กรมพัฒนาพลังงานทดแทน
และอนุรักษ์พลังงาน
กระทรวงพลังงาน

DEDE 2023

Thailand's Energy Efficiency

28th February 2023

Division of Energy Efficiency Promotion,

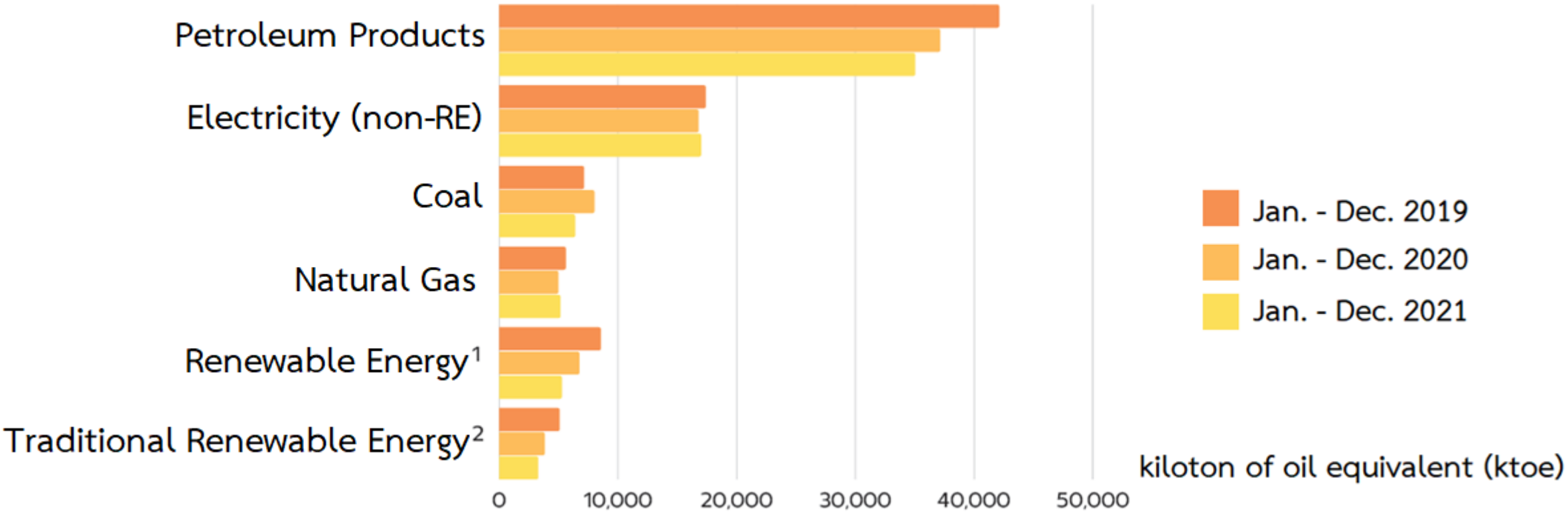
Department of Alternative Energy Development and Efficiency (DEDE)

Outline

- Thailand's Energy Situation
- Thailand's Energy Efficiency Situation
- Energy Efficiency Plan & Key Measures

Thailand's Energy Situation

Final Energy Consumption by Fuel Type



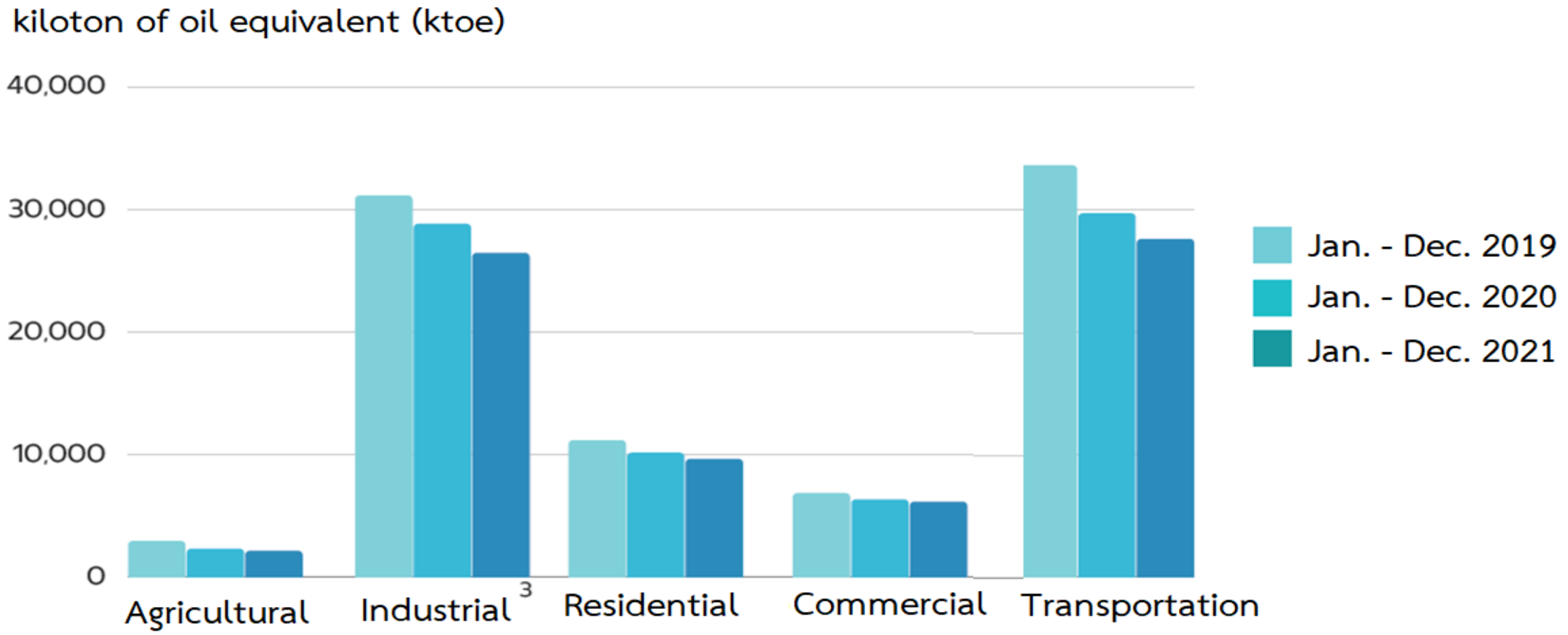
Note :

1 Renewable energy consists of solar energy, rice husk, bagasse, agricultural waste and biogas.

2 Traditional renewable energy consists of charcoal, rice husk, agricultural waste. Used in residential homes and household industries.

Thailand's Energy Situation (cont.)

Final Energy Consumption by Economic Sectors



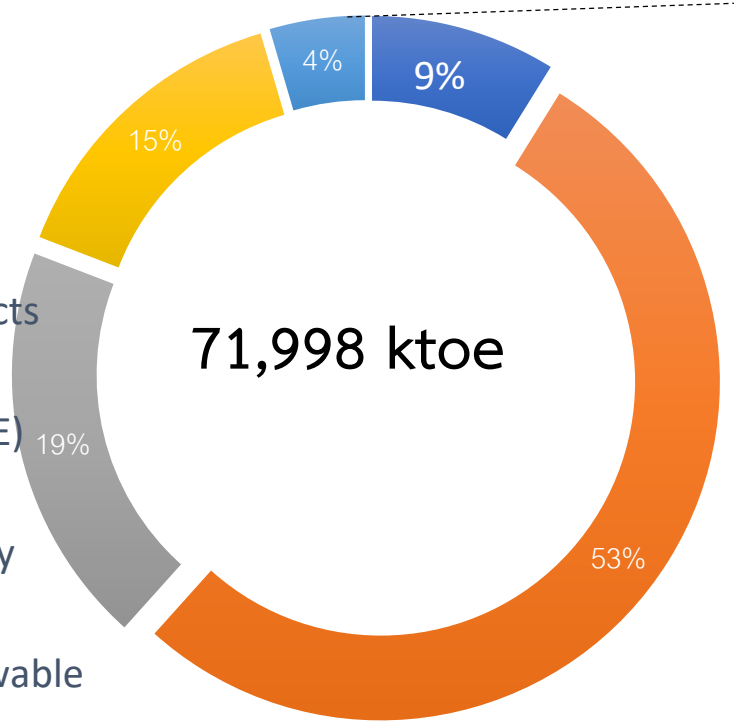
Note :

3 Industrial Sectors Consisting of Manufacturing Industry 26,223 ktoe., Mining 120 ktoe. and Construction 117 ktoe.

Thailand's Energy Situation (cont.)

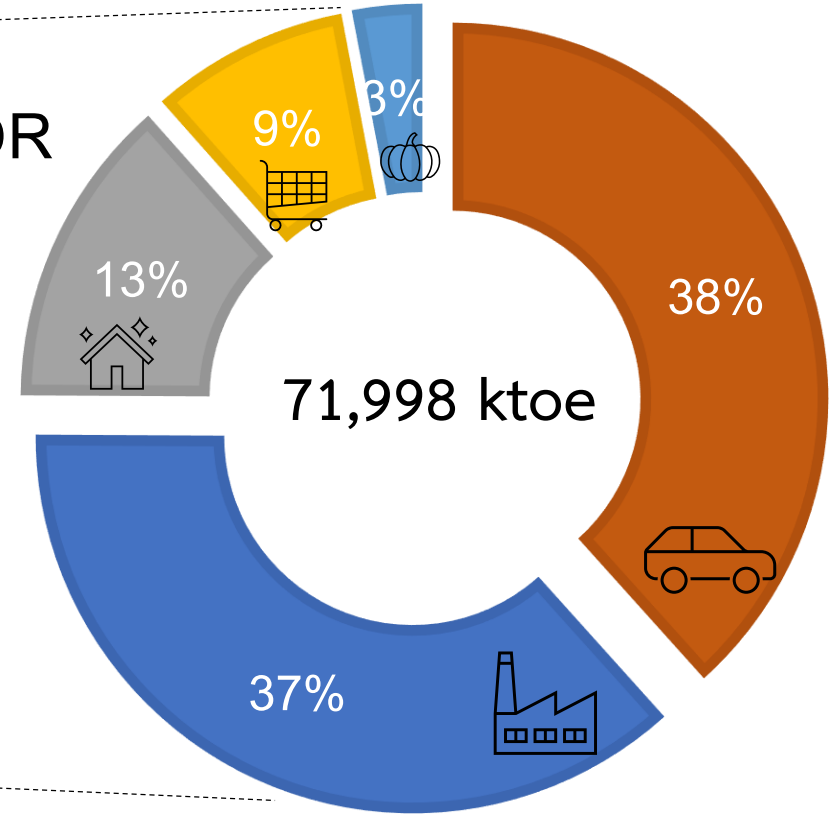
Proportion of Final Energy Consumption, 2021

BY FUEL



- Coal
- Petroleum Products
- Electricity (non-RE)
- Renewable Energy
- Traditional Renewable Energy

BY SECTOR



- Transportation
- Industrial
- Residential
- Commercial
- Agriculture

Note :

1 Renewable energy consists of solar energy, rice husk, bagasse, agricultural waste and biogas.

2 Traditional renewable energy consists of charcoal, rice husk, agricultural waste. Used in residential homes and household industries.

Source: Thailand's Energy Efficiency Situation 2021, DEDE

Thailand's Energy Situation (cont.)

Thailand's CO_2 Emission

Data from 2021:

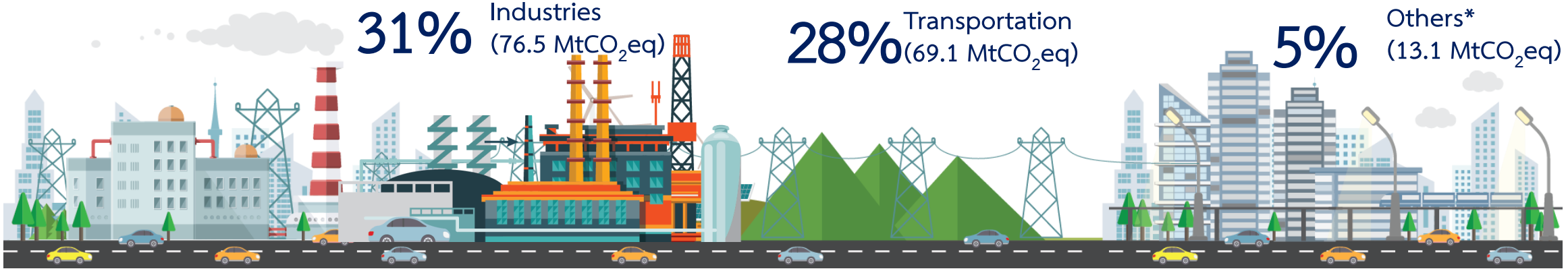
36% Electricity Production (88.3 $MtCO_2eq$)

Total CO_2 Emission: 246.9 $MtCO_2$

31% Industries (76.5 $MtCO_2eq$)

28% Transportation (69.1 $MtCO_2eq$)

5% Others* (13.1 $MtCO_2eq$)



Others* includes residential, agricultural, commercial, etc.

2.04 $MtCO_2/ktoe$

CO_2 emission per energy consumption

Lower than global average as well as Asia, US, China, and Europe's average

3.69 $tCO_2/capita$

CO_2 emission per capita

Higher than Asia's average

23.50 $kgCO_2/MBaht$

CO_2 emission per GDP

Higher than US, Europe, and global average

0.42 $kgCO_2/kWh$

CO_2 emission per electricity production

Higher than Europe's and developed countries in America

Source: Thailand's Energy Report 2021, EPPO

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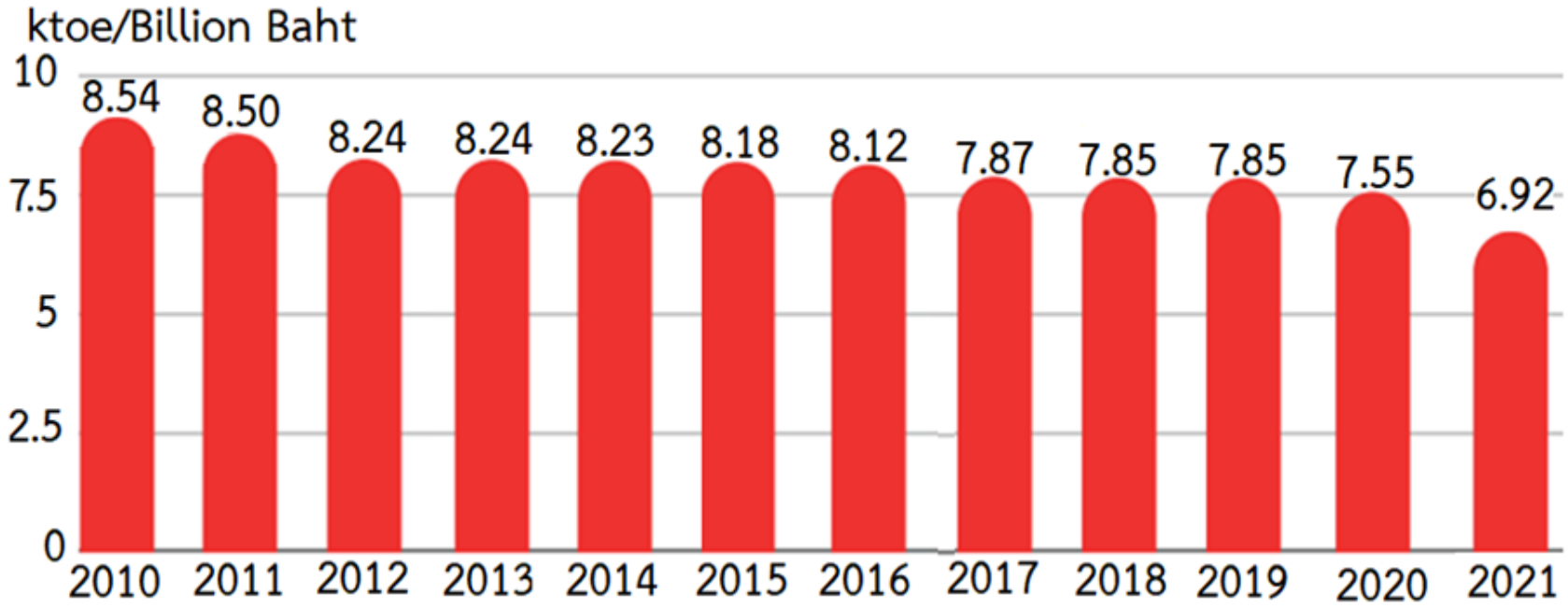
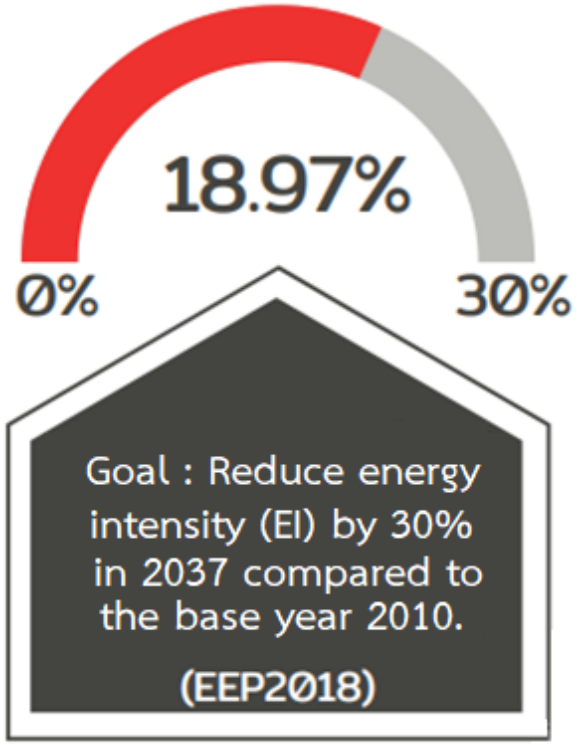
Thailand's Energy Efficiency Situation

Energy Intensity, 2010 - 2021





Thailand, 2021

- Final Energy Consumption **71,998 ktoe**
- Gross Domestic Product : GDP **10,403,700 million baht**
- Energy Intensity : EI **6.92**

Energy Efficiency Plan

EEP 2018

- Saving target for the year 2037 is 49,064 ktoe
- Reduce energy intensity (Energy Intensity, EI) down 30 percent by 2037

EEP 2022

NEW

(In Progress)

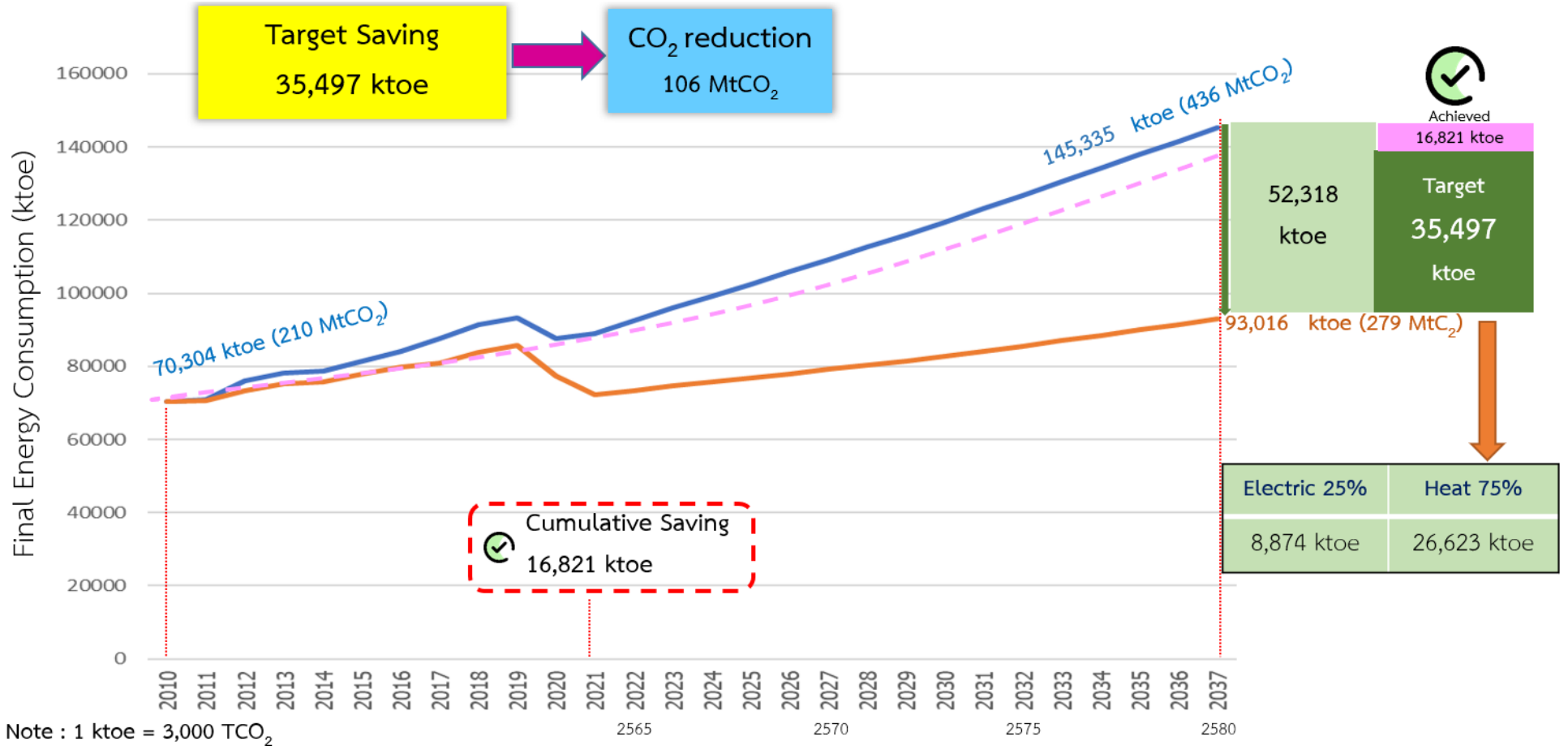
- Saving target for the year 2037 is 35,497 ktoe., reducing EI down 36 percent by 2037
- The goal of saving in the year 2050 is 64,340 ktoe., reducing EI by 40 percent by 2050
- Carbon neutral goal of the country's energy sector in 2050 (95.5 million tons of carbon)

Do not reference: currently under consideration and subject to changes

Energy Efficiency Plan (cont.)

Target energy intensity (EI) reduction of 36% within 2037

and 40% within 2050 compared to the 2010 level



Final energy consumption in case of having and without an energy conservation plan within 2037

Should not be referenced: currently under consideration and subject to changes

Energy Efficiency Plan (cont.)

Remark: EEP is still under revision.

Energy efficiency measures target by energy types: 2022 - 2037

Unit: ktoe

	Compulsory	Voluntary	Total	%
Electricity	2,679	6,083	8,761	25
Thermal	5,672	21,063	26,736	75
Total	8,351	27,146	35,497	100

Energy efficiency measures target by economic sectors: 2022 - 2037

Unit: ktoe

Sector	Compulsory		Voluntary		Total	%
	Elec.	Thermal	Elec.	Thermal		
1. Industrial	1,136	3,995	2,897	4,404	12,424	35
2. Commercial	1,473	28	1,491	550	3,550	10
3. Residential	20	-	1,546	208	1,774	5
4. Agricultural	50	-	148	512	710	2
5. Transportation		1,650	-	15,389	17,039	48
Total	2,679	5,672	6,083	21,063	35,497	100

Should not be referenced: currently under consideration and subject to changes

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Energy Efficiency Plan (cont.)

Do not reference: currently under consideration and subject to changes

EEP 2022 saving goal 35,497 ktoe (NEW)

5 groups target

1. Industrial
2. Commercial
3. Residential
4. Agricultural
5. Transportation

Energy Efficiency Strategy 2018-2037

Compulsory

- Energy Conservation Promotion Act (DBs/DFs)
- Building Energy Code (BEC)
- Factory Energy Code (FEC)
- Energy Efficiency Resource Standard (EERS)

Voluntary

- Financial Incentives (Standard Offer Program, DSM Bidding, Soft loan, ESCOs, Tax Incentive, Direct Subsidy)
- Standard & Labelling (MEPS/HEPS)
- EE in Transport (Eco Sticker, Shift mode etc.)
- Innovation (IOT, Smart farm, Smart Factory, Smart Building, Big Data)

Complementary

- Research and Development of technologies and innovations (R&D)
- Human Resource Development (HRD)
- Public awareness (PR)

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Energy Efficiency Legal Framework

Energy Conservation and Promotion (ECP) Act. B.E. 1992 (revision B.E.2007)

Effective from 1/6/2008

Energy Conservation and Promotion Act (1992)

Energy Conservation and Promotion Act (2007)

Decree on designated building

Effective from 14/11/1995

Decree on designated factory

Effective from 8/7/1997

Ministerial Regulations

Energy Management in designated buildings and factories

Effective from 20/11/2009

Persons Responsible for Energy (PRE)

Effective from 28/11/2009

Energy Management Auditors

Effective from 7/11/2012

Building Energy Code

Effective from 20/6/2009

High Energy Efficiency Standard for Equipments and Machinery

Effective from 8/4/2009

Compulsory

Voluntary

EnCon Fund

- Invest and support to promote EE & RE related activities
- Both Private and Public Sector
- R&D, Demonstration, Education and Training, Awareness and Public Relation.

Complementary

Source: EnCon Act.: http://www.eppo.go.th/images/law/ENG/nation2.pdf / EnCon Fund: http://www.enconfund.go.th

Compulsory Program – (Energy Conservation Promotion Act)

Classification of designated factories/buildings

Criteria	Designated Factories/Buildings	
	Group 1	Group 2
Installed electric meter (total)	Between 1000 – 3000 kW	More than 3000 kW
Installed transformers (total)	Between 1,175 – 3,530 kVA	More than 3,530 kVA
Total annual energy consumption	Between 20 – 60 TJ/year	More than 60 TJ/year

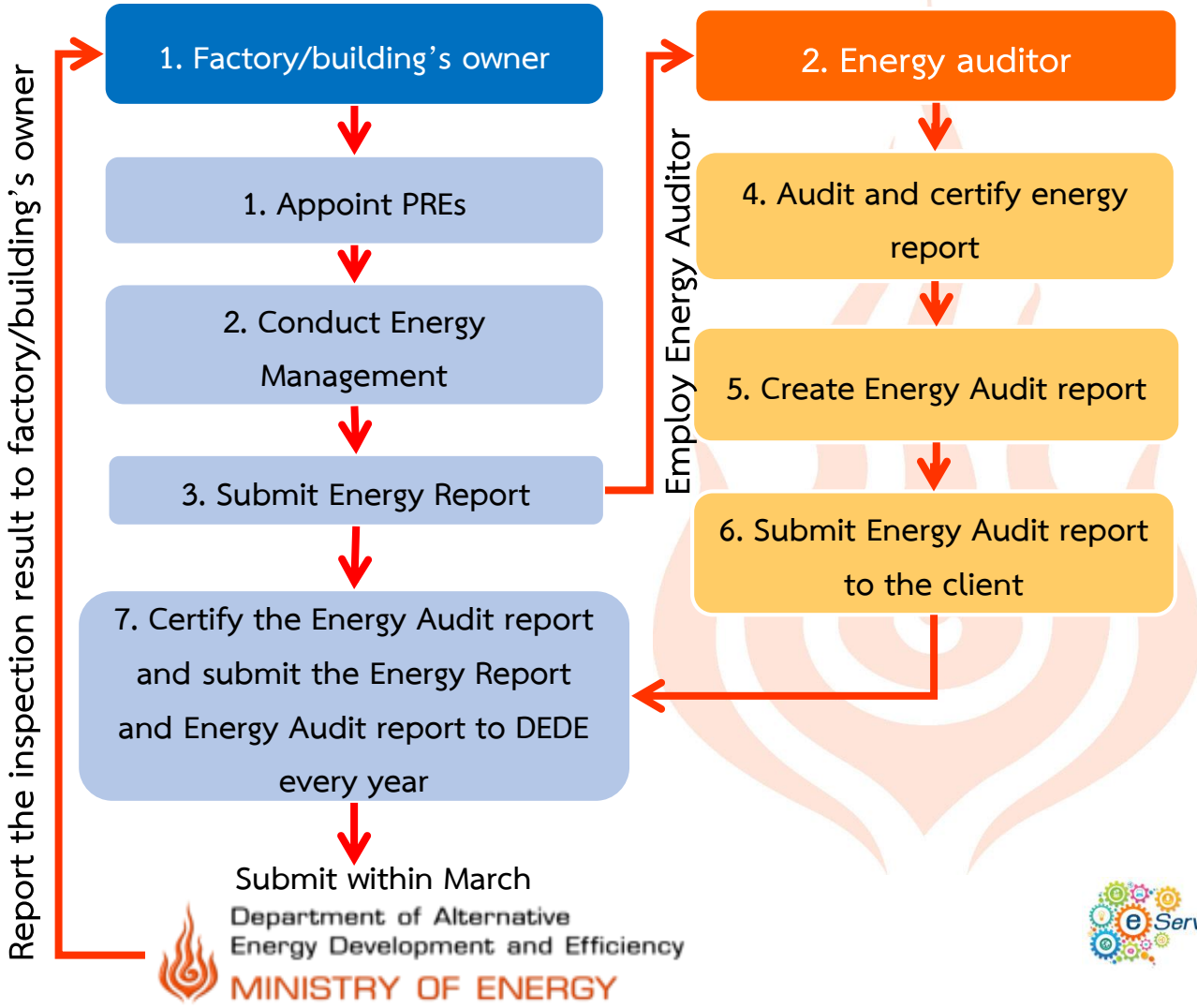
Legal responsibilities of designated factories/buildings

1. Appoint Person Responsible for Energy (PRE)
   - At least PREs (C-PRE) for Group 1
   - At least 2 PREs (C-PRE) for group 2, in which one must be senior PREs. (S-PRE)
2. Conduct energy management system as described in regulation and submit an annual report to DEDE every March.

Duties of Person Responsible for Energy (PRE)

1. Maintain and monitor efficiency of machines and equipment periodically
2. Improve energy use following energy conservation measures
3. Help owner to conduct energy management system
4. Help owner to follow the order of Director General of DEDE

Thailand's Energy Auditing System



Compulsory Program – (Building Energy Code (BEC))

New Energy Conservation Building base of Thailand's BEC Criteria


Hospital

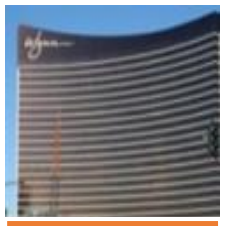

Education


Offices


Condominium


Convention Hall


Entertainment


Hotels


Theatre


Department Store

For new or renovated buildings

9 types of new or retrofitted buildings

(total area (all floors combined) ≥ 2,000 m^2)

must comply with building energy code.

1. Building Envelope
2. Lighting System
3. Air-conditioning System
4. Water-heating System
5. Renewable Energy
6. Total Consumption

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Voluntary Program (Financial Incentive : Direct Subsidy)

Support investment in modifying machinery, materials and equipment for energy saving 2021

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Support 20 - 30%, maximum

3 million baht/company

The designated Factories and private buildings.
Support **20%**

SMEs, start-up entrepreneurs, agricultural entrepreneurs.
Support **30%**

The maximum support amount is 3,000,000 baht/company, the payback period is no more than 7 years.

Voluntary Program (Energy Efficiency for SMEs)

Not Designated factories/building

The small and medium sized industries

(not designated factories)

SME Factory Criteria

(not designated factories)

Power Meter smaller than 1,000 kW

Transformer smaller than 1,175 kVA

Total Energy Consumption smaller than 20 TJ/year

More than 50,000 SME Industries

Source: DEDE

Major challenges in implementing EE for SMEs

1. **Low-priority investment by managements**
2. **Unattractive or unclear on risk-return profiles**
3. **Complexity of MRV process**
4. **Small Scale of energy efficiency projects**
5. **Private finances of energy efficiency in Thailand is still conventional with limited groups of involvement**
6. **Lacks of info for Evaluation and Assessment**

There are substantial challenges facing energy efficiency SME investments around the world

Voluntary Program - Standard and Labelling(S&L)

MEPS: Minimum Energy Performance Standards

Both voluntary and mandatory program

Thai Industrial Standards Institute
Ministry of Industry

voluntary certification mark

mandatory certification mark

HEPS: High Energy Performance Standard

Voluntary program

EGAT
Power for Thai Happiness

Electrical Appliance

22 Products


Microwave


Iron


Electric Jar Pot


Electric Pump


Washing Machine


Electric Water Heater

DEDE

Non-electrical appliance and industrial equipment

19 Products

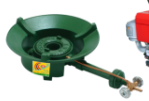

Glass


3P Motor


VSD


Air Com


Paint

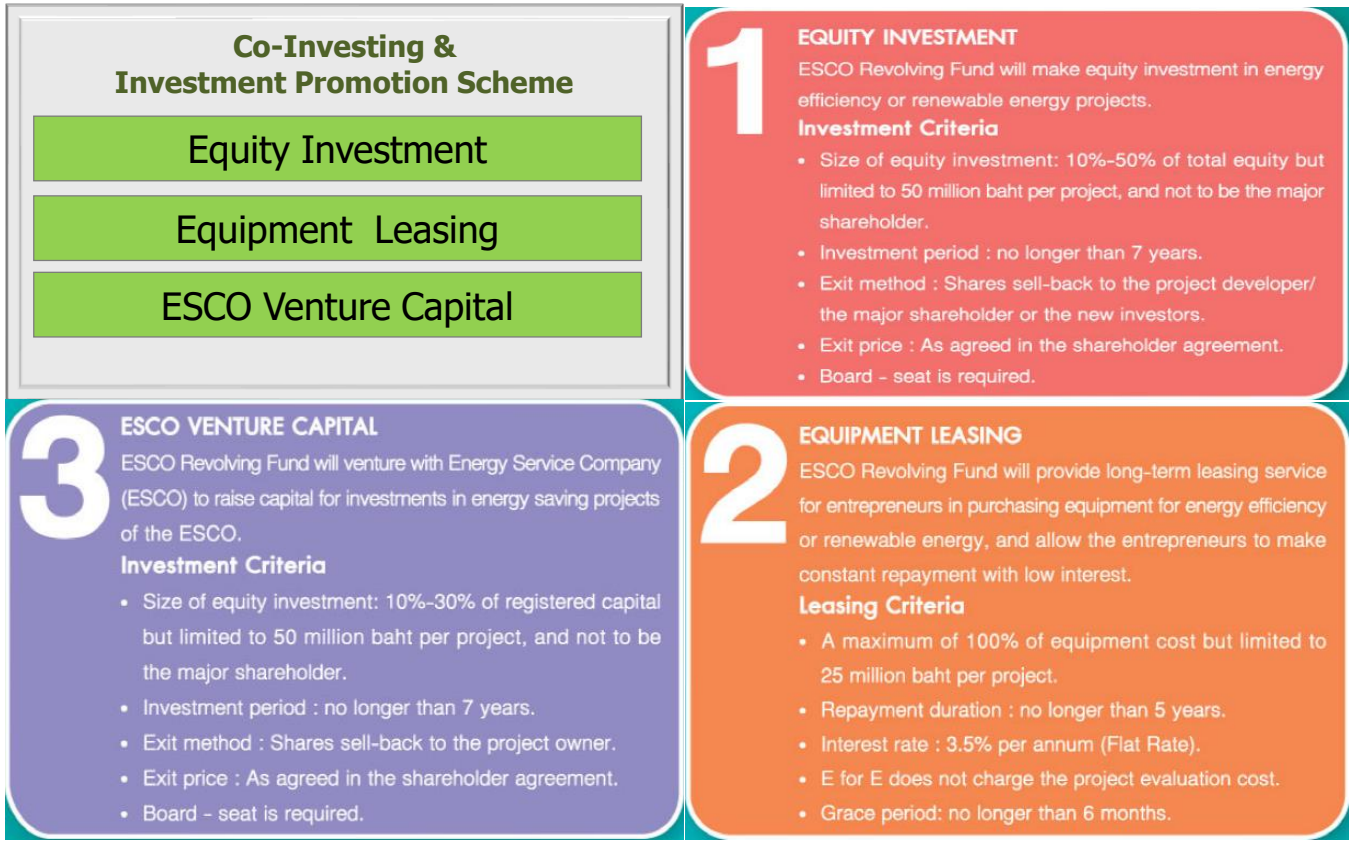

High Pres. Stove


Gasoline Engine


Diesel Engine

TISI: Thailand Industrial Standard Institute, EGAT: Electricity Generating Authority of Thailand

Voluntary Program (ESCO Revolving Fund)



Energy Service Company (ESCO)

Thai ESCO Association สมาคมบริษัทจัดการพลังงานไทย

1. Must be registered as Energy Service Company (ESCO) with The Institute of Industrial Energy , The Federation of Thailand Industries (FTI)
2. Energy Performance Contract : ECP
3. Measurement and Verification: M&V

Complementary Program (Public Perception / Promotion)

Prestigious national energy awards in 5 categories

1. Alternative Energy
2. Conservative Energy
3. Energy Personnel
4. Creative Energy
5. Energy Supporter

The winners may proceed to ASEAN Energy Awards,
a regional international awards on energy