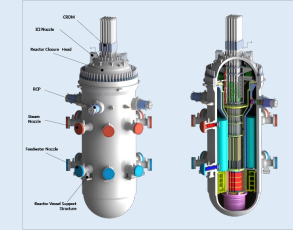


Electricity Generating Proportion in Thailand (2021)

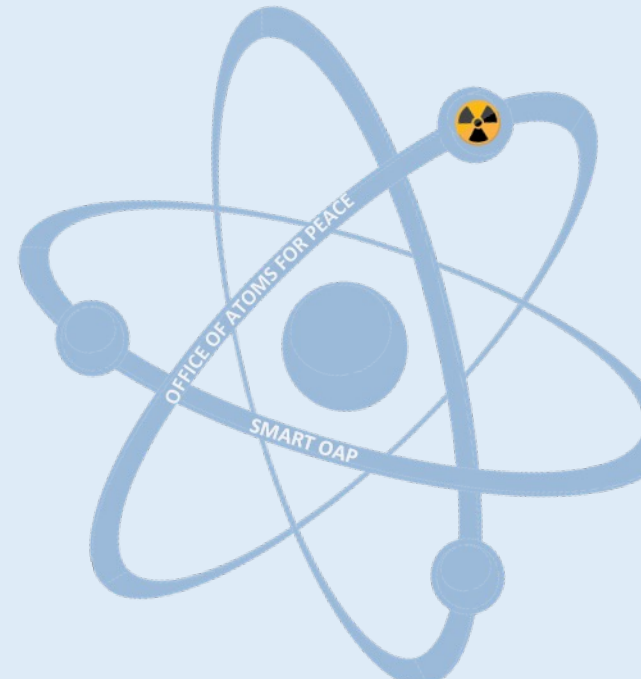


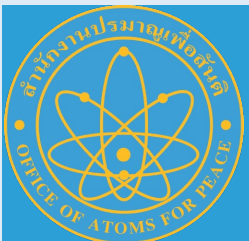


Step Forward



- ⚛ **Decision to “GO NUCLEAR”**, and with “NPP” or “SMRs?”
- ⚛ **Identify the purposes** of NPP / SMRs: electricity production, heat, integrated power resources?
- ⚛ **Technology selection**; water-cooled or non water-cooled?
- ⚛ **Site selection**:
 - Industrial needs
 - SMART grid





Governmental infrastructure for nuclear and programme

Preparation of all necessary infrastructures

Legal:



- ⚙️ Amendment of the Nuclear Energy for Peace Act
- ⚙️ International legal instruments

Establish the “Nuclear Power Infrastructure Preparation Committee”



Human resources development



- ⚙️ Regulatory body
- ⚙️ Operator
- ⚙️ Technical and Scientific Support Organizations (TSO)
- ⚙️ Other relevant organizations

Develop the licensing approach (with “design certificate”?)



Grid



Safety culture

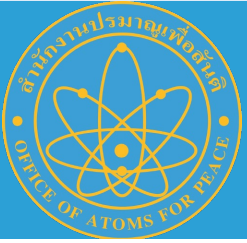


Security and safeguards regimes

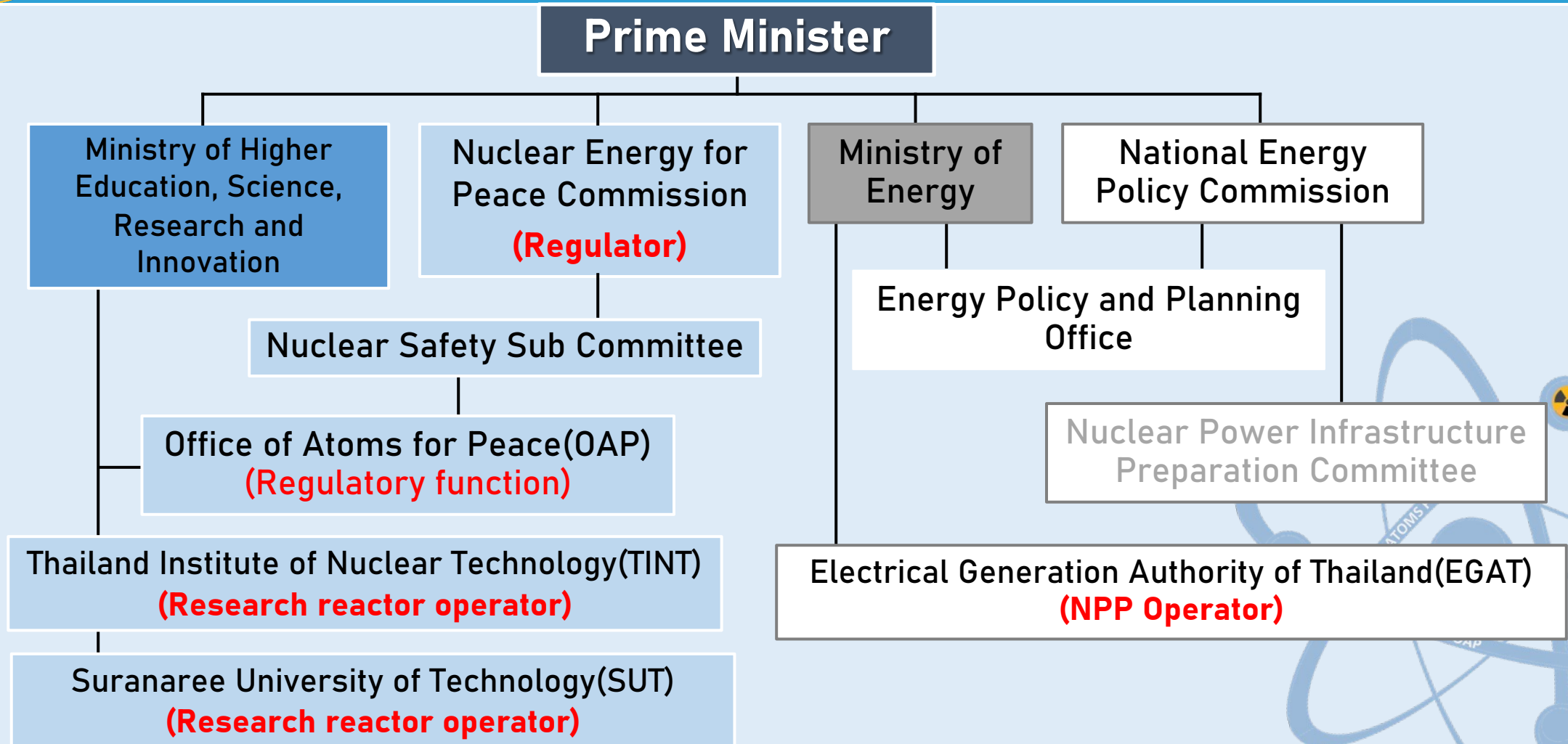
Other resources: financial, land, etc.



SMART OAP



National Organizations Roles and Responsibilities





Overview of legal and regulatory framework infrastructure for safety of nuclear reactors and radiation facilities in Thailand

Nuclear Energy for Peace Act (2016) as amended with 152 sections in 15 Chapters

Chapter 1: General Provisions

Chapter 2: Nuclear Regulatory Committee

Chapter 3: Radioactive Materials and Radiation Generating Devices

Chapter 4: Nuclear Materials

Chapter 5: Nuclear Facilities

Chapter 6: Radioactive Waste

Chapter 7: Spent Nuclear Fuel

Chapter 8: Safety Security and Safeguards

Chapter 9: Transportation

Chapter 10: Nuclear and Radiation Emergency

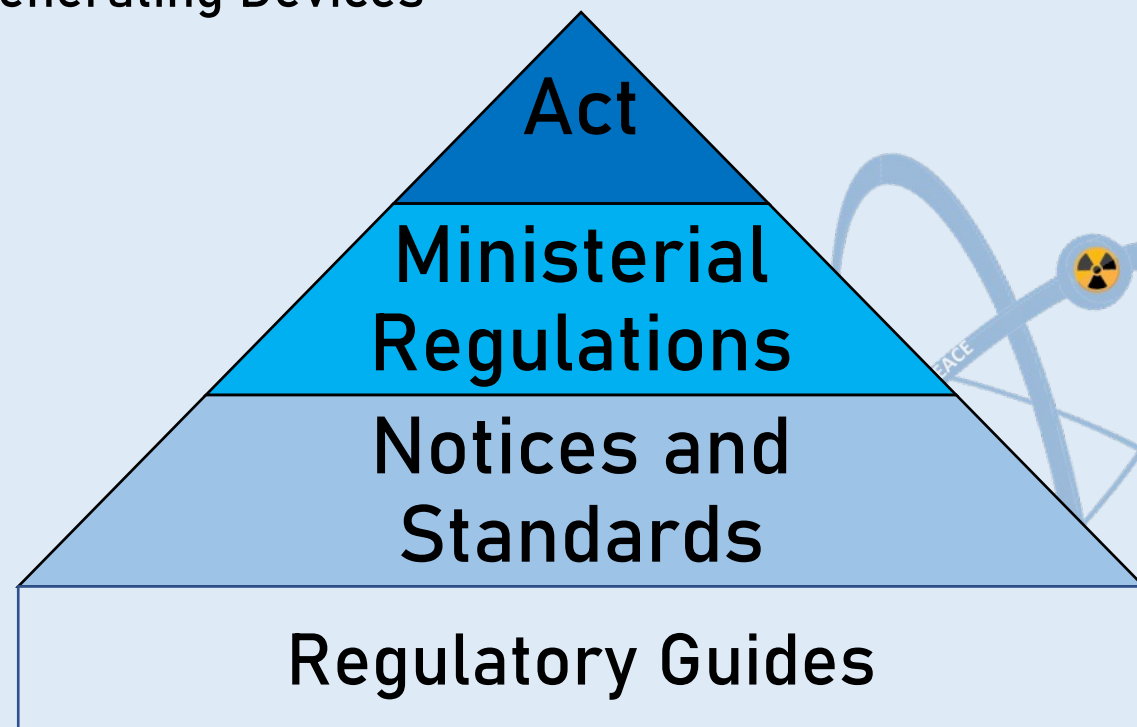
Chapter 11: License Revocation and Suspension

Chapter 12: Appeal

Chapter 13: Inspectors

Chapter 14: Penalties

Chapter 15: Transitional Provisions





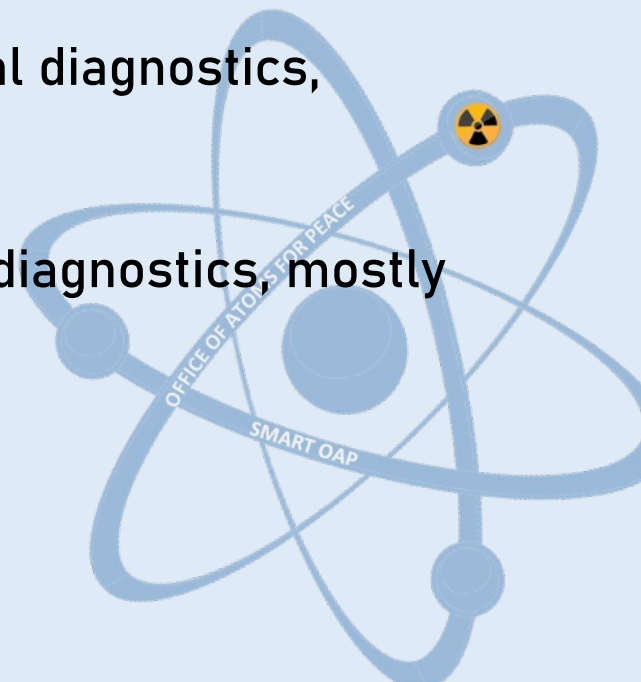
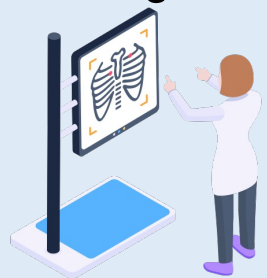
Regulatory bodies

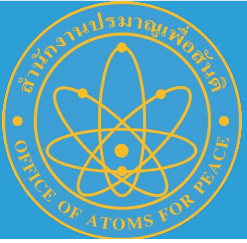
Under the Nuclear Energy for Peace Act (2016) as amended: The Office of Atoms for Peace

- ❁ Licenses issued by the Secretary-General
- ❁ Licenses must be approved by the Nuclear Energy for Peace Commission if involving nuclear facilities, radioactive waste management facilities, and spent nuclear fuel
- ❁ Regulate all but radiation generators specifically designed for medical diagnostics, mostly x-ray machines

The Ministry of Public Health

- ❁ Regulate only radiation generators specifically designed for medical diagnostics, mostly x-ray machines





Overview of legal and regulatory framework infrastructure for safety of nuclear reactors and radiation facilities in Thailand

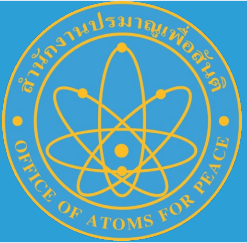
☢ Licensing

- License fee
- Guarantee required for radioactive waste management
- Safety officer required

☢ Notification

☢ Exemption

Things to be regulated	Exemption	Notification	Licensing
Radioactive material	X	X	X
Radiation generators	X	X	X
Nuclear material		X	X
Nuclear facilities			X
Spent nuclear fuel			X
Radioactive waste			X
Radioactive waste management facilities			X



Overview of legal and regulatory framework infrastructure for safety of nuclear reactors and radiation facilities in Thailand

List of Nuclear Materials under the Act

1) source material



(a) natural uranium, depleted uranium, thorium, or other material as prescribed by the Ministerial Regulation

(b) mineral or ore containing one or more materials specified in (a) in such concentration as prescribed by the Ministerial Regulation

(2) special nuclear material such as

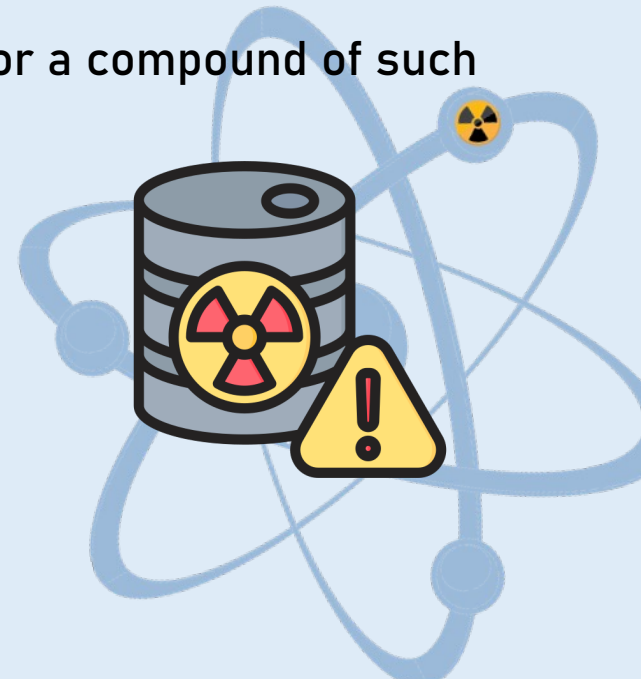
(a) plutonium, uranium-233, uranium enriched by uranium-233 or uranium-235, or a compound of such element;

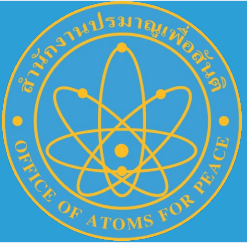


(b) any material containing one or more materials specified in (a) in a mixture;

(c) other material as prescribed by the Ministerial Regulation;

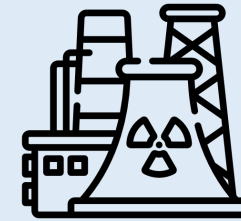
(3) other material as prescribed by the Ministerial Regulation;



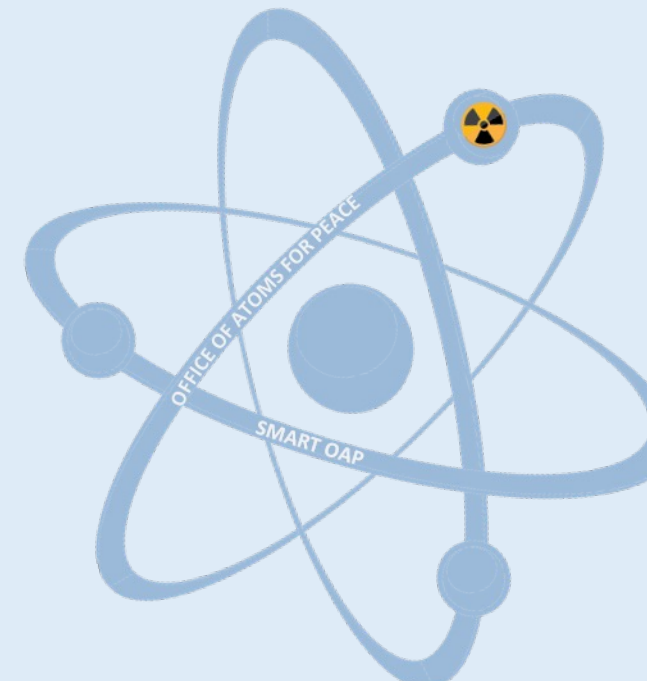


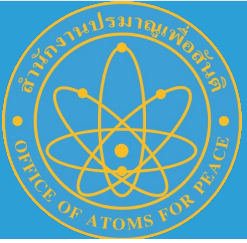
Overview of legal and regulatory framework infrastructure for safety of nuclear reactors and radiation facilities in Thailand

☢ List of Nuclear Facilities under the Act



- ⚠ Facility that utilizes a nuclear reactor for energy production but not including a vehicle that utilizes a nuclear reactor for propulsion
- ⚠ Facility that utilizes a research reactor
- ⚠ Facility that performs milling to extract nuclear materials
- ⚠ Facility that converts or enriches nuclear materials
- ⚠ Facility that fabricates or stores nuclear fuel
- ⚠ Facility that stores or reprocesses spent nuclear fuel





Licensing process for Nuclear Facilities in Thailand

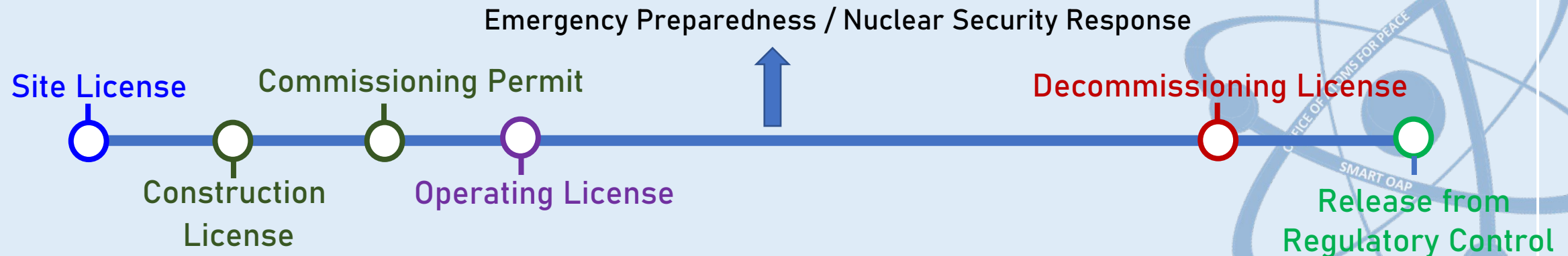
Licenses for Nuclear Facilities in the Act 2016, issued by the Secretary General of the Office of Atoms for Peace with the approval of the Nuclear Energy for Peace Commission.

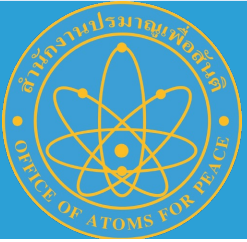
❖ **Site License**

❖ **Construction License (commissioning permit)**

❖ **Operating License**

❖ **Decommissioning License**





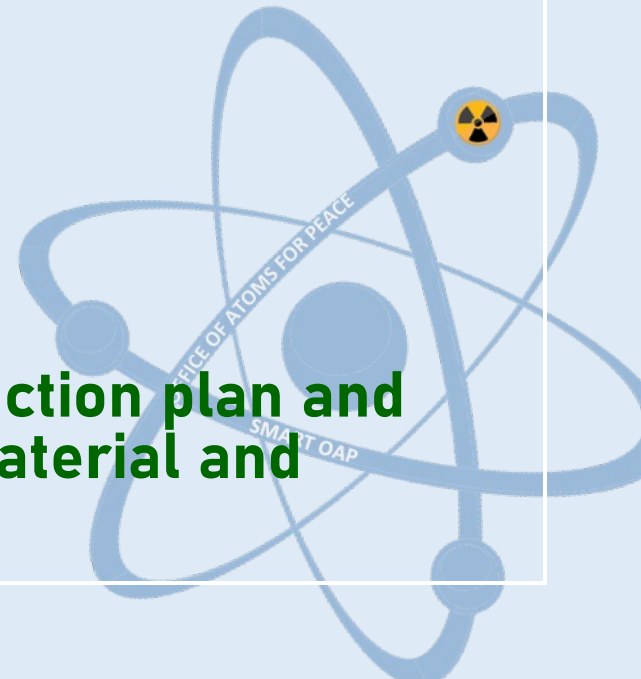
Licensing process for Nuclear Facilities in Thailand

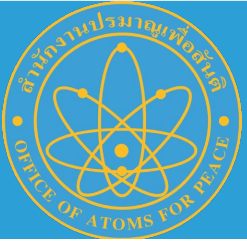
Site License

- Submitted documents for Site license
 - Site Evaluation Report
 - Support documents for Site License (e.g. Security plan, Project feasibility study results)
- Public Hearing

Construction License (commissioning permit)

- Submitted documents for Construction license
 - Preliminary Safety Analysis Report (PSAR)
 - Support documents for Construction License (e.g. Construction plan and installation of equipment system, Nuclear fuel, nuclear material and radioactive materials transport plan)





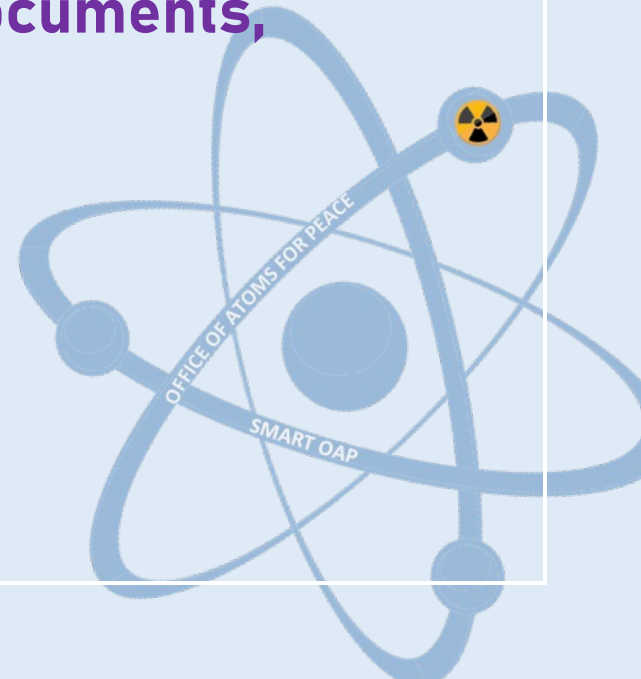
Licensing process for Nuclear Facilities in Thailand

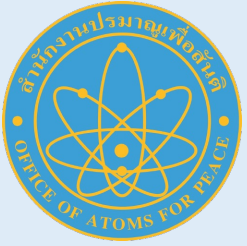
Operating License

- **Submitted documents for Operating license**
 - **Final Safety Analysis Report (FSAR)**
 - **Construction License**
 - **Support documents for Operating License (e.g. financial documents, Assurance plan for radioactive waste management)**

Decommissioning License

- **Submitted documents for Decommissioning license**
 - **Decommissioning Plan**
 - **Financial documents**





Office of Atoms for Peace(OAP)

Ministry of Higher Education, Science, Research and Innovation.Thailand

Thank you for your attention

