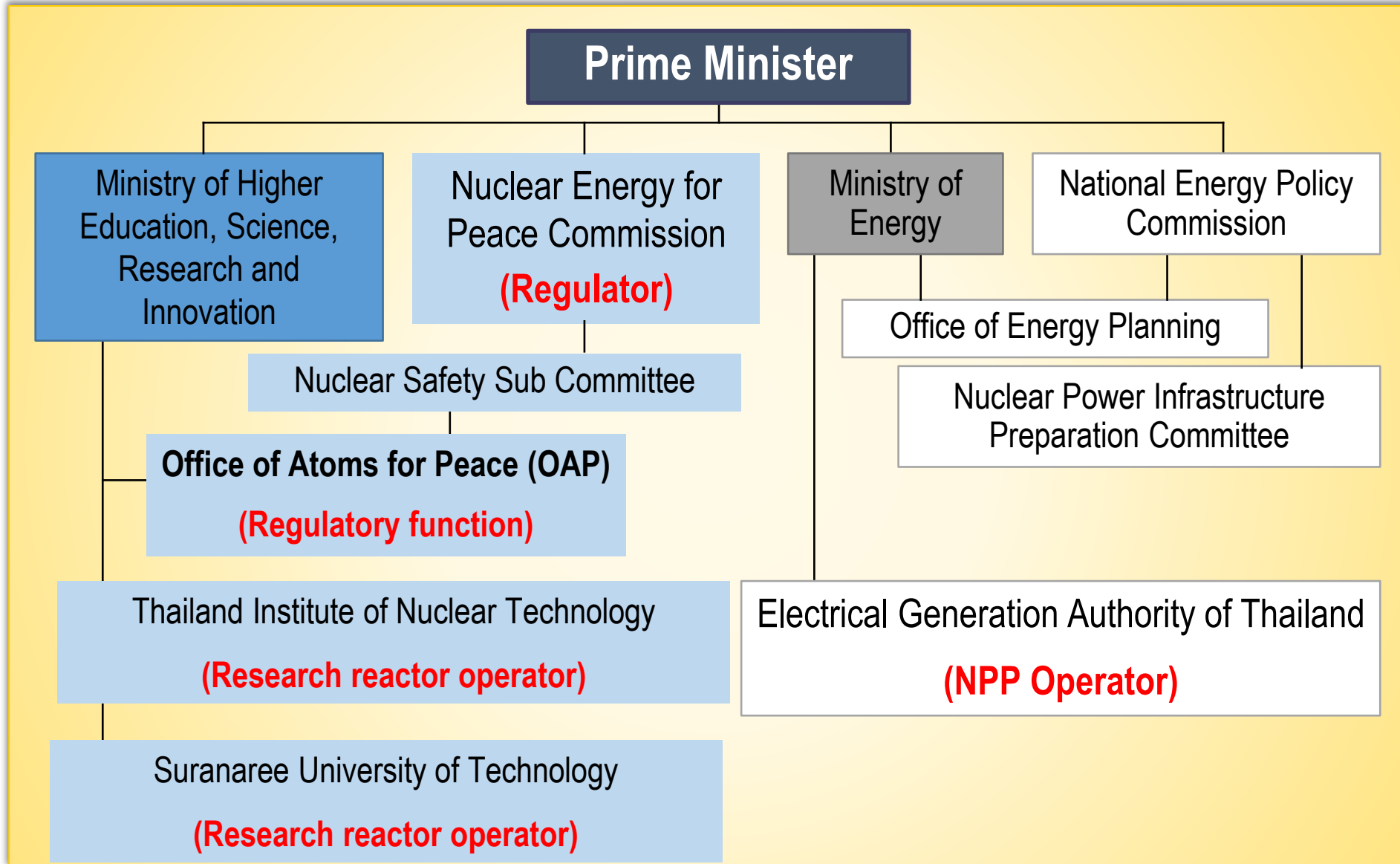


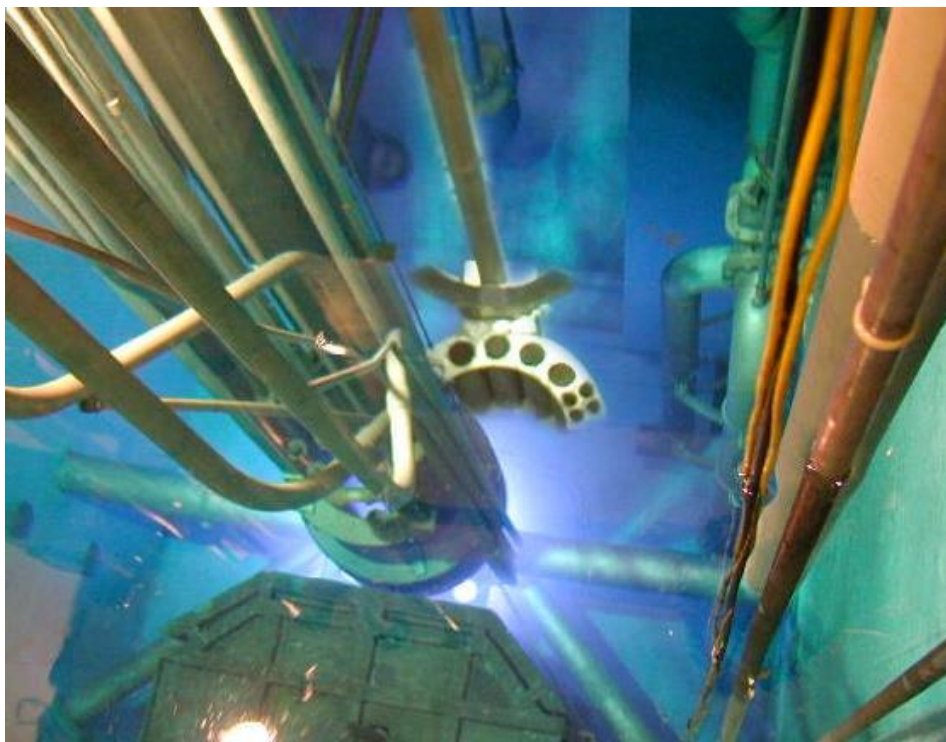


NUCLEAR ENERGY PROGRAM IN THAILAND & CONSIDERATIONS FOR SMR_s

PEERAVUTH BOONSUWAN, PH.D.
OFFICE OF ATOMS FOR PEACE, THAILAND

NATIONAL NUCLEAR INFRASTRUCTURE





FIRST RESEARCH REACTOR IN THAILAND – TRR-1/M1

- Operated by Thailand Institute of Nuclear Technology (TINT).
- Power 1.3 MWth.
- 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.



NEAR-FUTURE RESEARCH REACTOR PROJECTS IN THAILAND

I. A **45 kW** research reactor for Boron Neutron Captured Therapy research of Suranaree University of Technology (SUT). Located in Nakorn-Rachsrima province.

- *Issued Site license in January 2021.*
- *Under process of Construction License application*
- *Plan to construct in 2024-2025*

II. 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 FACILITY PROJECTS IN 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

Nuclear Power

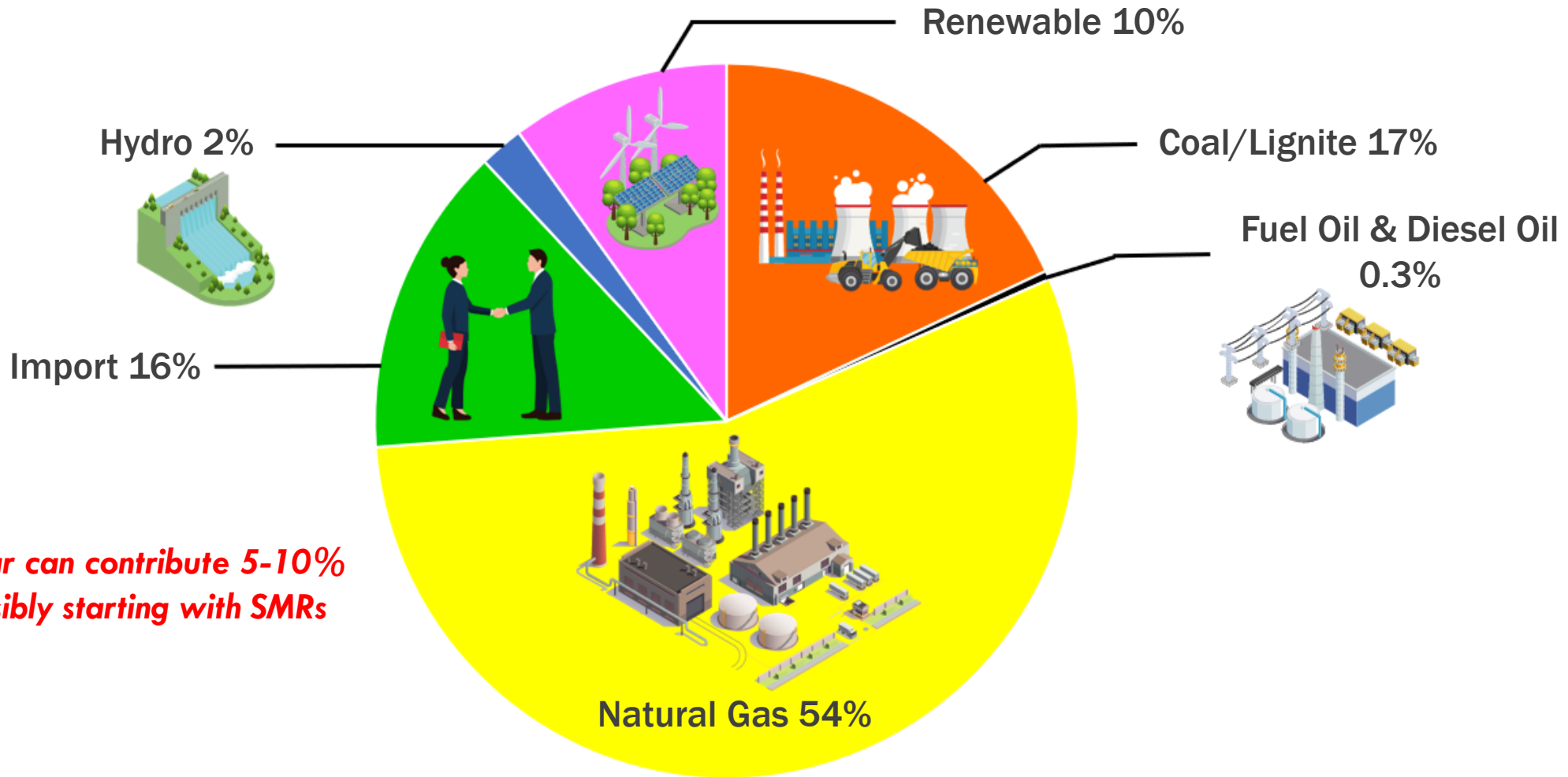
in the Power Development Plan (PDP)

- PDP 2007
- PDP 2010 (3 revisions)
→ Fukushima accident in 2011
- PDP 2015
- PDP 2018 (no NPP)
- PDP 2022(or 2023) is being revised

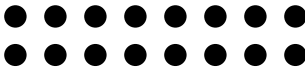
NUCLEAR POWER PROGRAM IN THAILAND

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 2022 (revising)	→ Ministry of Energy is considering to add Small Modular Reactor (SMR) to integrate into SMART grid.			

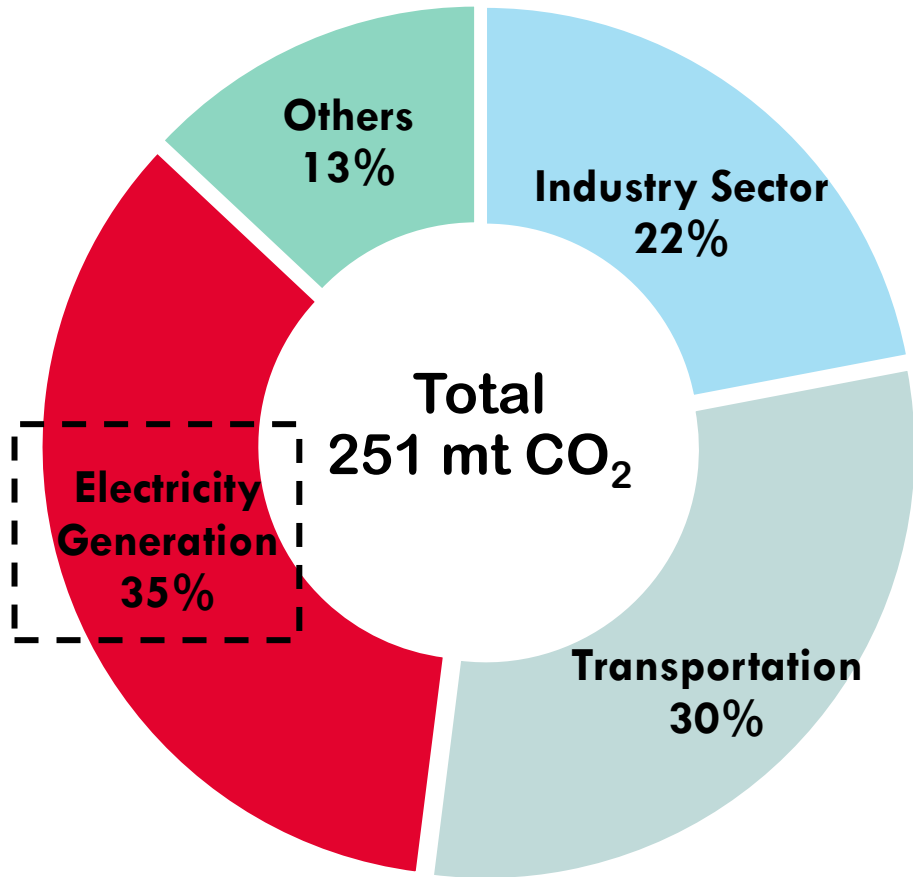
ELECTRICITY GENERATING PROPORTION IN THAILAND (2021)



**Nuclear can contribute 5-10%
- possibly starting with SMRs**



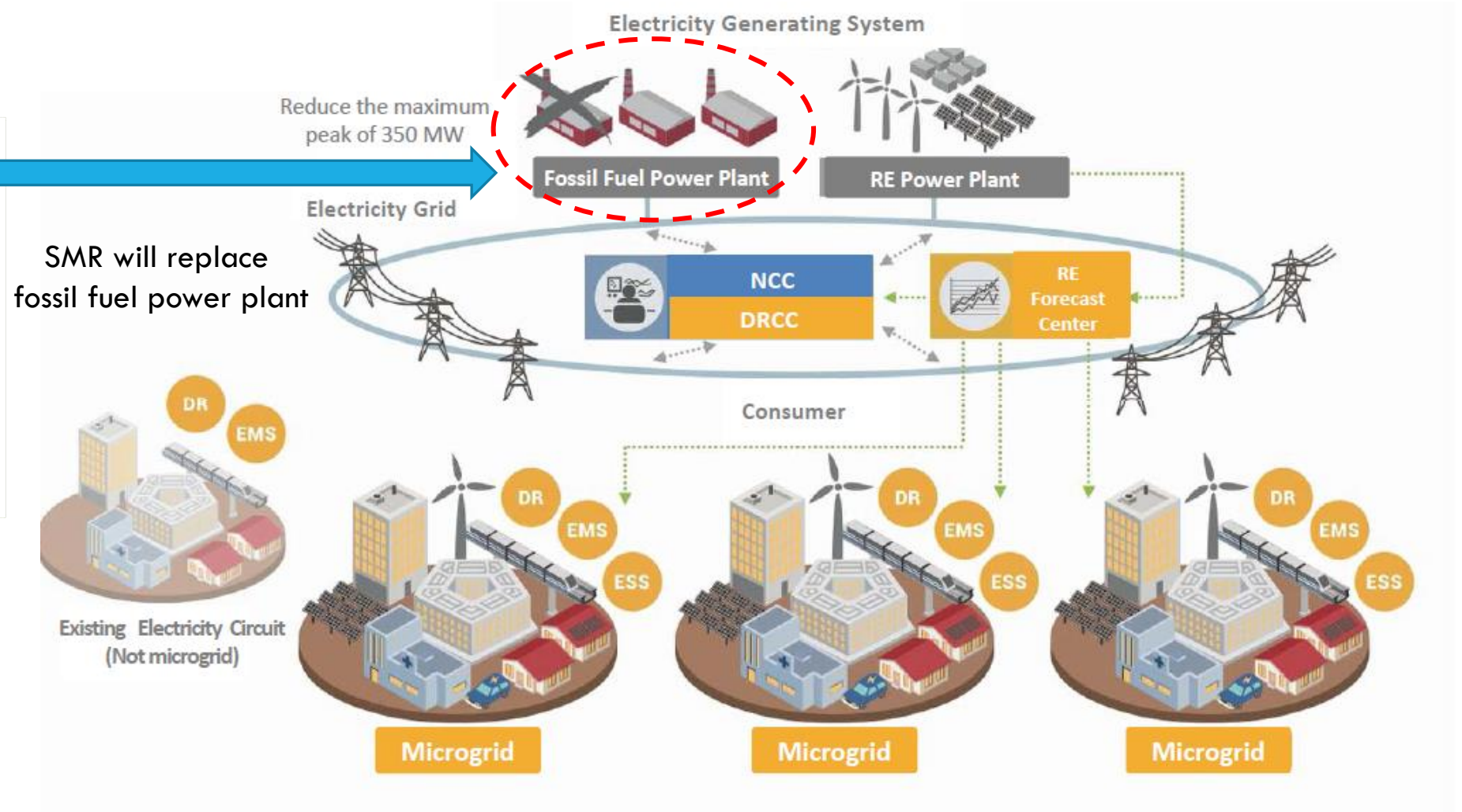
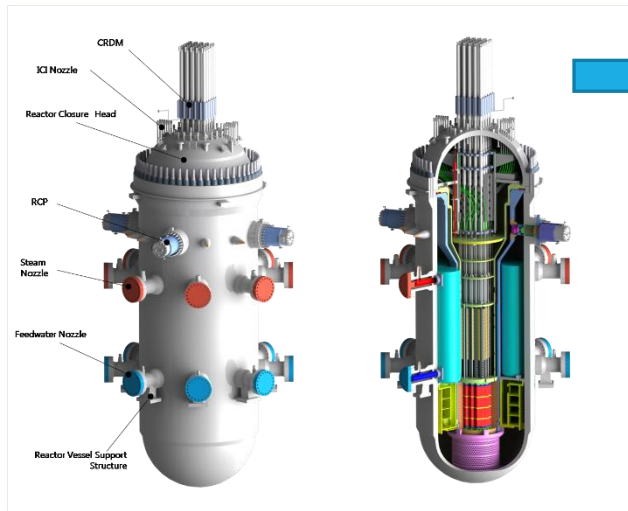
Thailand's CO₂ Emission by Sector



Total carbon dioxide 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.

CONCEPT OF SMART GRID



Benefit;

- Supply to energy demand
- Reduction of CO₂ - gas emission
- Fuel diversification

Re : Renewable Energy
ESS : Energy Storage

DR : Demand Response
EMS : Energy Management System

NCC : National Control Center
DRCC : Demand Response Control Center

CURRENT CHALLENGES

- **National position**

 - Political instability

 - Government commitment  Focusing on RE + Hybrid technologies

- **Public acceptance**

 - Public dialogues on nuclear options

 - Pilot plants (SMRs) to build public confidence

- **Laws and regulations for nuclear power / SMRs**

 - Nuclear Energy for Peace Act 2016 was enacted and updated in 2019

 - Amendments to be made specifically for SMRs for licensing approach, security, or transportation (ongoing)

- **Leveraging international assistance/expertise for SMRs in terms of technologies and effective regulation (IAEA, US (FIRST), China, etc.)**

SUMMARY

- SMRs seem to be a logical and viable option for Thailand in terms of public acceptance, initial investment, environment, and regulation.
- Thailand has yet to decide on the type, but the SMRs need to be based on proven technologies – most likely LWR-type, but Thailand is open to other new technologies.
- Thailand has been working on establishing effective regulation controls and will likely be enacting new legislation specifically for SMRs to ensure the safety, security, and safeguards of future SMRs to be built in Thailand.

Thank you

