Department of Alternative
Energy Development and Efficiency
MINISTRY OF ENERGY

Thailand's BCG Model for Green energy towards Carbon Neutrality

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Outline

- Energy Situation and CO_2 Emission from Energy Consumption in Thailand
- National Energy Plan
- BCG Model

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Energy Situation Overview

* January-May 2022

Production

18.9%

721 KBPD*

Primary energy production decreased, except hydropower had risen for 51.1%

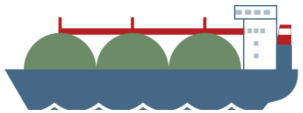
Primary Energy

Import (net)

0.6%

1,566 KBPD*

Energy import (net) had increased in every energy sources, consist of crude oil, electricity and natural gas. Coal import, however, remained steady.



Final Energy

10.3%

1,571 KBPD*

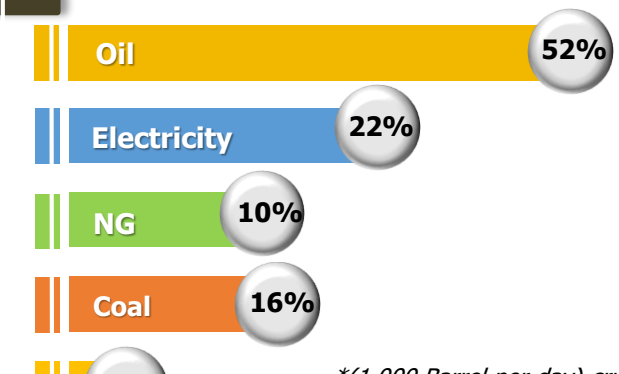
Final energy consumption soared in every energy forms, particularly oil accounted for 52% had risen from last year for 12.3%. Similarly, electricity consumption also increased for 4.1%

Consumption

1.3%

2,077 KBPD*

Energy consumption had increased compare to the same period of previous year. Consumption of natural gas, coal, hydropower and imported electricity were risen.

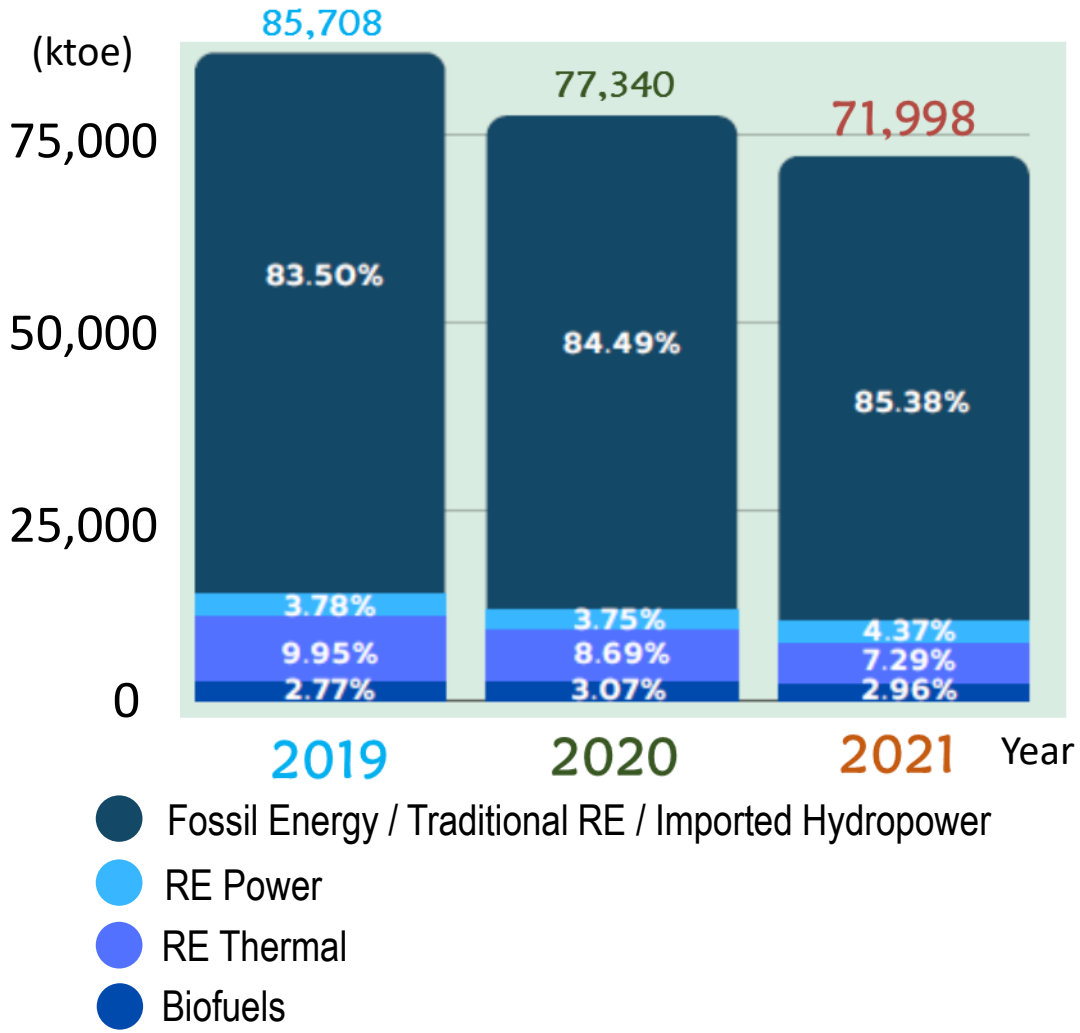


*(1,000 Barrel per day) crude oil equivalent

remarks: compare to the same period of last year

Renewable Energy Status

Thailand's Final Energy Consumptions



	RE's applications	
	Electricity (MW)	Thermal (ktoe)
1. Solar	3,027.68	10.90
2. Wind	1,546.32	-
3. Small Hydropower	190.39	-
4. Biomass	3,773.67	4,405.00
5. Biogas	572.72	688.00
6. Waste to Energy	348.48	144.00
7. Large Hydropower	2,919.66	-
8. Geothermal	0.30	-
Total	**12,379.22**	**5,248**

Biofuels	
1. Ethanol	3.71 million liters per day
2. Biodiesel	4.58 million liters per day

	2020	2021
%RE share to the final energy consumption	15.51% (11,997 ktoe)	14.62% (10,527 ktoe)

CO_2 Emission from Thailand Energy Consumption

as of 2020

remark: compared to the same period of last year

CO_2 Emission by sector 244.8 MT CO_2 ↓0.5%

Power	Transport	Industry	Others*
37%	29%	28%	6%
90 MT CO_2 ↓	70.6 MT CO_2 ↓	69 MT CO_2 ↓	15.2 MT CO_2 ↓

*consist of household, agriculture, commerce, etc.

CO_2 emission per energy consumption

2,030 Tonne CO_2/KTOE

Thailand CO_2 emission per energy consumption is below global, Asian countries, USA, China, and EU average

Energy consumption means primary energy consumption which includes renewable energy

CO_2 emission per capita

3.68 Tonne CO_2/capita as of 2020

Thailand CO_2 emission per capita is below global, USA, EU and China average, however, above Asian countries average

CO_2 emission per GDP

23.85 kg. CO_2/Million Baht as of 2020

Thailand CO_2 emission per GDP is below China and Asian countries average, but higher than global, USA, and EU average

CO_2 emission per electricity generation

0.437 kg. CO_2/kWh

Thailand CO_2 emission per electricity generation in below China and Asian countries average, but outweigh EU and developed countries in America

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Thailand's Climate Change Intention from COP26

Thailand's measures to achieve Carbon Neutrality and Net Zero GHG Emission

Power and Transport Sector

- Energy efficiency improvement/adjustment of new technologies such as EV, CCS, CCUS, BECCS
- Increase RE proportion in electricity and heat production
- Increase energy performance in power sector
- Development of infrastructure to cope with technology transition toward 4D1E policy
- RE utilization in vehicles (Ethanol and Biodiesel)

EV = Electric Vehicles
CCS = Carbon Capture Storage
CCUS = Carbon Capture Utilization and Storage
BECCS = Bio-Energy with CCS

Industrial Process and Product Utilization

- Replacement of clinker in hydraulic cement and ready mixed concrete production, and utilization of low CO_2 emission technology in cement production process
- Methane management in industry
- Low GWP refrigerant, such as Hydrocarbon (HCs) refrigerant
- Wastewater management in industry sector by increasing biogas production from its wastewater

Waste Management

<u>Municipal Waste Management</u>

- reduce waste
- utilization of gas for waste landfill
- application of biowaste to fertilizer

<u>Municipal Water Management</u>

- accumulation of wastewater into the system
- increase community wastewater treatment system

Agriculture

- Manure management
- Sustainable agriculture
- low GHG emission plant implantation

Forestry and Land Utilization

- Reforestation and forest rehabilitation
- Forestation of economic forest
- Increase green area in urban and rural
- Forest invasion and wildfire safeguard

Strategic Direction of National Energy Plan 2022

01

Energy for economic growth

Reduce the burden of energy costs and promote investments in energy infrastructure

02

Energy for jobs & income

Support SMEs and vulnerable groups to overcome the economic hardship due to COVID-19. Also, strengthens the local economy

03

Energy infrastructure of the future

Transform energy sector with new innovation and environmental concern

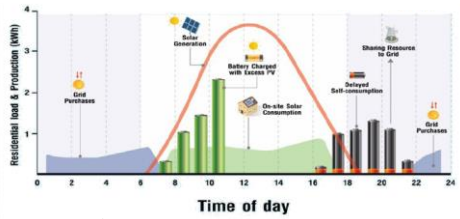
National Energy Plan 2022

Thailand Energy Policy Direction

Energy Policy Adjustment towards Low Carbon Economy

RE >50%

Increase electricity generation from RE more than 50%



▶ RE cost reduction ▶ ESS cost reduction ▶ Smart Grid development

▶ Prosumer system and decentralized production

EE >30%

Increase EE target for more than 30% by utilization of high performance technology

5 sectors:
- Industry
- Building
- Household
- Agriculture
- Transport

✓ Compulsory
✓ Promotion
✓ Complementary

Carbon Neutrality 2050

EV 30@30

Increase EV share at 30% by 2030

Supporting measures
- ✓ EV promotion and battery industry
- ✓ EV infrastructure development

Benefits
- ✓ reduce PM 2.5, CO_2
- ✓ clean energy promotion in transport sector
- ✓ reduce energy cost

4D1E

- DIGITALIZATION
- DE-REGULATION
- DECARBONIZATION
- ELECTRIFICATION
- DECENTRALIZATION

Energy Infrastructure for the future

Identify Key Energy innovation technology

- *EV / Battery*
- *Smartgrid*
- *Smart Energy*
- *Hydrogen*

Rearrange industry structure and management

Enable market-mechanism to increase competition in the energy sector

Innovation and new technologies

De-carbonization Grid modernization EV/ESS to promote

Smart energy management system

Use of AI for grid management, National Energy Information Center

New energy businesses

New opportunities for energy business such as smart grid smart energy, network/business, peer-to-peer energy trading, distributed energy system

4D and 1E Policy

Digitalization

- Enhance the transmission system to be “Smart grid”
- Support development of ESS for increasing stability to community and large power plant

De-centralization

- Promote P2P power trading by supporting of electricity conveying through on-grid and off-grid system
- Promote community power plant, including proceeding for community power plant network mapping

De-carbonization

- Promote production and utilization of electricity from solar and bioenergies

De-regulation

- Originating of “Sandbox” Project for energy innovation development Promote “Energy Start-up” concept
- Conduct flexibility of ENCON fund utilization for promoting community’s energy business
- Increase opportunity for public for electricity purchasing (“Prosumer”)

Electrification

- Promote utilization of EV
- EV infrastructure

Driven Mechanism of MoEN's BCG

Vision :

Develop Green Energy according to BCG Model to achieve

Carbon Neutrality by 2050

Driven Mechanisms of BCG on Energy

BCG

Energy

Higher Energy Security
Enhance energy security and self-sufficiency

Better Well-being
Improve quality of life and sustainable development for community and urban area

Higher Income
Develop local economy, create jobs and make an income from energy

Better Environment
Reduce GHG emission and protect environment

GREEN ENERGY - CARBON SINK

Clean Energy with Low carbon

Energy in Transportation sector & EV

Energy Efficiency Enhancement

Biorefinery, Energy Industry, Biochemical

Carbon Sink & CO_2 Absorption

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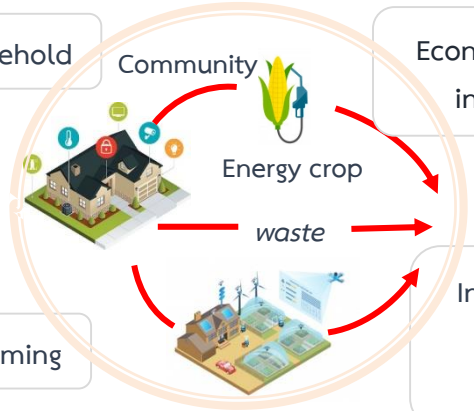
Driven Mechanisms of BCG on Energy

1. Clean Energy with Low Carbon

Develop energy in community, household and agriculture

- RE in household
- Economic-Energy in community
- Smart Farming
- Income from agricultural products



Develop Pilot Area/Sandbox on Energy Trading

- Pilot Community Power Plant on island/remote area
- Hydro-floating Solar Hybrid
- Wangchan Valley
- Bangkrui Green Community
- Smart Grid – Energy Trading Platform : ETP (Srisaengtham Model)
- Energy learning center
- TU-EGAT Energy Sandbox

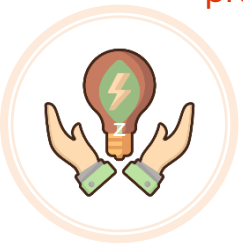
Disseminate Community Power Plant Project

- Community Power Plant Project
- Community Power Plant Project integrating with water food and energy

Promote RE in industrial and commercial sector

- Reduce coal use and promote clean energy
- Circular Economy Organization
- Smart Business – Smart Energy
- Waste to Value

Develop infrastructure and regulation to promote green energy



- Power trading market in pilot area
- Power system management to support decentralized power system

Driven Mechanisms of BCG on Energy (cont'd)

2. Energy in Transportation Sector & EV

Develop Infrastructure for EV, power system, charing station, regulation/safety

Develop value added industry for biofuel's raw material to reduce impact from the transition to EV

Develop and promote new energy technology; hydrogen

3. Energy Efficiency Enhancement

Increase energy efficiency in government organization

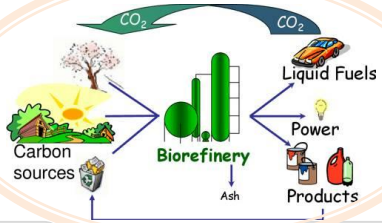
Promote energy saving in SMEs and household

Promote technology, innovation and high efficiency equipment

4. Biorefinery

Improve base-technology on entired biochemical industry

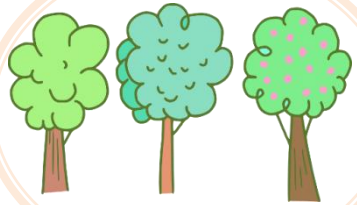
Develop Olechemical on EEC area



Become the leader of Biorefinery in the region

Nakornsawan Biocomplex Phase 1 – Phase 2

5. Carbon Sink & CO2 Absorption



Afforest to increase carbon absorption

Develop carbon pricing and carbon credits

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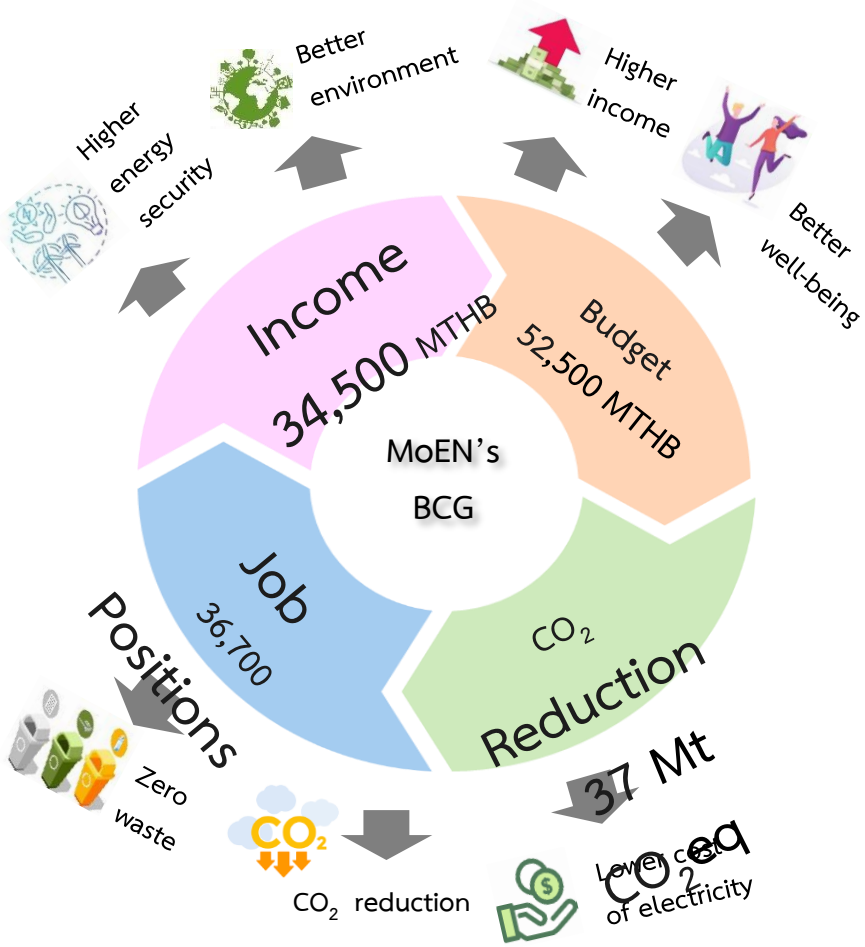
MoEN's BCG 2021-2027

- Smooth ENERGY TRANSITION according to National Energy Plan
- Support national development to have high-income and pass over middle-income trap
- Develop based economic and social and sustainable growth of community
- Protect environment for next generation and achieve Carbon Neutrality target

2021-2027



Energy Transition

PDP
EEP
AEDP
GAS
OIL

TIEB
THAILAND INTEGRATED ENERGY BLUEPRINT

National Energy Plan

Renewable Energy

Smart Grid

Smart & Green Industry

Energy Efficiency

Green Society

Smart Community

Smart Life

Community Based

Smart Energy

Technology & Innovation

Eco & Green

Thank you for your attention

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