Promotion of Energy Resilience and Grid Modernization through ASEAN Energy Resilience Initiative

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Outline

- Introduction of ENTEC, NSTDA
- Global trend of SDG
- Renewable Energy vs Energy Resilience
- Promoting Energy Resilience in ASEAN
- Concluding Remarks

ENTEC | National Energy Technology Center

National Energy Technology Center (ENTEC) was formally established on June 9, 2020 when it was approved by the Thai Cabinet.
It becomes the fifth national center under the National Science and Technology Development Agency (NSTDA).

Vision: A leading organization and a focal point for Thailand's energy technology development

ENTEC | Vision

Impact

Create economical impact, competitiveness, social value and environment

Relevance

Link with national strategy to drive country toward innovation-based economy and sustainability

Visibility

Demonstrate output through R&D competency at national, regional and international level

Excellence

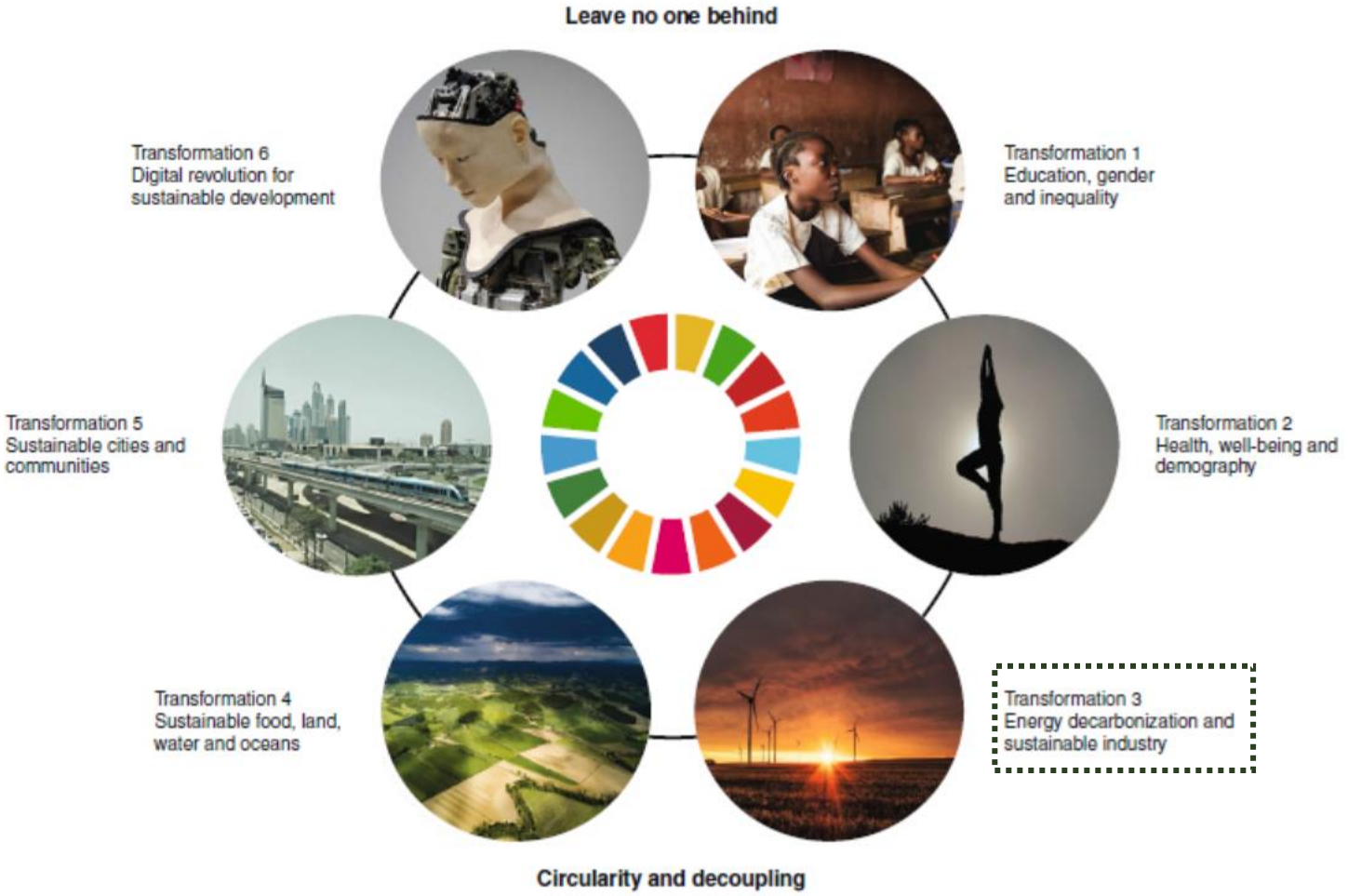
Strive for excellence by creating expertise, capability and competency to create multiply effects on National and international economy & society amid rapid change

ENTEC | Research and Development

Global trend of SDG

How SDGs are interpreted through Resilience

SDGs | Six Transformations to Achieve Sustainable Development Goals

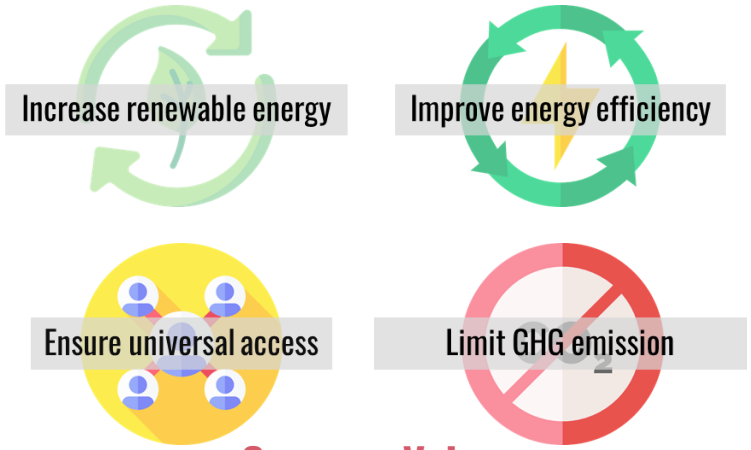


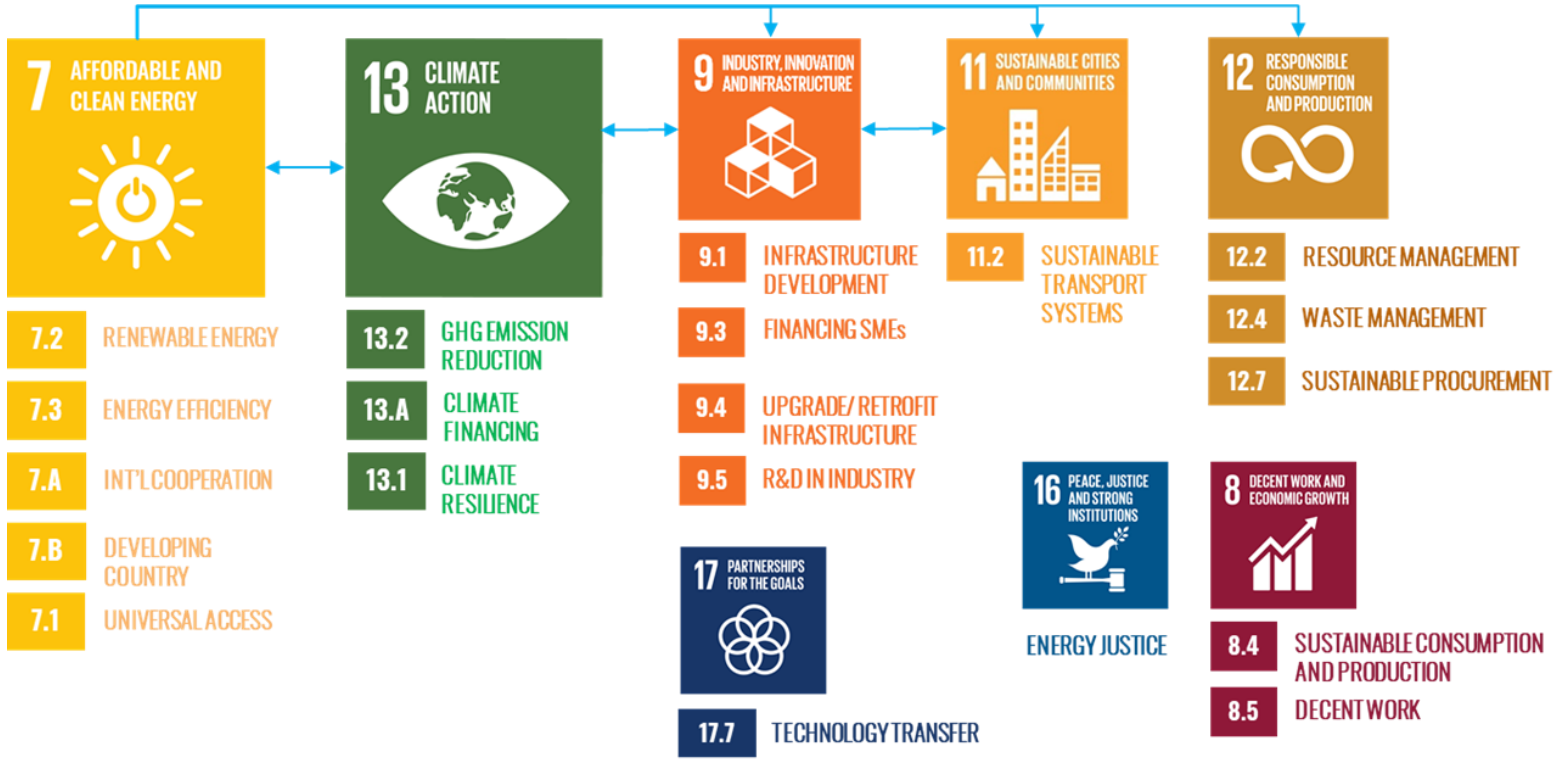
Sachs, J.D., et al., Six Transformations to achieve the Sustainable Development Goals, Nature Sustainability, 2, 805-814 (2019)

SDGs | Promoting Energy Decarbonization

TRANSFORMATION

Transform to a society with cleaner energy to sustainably achieve climate neutrality





Chollacoop, N., Silva, K., Energy Decarbonization with Universal Access, High-Level Experts Meeting, January 28, 2022

COP26 | Global Efforts towards Net Zero Emission & Climate Adaptation

2021

COP26

Paris Agreement

2016

2015

COP21

Net zero and 1.5 degrees

Countries are called on to reach **net-zero carbon emissions by 2050** and to keep global temperatures **below 1.5C**

Protect ecosystems and habitats

States are encouraged to **protect and restore ecosystems** and build resilient infrastructures to withstand climate change

Mobilise finance

Developed nations are asked to mobilise **$100bn in climate finance** per year for poorer nations to tackle climate change

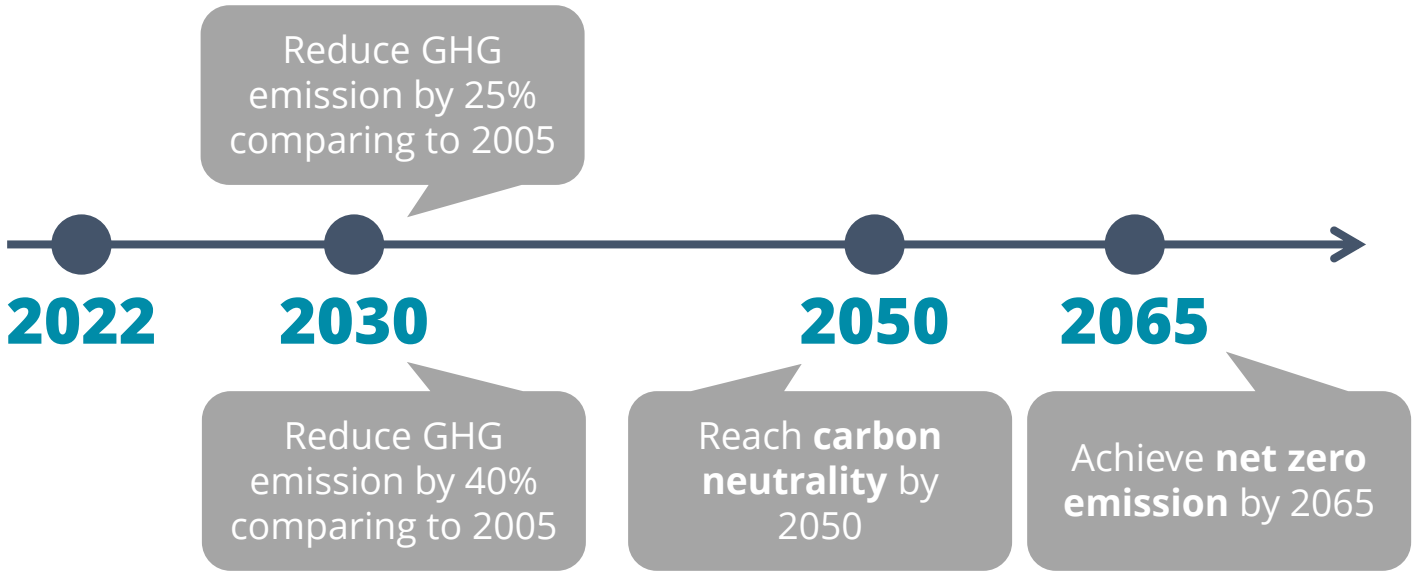
Collaboration

Parties at COP26 will need to **collaborate** to finalise the **Paris Rulebook**, which sets out the rules of the Paris Agreement

https://www.aljazeera.com/news/2021/11/4/infographic-cop26-climate-summit-goals-explained

Net Zero Emission

Updated NDC (2020)



Prime Minister's Pledge (2021)

https://www.mfa.go.th/en/content/cop26-glasgow?cate=5d5bcb4e15e39c306000683c

Renewable Energy | Current Targets

AEDP2018
กระทรวงพลังงาน
MINISTRY OF ENERGY

Update

National Energy Plan in 2022

RENEWABLE ENERGY CONSUMPTION

73.22 KTOE/day [2020]

RENEWABLE ENERGY

15.48%

OF FINAL ENERGY CONSUMPTION IN 2018

	ELECTRICITY	HEAT	BIOFUEL
	5.75%	21.20%	3.22%
INCREASING OF ELECTRICITY DEMAND	34.23% ↑	41.61% ↑	9.99% ↑

TARGET OF PROPORTION OF RENEWABLE ENERGY IN 2037

> 30%

OF FINAL ENERGY CONSUMPTION IN 2037

TARGET OF PROPORTION OF RENEWABLE ENERGY IN 2050

> 50%

OF FINAL ENERGY CONSUMPTION IN 2050

Sources: http://www.eppo.go.th/index.php/th/informationservices/ct-menu-item-56
https://www.dede.go.th/download/Plan_62/20201021_TIEB_AEDP2018.pdf
http://www.eppo.go.th/epposite/index.php/th/petroleum/oil/link-doeb/item/17093-nep

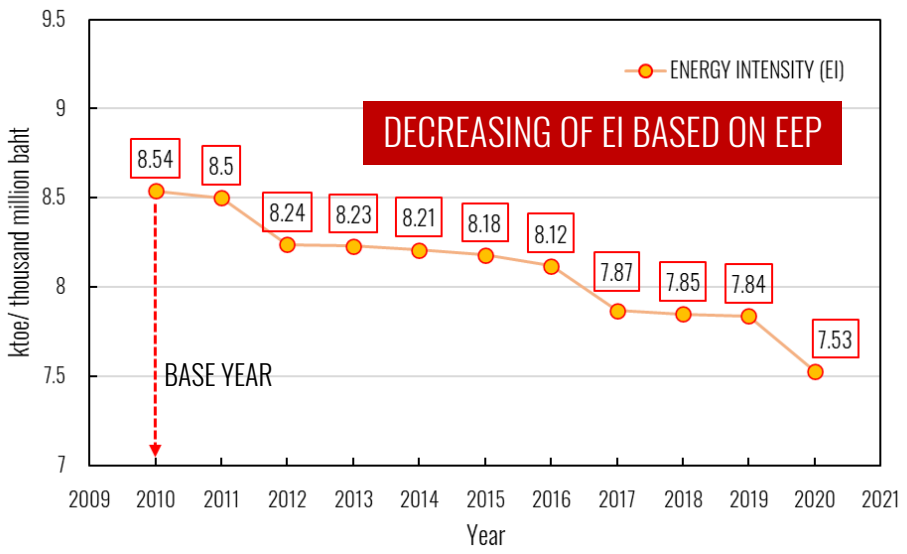
Energy Efficiency | Current Targets

EEP2018: Energy Efficiency Plan 2018

Energy Intensity (EI) decreased by 30 percent in 2037 compared to the base year [2010]

FINAL ENERGY CONSUMPTION WITHOUT EEP 80,752 ktoe [2018] → 181,238 ktoe [2030]

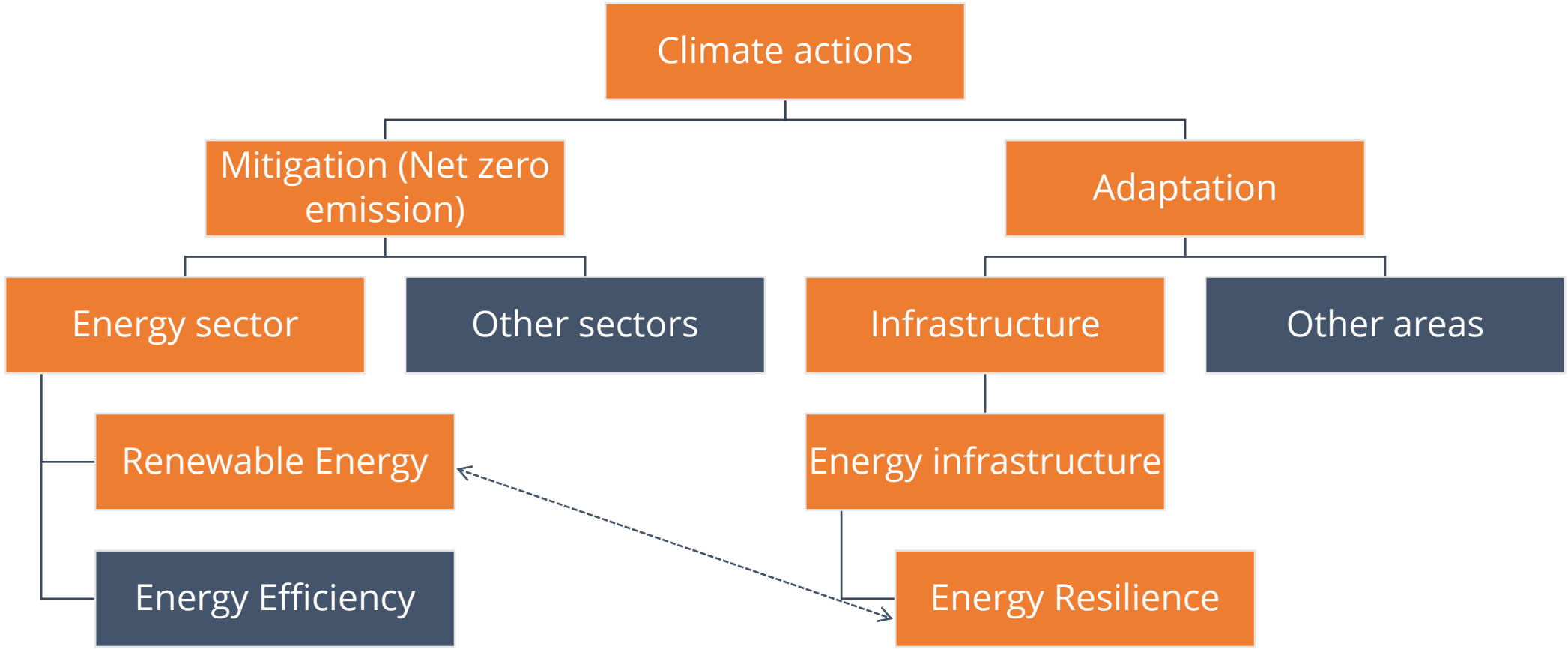
TARGET: 54,371 ktoe [30% EI]



DONE 5,307 ktoe	INDUSTRY 21,137 ktoe
COMMERCIAL 6,418 ktoe	RESIDENTIAL 3,300 ktoe
AGRICULTURE 527 ktoe	TRANSPORT 17,682 ktoe

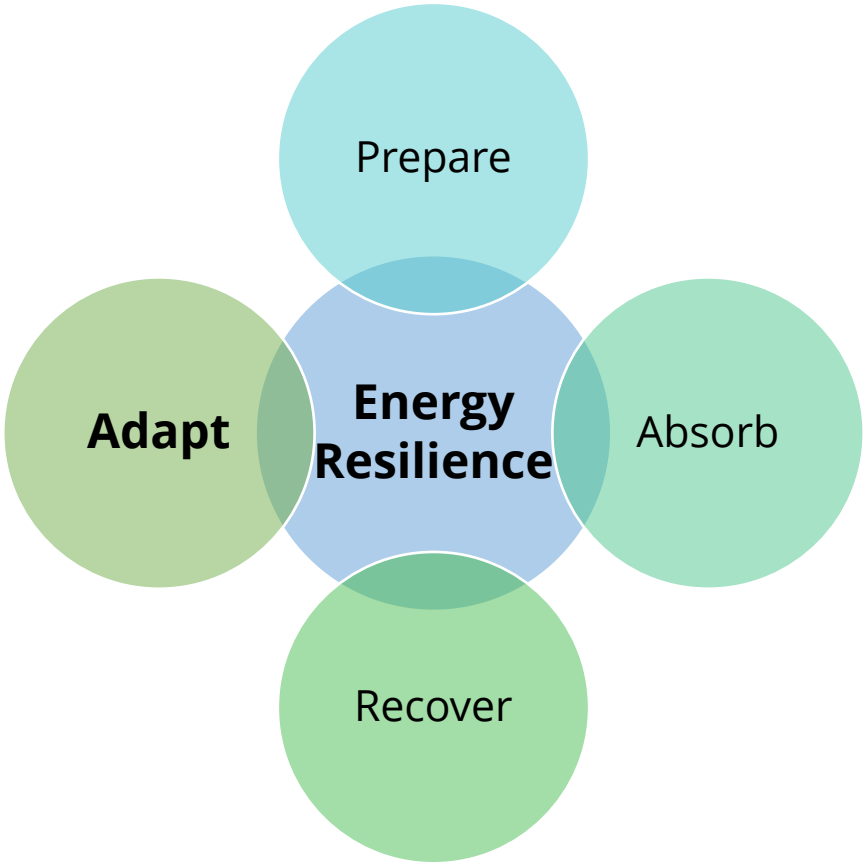
This will be updated in the new **National Energy Plan 2022** to achieve the targets in the Prime Minister's pledge at **COP26**

Climate Actions | Mitigation and Adaptation in Energy Sector



Energy Resilience

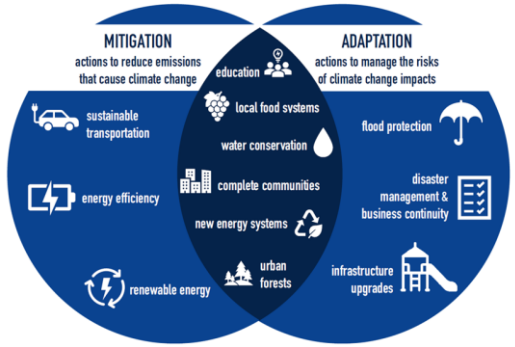
Addressing SDGs and Enhancing Climate Adaptability



Renewables to address climate change

Mitigating **climate change** impacts on renewables

Mitigation-focused **Seeking balance**

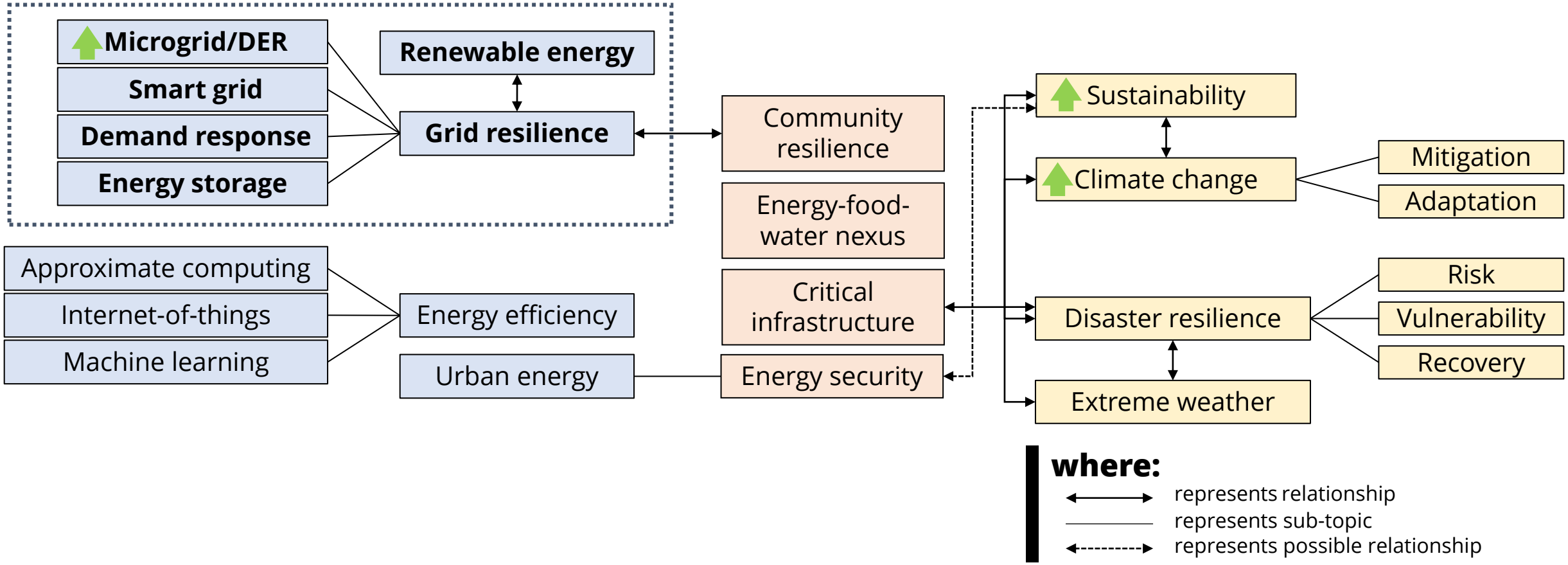


Roege, et al., Metrics for Energy Resilience, Energy Policy, 72:249-56 (2014)

Renewable Energy vs Energy Resilience

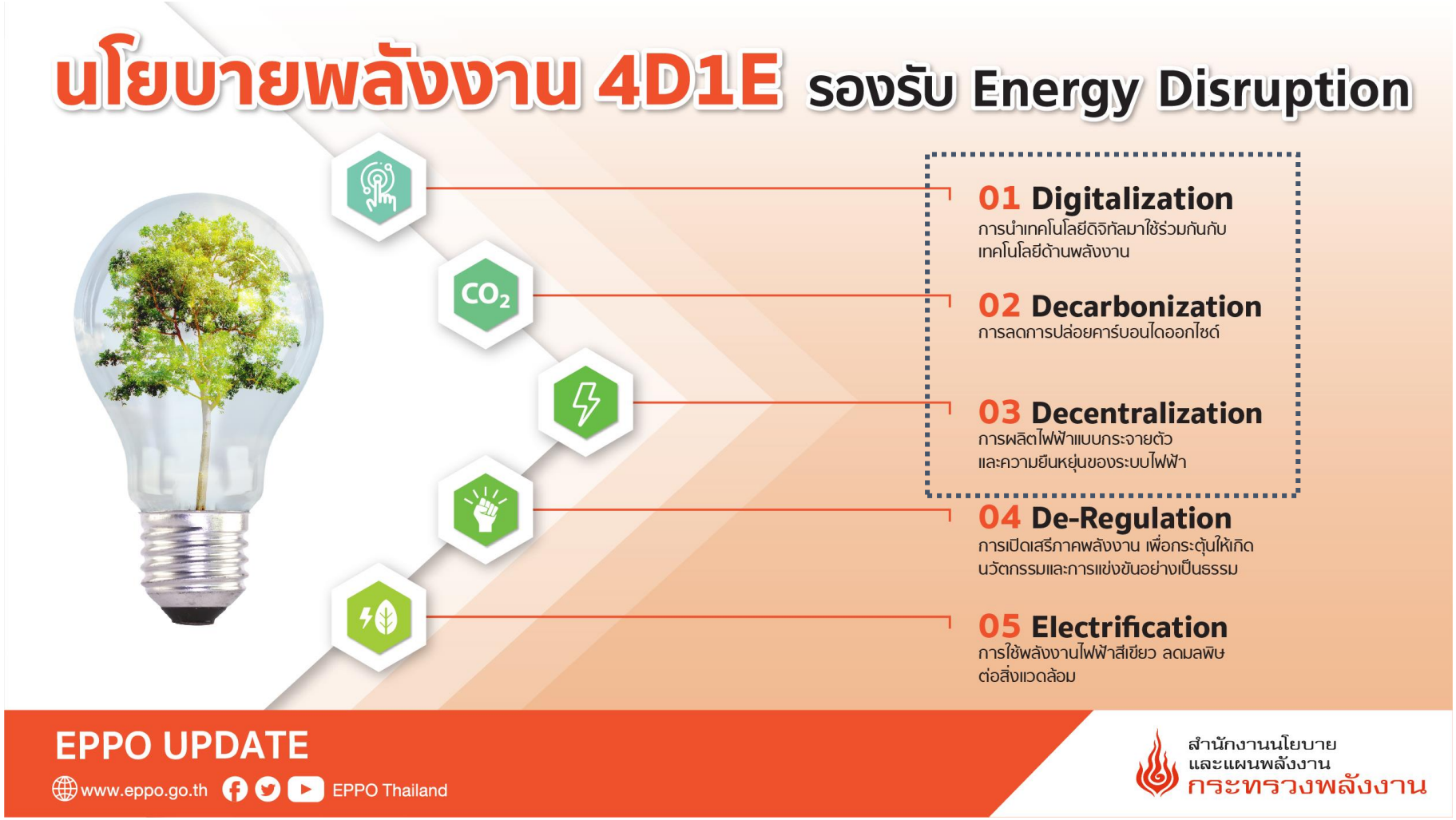
Increase in renewable energy share and power grid modernization can enhance resilience of energy infrastructure, and vice versa.

ER ↔ RE | Findings from the Landscape of Energy Resilience



Janta, P.; Paoprasert, N.; Patumwongsakorn, P.; Chollacoop, N.; Silva, K.
Exploring Research Landscape of Energy Resilience through Bibliometric Analysis. (under review)

4D1E | Coping with Energy Disruption



Smart Grid | Smart Grid Thailand

สมาร์ทกริด ไทยแลนด์

Demand response and energy management system

- Load aggregators
- Energy management systems in houses, buildings and factories

Forecasting System for Renewable Electricity Generation

- Development of forecasting models
- Demonstration projects in 8 SPPs
- RE forecast center

Microgrid and energy storage system

- Microgrid demonstration projects
- Microgrid business models
- R&D of energy storage systems

Enabling mechanisms

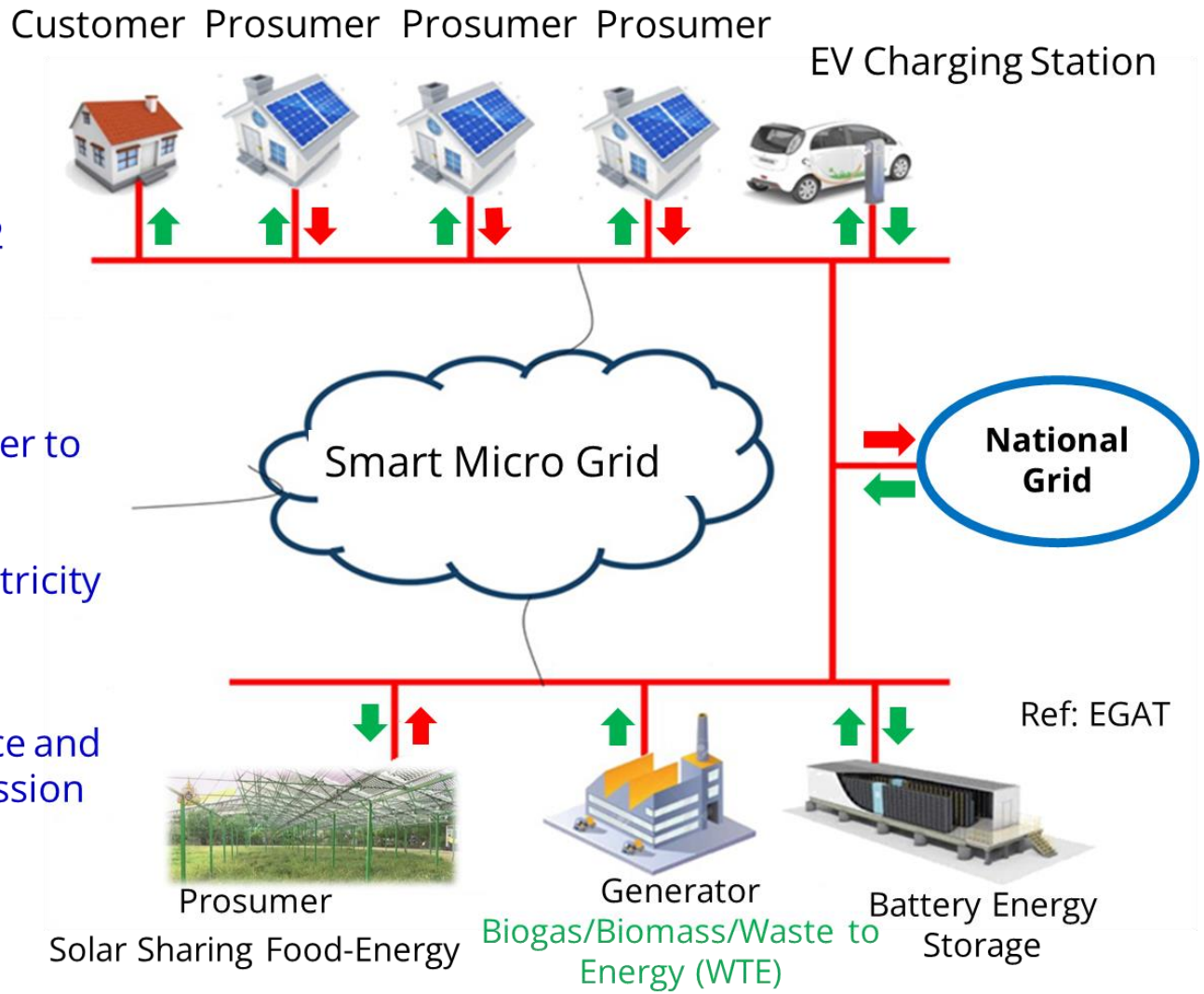
- Dedicated national committee
- R&D and human capital development
- Smart grid information center

https://thai-smartgrid.com/

Smart Microgrid and Energy Trading Platform

Main Functions

1. Management and balancing of energy in Microgrid (Demand and Supply).
2. Functional Microgrid can be operated in 2 Modes.
   - Grid Connected Mode.
   - Islanding Mode.
3. The useful information can be sent in order to plan electricity consumption such as.
   - Power consumption.
   - Recommended information for electricity consumption.
   - Event report.
4. The power plant can plan the maintenance and expansion of the generation and transmission systems correctly.
5. Peer to Peer (P2P) electricity trading.



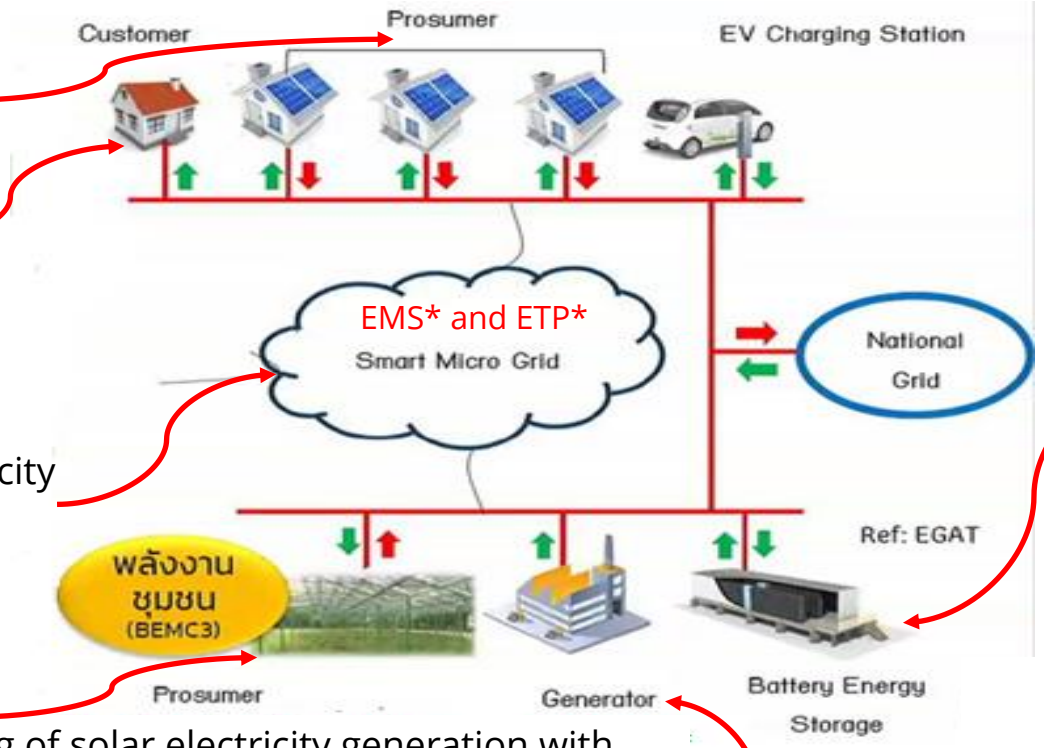
BCG Sisaengtham Phase 2

Peer to Peer trading in electricity networks (P2P trading platform)

Generate, consume and sell the surplus electricity.

Consumer (from Prosumer, Generator or national grid).

Management an electricity in network by ETP* and EMS* software.



Store excess energy from solar roof or solar sharing in daytime (low demand) and discharge energy in nighttime (high demand) or create energy security, support energy management in national grid.

"Solar sharing", integrating of solar electricity generation with agricultural production in the same area. To reduce cost, maximize benefit and create more income for community.

Community generations will be:

- Waste to Energy (Circular economy).
- Biomass/Biogas (Green economy).

EMS = Energy Management System, ETP = Energy Trading Platform


Sisaengtham School
Solar rooftop 48 kW
BESS 30 kW
รร.วัดศรีแสงธรรม
รร.วัดศรีแสงธรรม
รร.วัดศรีแสงธรรม

Promoting Energy Resilience in ASEAN

Energy Resilience Assessment

700 kW Solar Power Plant
@CMRU, Chiang Mai

100 kW Microgrid
@Ban Pha Dan, Lamphun

State-owned power plant	Commercial power plant
Rural microgrid	Community plant

4.9 MW Biomass Power Plant
@Ban Khao Noi, Phitsanulok

Biogas Plant + 60 kVA Generator
@Ban Kham Khaen, Khon Kaen

Promoting Energy Resilience in ASEAN

Energy Resilience as ASEAN COSTI Priority for 2021

Draft as of 26 May 2021

THE 79TH MEETING OF ASEAN COMMITTEE ON SCIENCE, TECHNOLOGY AND

AGENDA ITEM 6. COSTI DIRECTION 2021-2025

6.1 COSTI 2021 ANNUAL PRIORITIES

6.1.4 To implement at least 2 projects addressing the Sustainable Development Goals

(1) EU-ASEAN Dialogue on Green Technology & Innovation Mapping (Philippines) [10 min]

(2) Energy Resilience (Thailand) [10 min]

(3) ASEAN Water Quality Index (Indonesia, Malaysia, Philippines) (tbc) [10 min]

5.1.2 The ASEAN Diagnostics Development (DxD) Initiative (Singapore, Philippines)

5.1.3 ASEAN High Performance Computing (HPC) Shared Infrastructure Initiative (Thailand, Singapore)

1

Draft as of 26 May 2021

THE 79TH MEETING OF ASEAN COMMITTEE ON SCIENCE, TECHNOLOGY AND

ON (COSTI-79)

, 09:00 – 16:00 (Jakarta time)

ENDA

nverging towards the Development of an

and Climate Resilience (Philippines)

5.1.5 ASEAN Young Scientists Network (Malaysia)

6.2.4 Bio-, Circular and Green Economy Model (Thailand)

<Chair to lead>

30 mins (include Q&A)

6.3 COSTI 2022 – 2025

2

Energy Resilience Workshops

1st Workshop

2nd Workshop

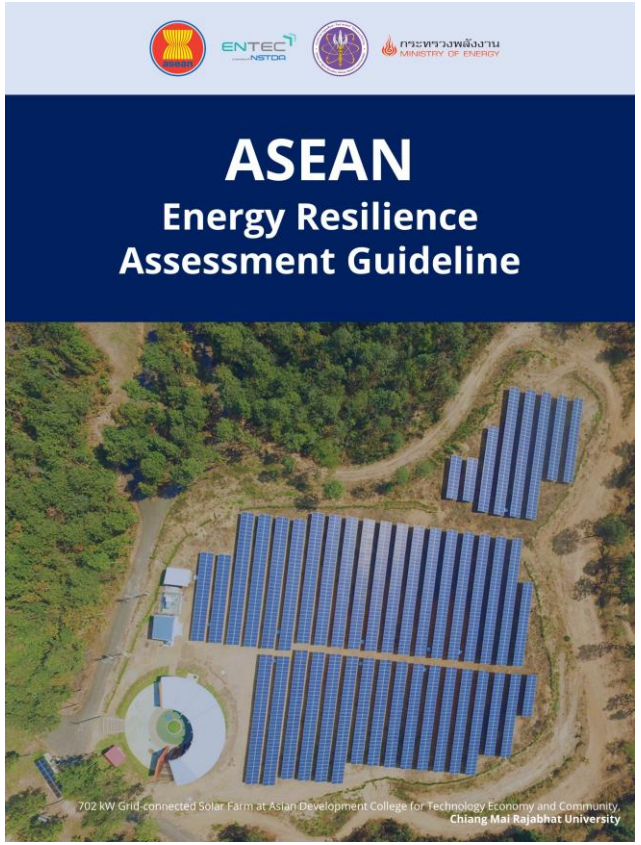
3rd Workshop

1st Workshop (June 17, 2021)
- 23 participants from 5 countries
- Enhance **understanding** linkage between energy resilience and sustainability/climate change
- Discuss the ways to use energy resilience to **build capacity** of energy systems toward climate change adaptation

2nd Workshop (September 21, 2021)
- 35 participants from 6 countries
- Increasing awareness and engage **national and regional stakeholders**
- Promoting **application** of energy resilience in ASEAN energy systems

3rd Workshop (May 9, 2022)
- 84 participants from 11 countries
- Leverage **efforts of ASEAN and APEC** in promoting energy resilience
- Promote **grassroots activities** in order to apply energy resilience in actual energy systems

ASEAN Energy Resilience Assessment Guideline



(tentative design)

- **ASEAN Energy Resilience Assessment Guideline** is developed based on findings from earlier assessments
- It will be **proposed to** ASEAN Sub-Committee on Sustainable Energy Research **(SCSER)** and ASEAN Committee on Science, Technology and Innovation **(COSTI) for endorsement**.

Energy Resilience Assessment in Malaysia

UiTM 50 MW Solar Power Plant & UiTM Malacca Solar Rooftop

- A **large-scale solar power plant** owned by **UiTM Holdings**
- Located in **Gambang, Malaysia**
- **PV capacity:** 61MW (DC) 50 MW (AC)
- The power plant has been **severely disrupted** by an event recently.
- **A joint funding project** will be conducted to investigate the issue.
  - **On-site assessment** will be held in September. The result will be finalized by the end of this year.

Concluding Remarks

- Increase in **renewable energy** share and power **grid modernization** can enhance energy resilience, and vice versa.
- **Smart grid** and **microgrid** are technologies to be employed to facilitate digitalization and decentralization which will consequently enhance **energy resilience**.
- ENTEC has been conducting **energy resilience assessment** since 2019 and made it an **ASEAN COSTI Annual Priority** of 2021
- ENTEC would be grateful to **join hands with partners** in Thailand and other countries to further promote and implement the concept of energy resilience in the region

Thank You

Thank You

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