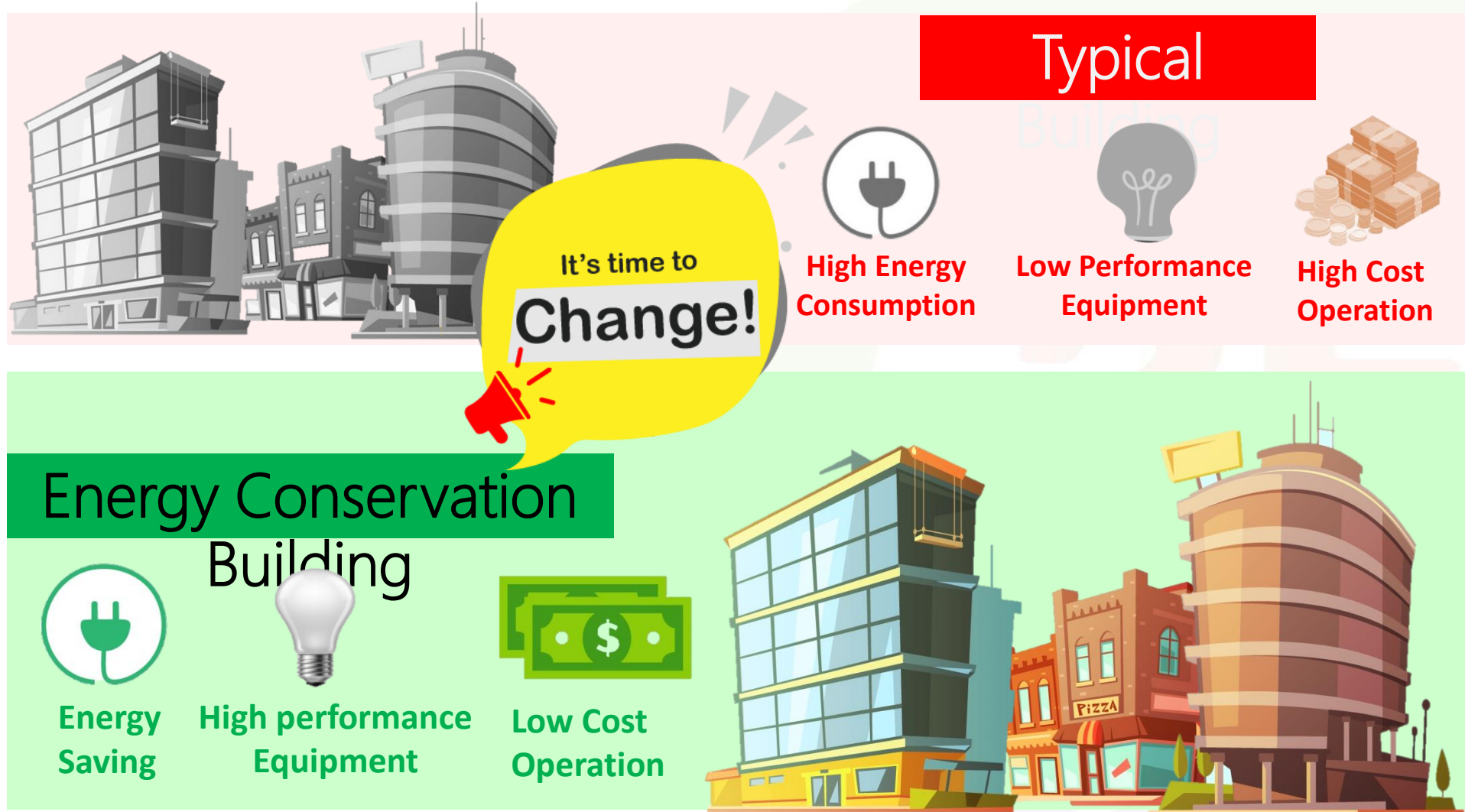


Current Situation of ZEB in Thailand

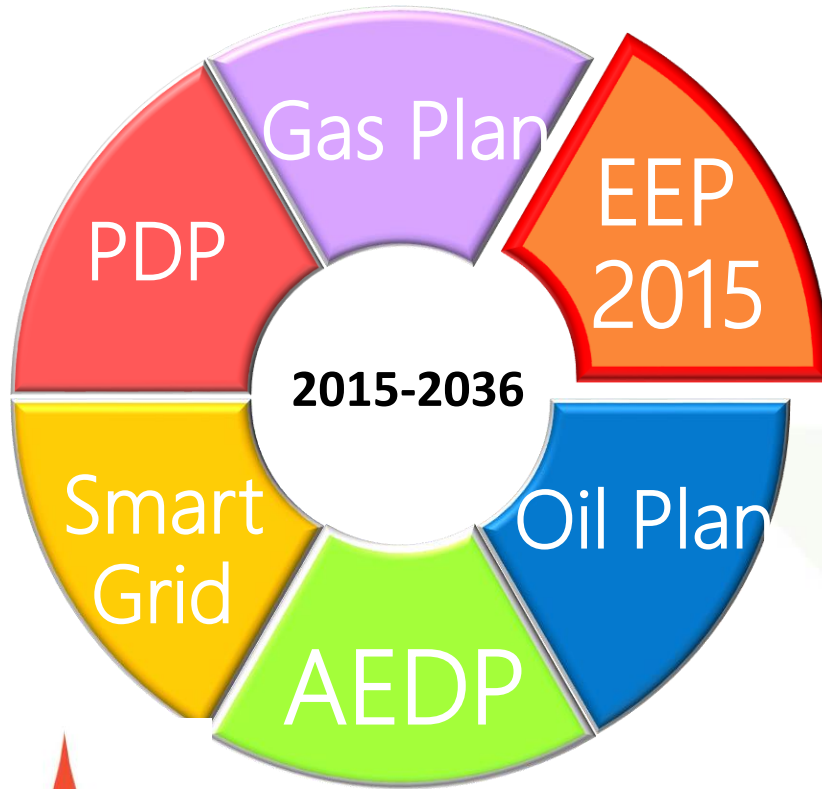
Mr. Prakob Eamsaard

Head of Building Standard Regulation and Enforcement Group

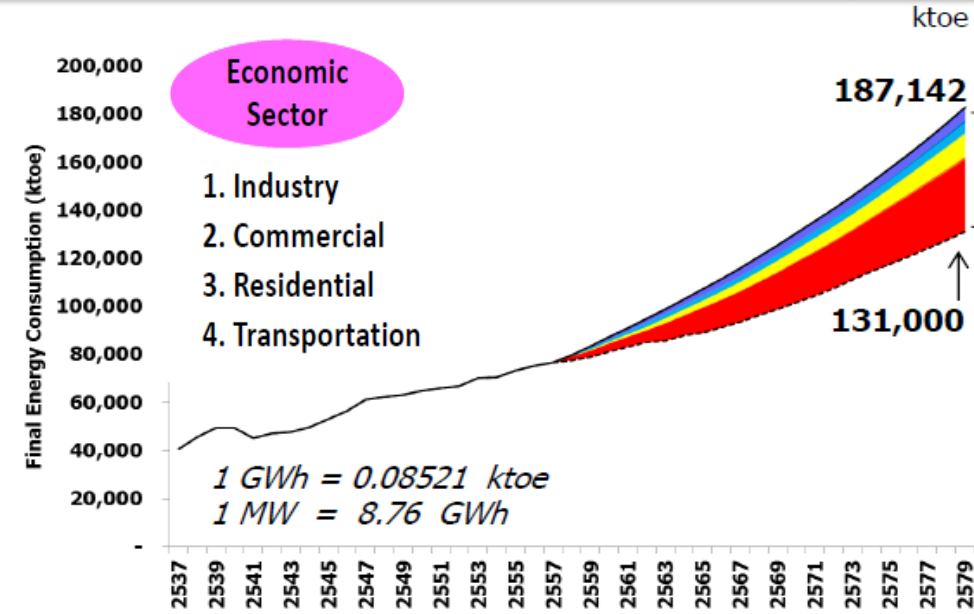
Division of Energy Regulation and Conservation



Thailand TIEB 2015



EEP = Energy Efficiency Plan
PDP = Power Development Plan
AEDP = Alternative Energy Development Plan

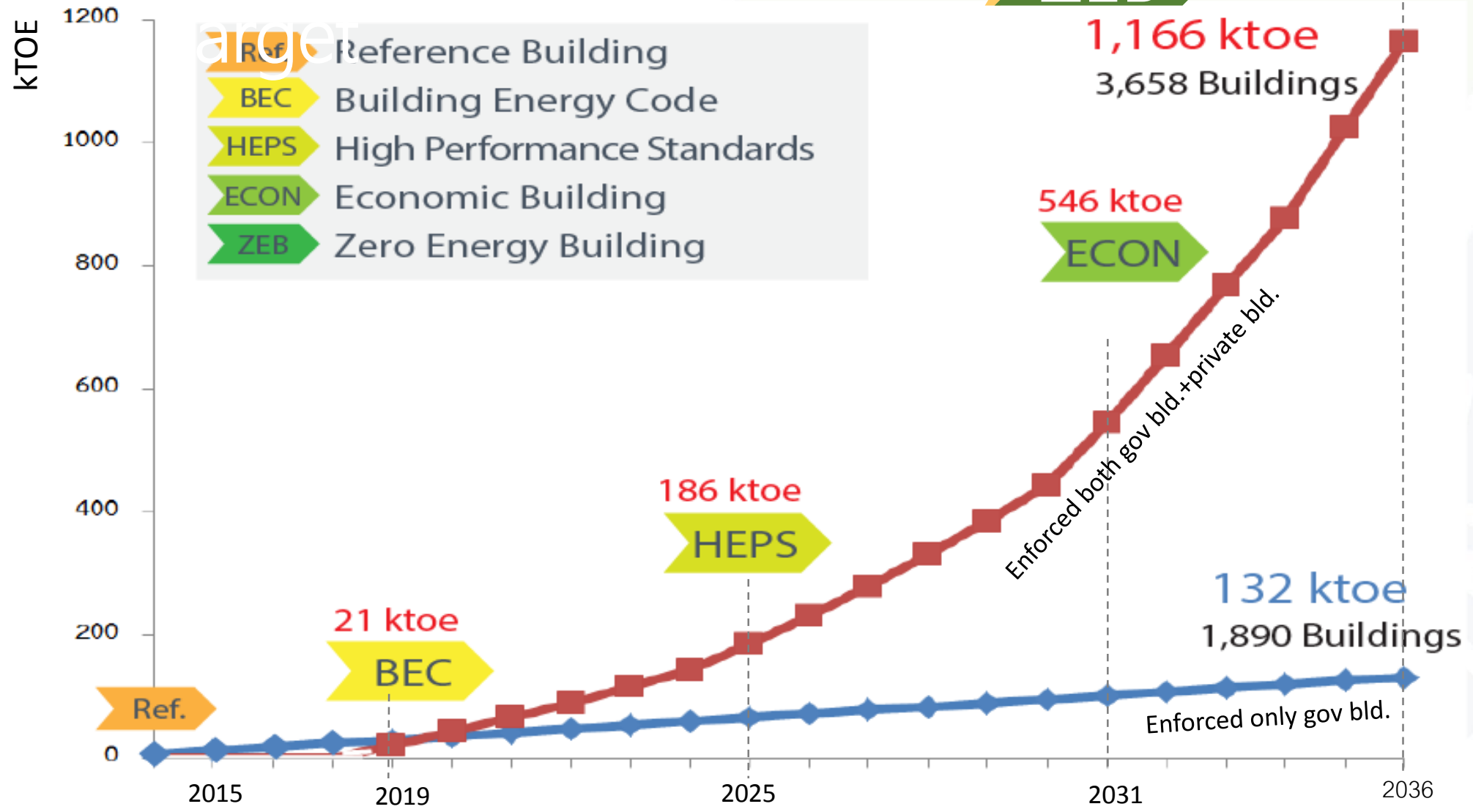


Expected Energy Saving by Economic sector		Total	
		(ktoe)	(%)
EE1	Enforcement of energy conservation standard in designated factory/building	5,156	10%
EE2	Building Energy Code (BEC) for the new buildings	1,166	2%
EE3	Energy conservation measures in public buildings	1,166	2%
EE4	Energy conservation measures for energy producers and distributors	3,324	10%
EE5	Financial Incentives and support for energy performance achievement	991	2%
EE6	Promoting greater use of LED	500	1%
EE7	Energy saving measures in transport sector	30,213	58%
Total (ktoe)		51,700	100%

EE2; Building Energy Code (BEC)

Energy Saving Target

ZEB



Net Energy Consumption



Building Type	Energy Consumption under Each Level of Energy Saving Capability (kWh/m ² /y)				
	Reference	BEC	HEPS	Econ	ZEB
Office building	219	171	141	82	57
Department store	308	231	194	146	112
Retail & wholesale business facility	370	298	266	161	126
Hotel	271	199	160	116	97
Condominium	256	211	198	132	95
Medical center	244	195	168	115	81
Educational institution	102	85	72	58	39
Other general buildings	182	134	110	66	53

% Saving



~ 20-25%

~ 30-35%

~ 60-65%

~ > 70%

Ref: EEDP 2013
Derived from Modeling
each building type
under each level of Energy
Saving Capability

Building Energy Code



OTTV/RTTV



LPD



A/C



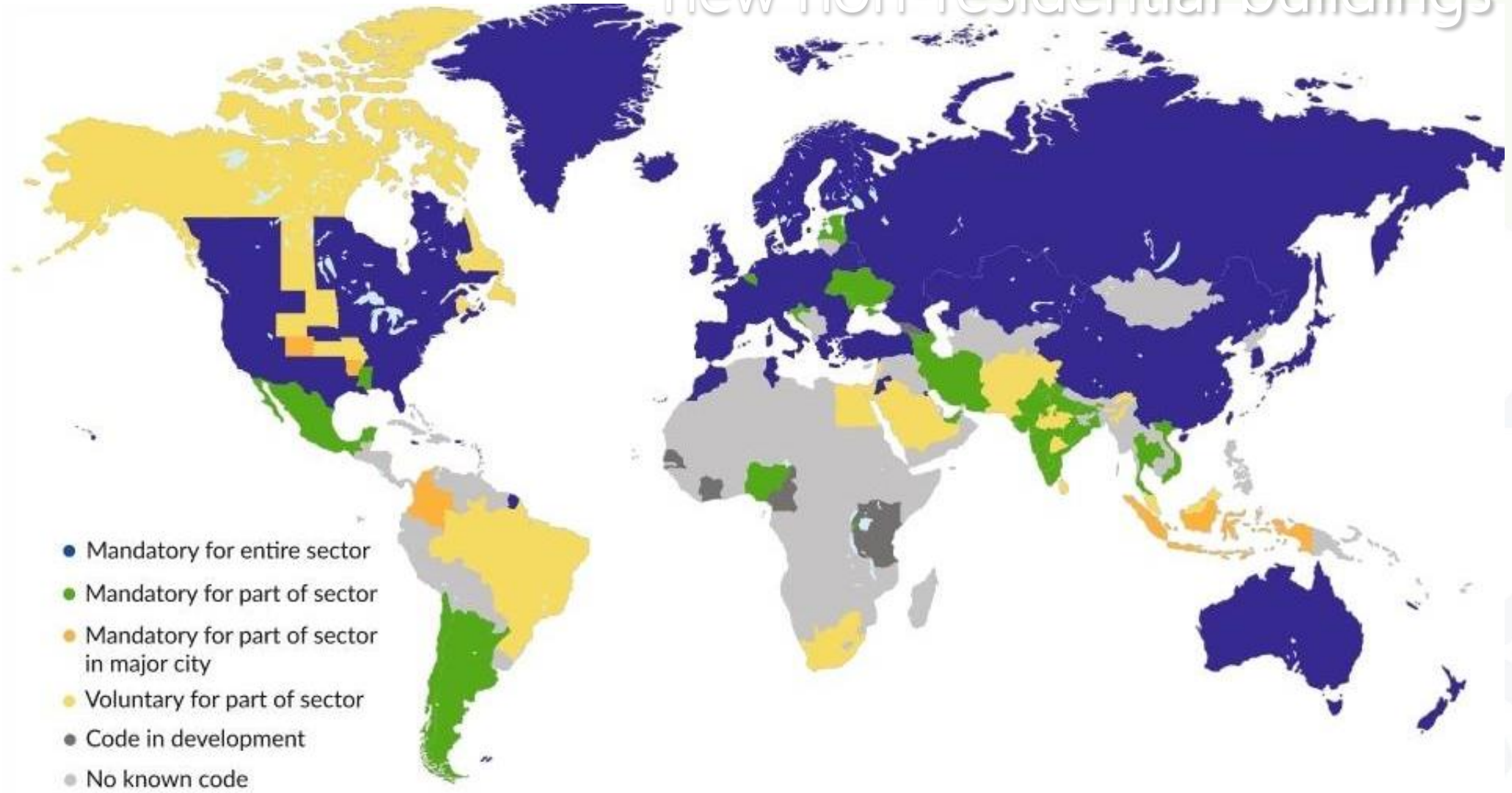
Hot Water



Renew



Status of building energy code implementation for new non-residential buildings



This map is without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries, and to the name of any territory, city or area.

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

Effective from 06/2008

Decree on designated building

Effective from 12/12/1995

Decree on designated factory

Effective from 17/07/1997

Ministerial Regulations

Energy Management in designated buildings and factories

Effective from 20/11/2009

Persons Responsible for Energy (PRE)

Effective from 31/07/2009

Energy Management Auditors

Effective from 11/05/2012

Building Energy Code

Effective from 20/06/2009

*under revise 2019

High Energy Efficiency Standard for Equipments and Machinery

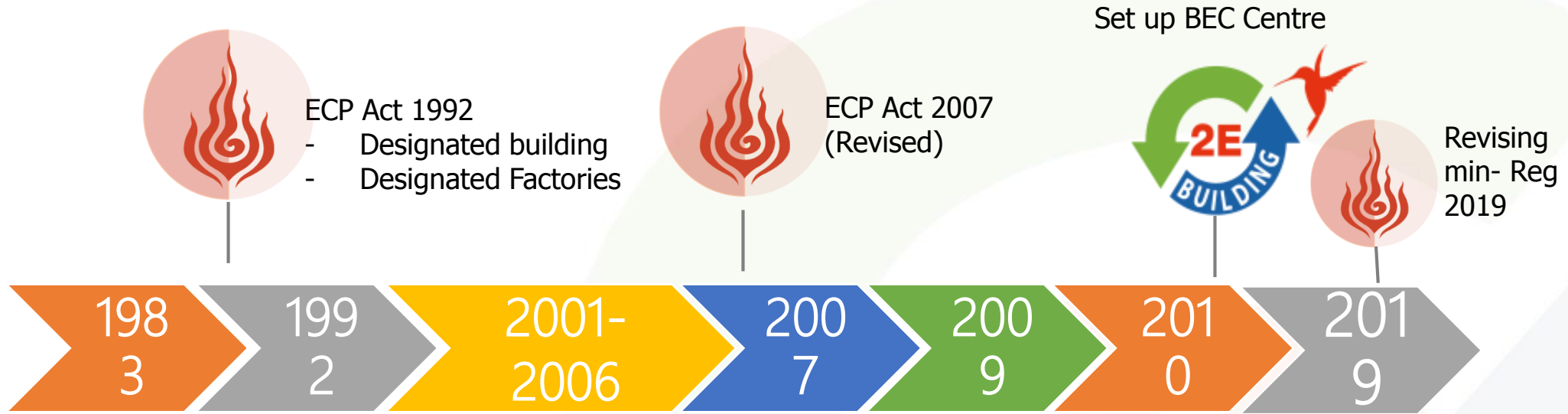
Effective from 08/04/2009

1992

- Focus on Engineering Solutions
- Low attention on Value of People

2007

- Integrate Energy Management System
- Systematic approach of energy conservation



USAID + ASEAN
 Research Energy Efficient
 Building in Thailand



DEDE+DANIDA +AIT
 research Energy Efficient
 Design guideline

DEDE released ministerial
 regulation and noticed of
 DEDE 2009



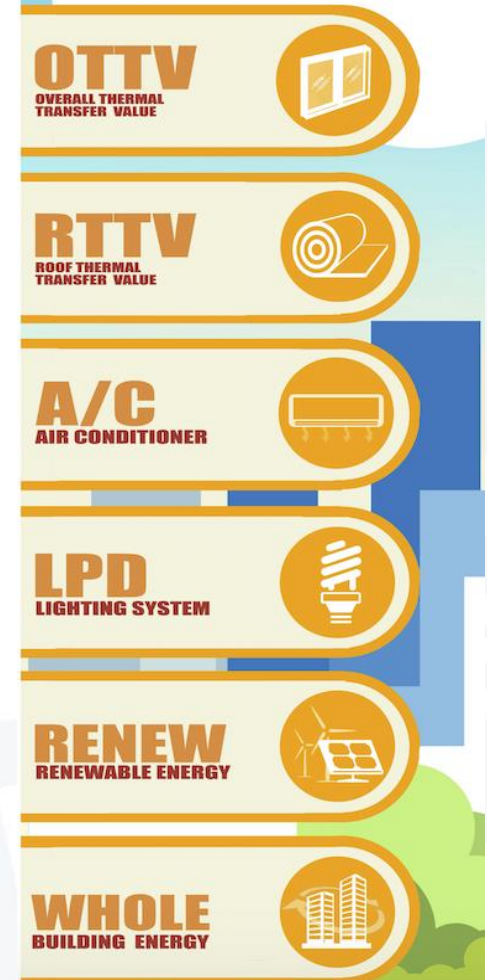
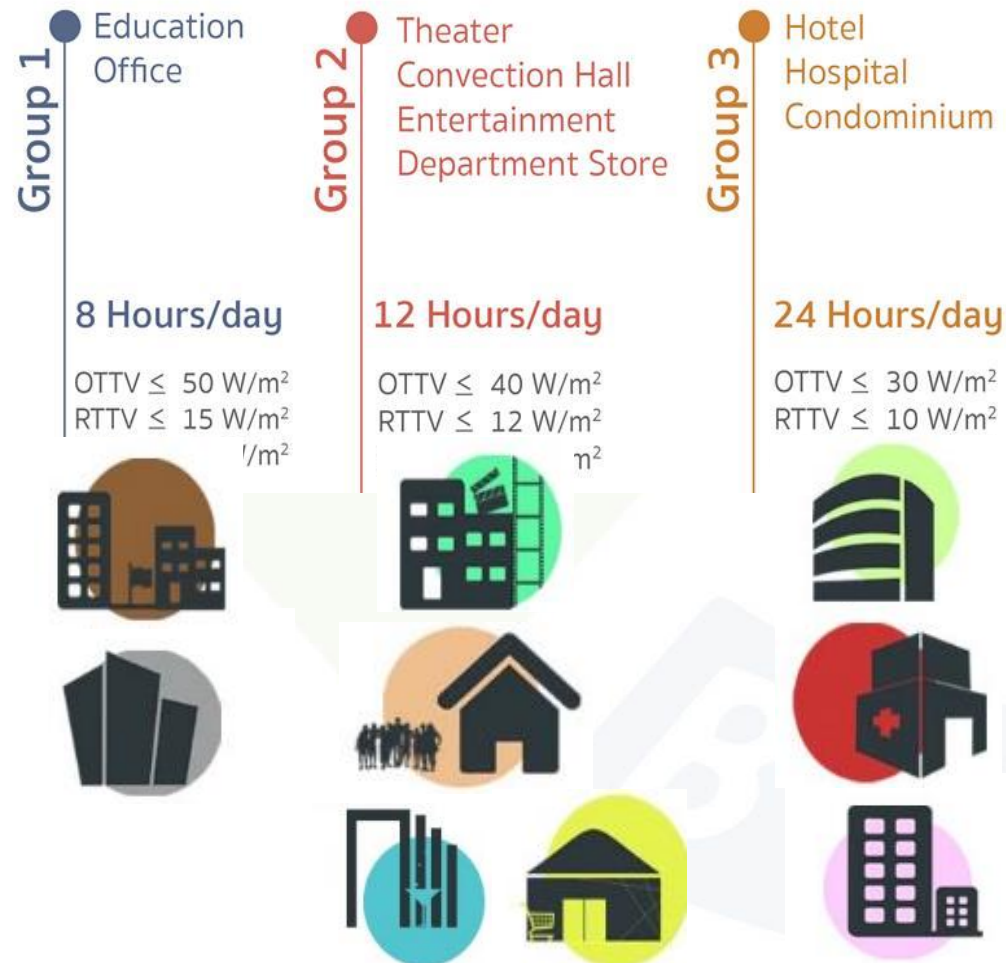
Min-Reg Noticed#1/Noticed#2

BEC Ministerial Regulations : version 2019

- **Enforcement new or retrofitted buildings of 9 buildings types which have total area $\geq 2,000 \text{ m}^2$**
(Draft Min Regulations 2019 Will start to force building size of $10,000 \text{ m}^2$ in the 1st year and reduced to the size of $5,000 \text{ m}^2$ in the 2nd year and $2,000 \text{ m}^2$ in the 3rd year)

To prescribe types and sizes of buildings and also standards, rules and procedures for designing of energy conservation building.

New or retrofitted buildings being constructed which have total area of all stories equal to **$2,000 \text{ m}^2$** or more must be designed under the energy conservation requirements

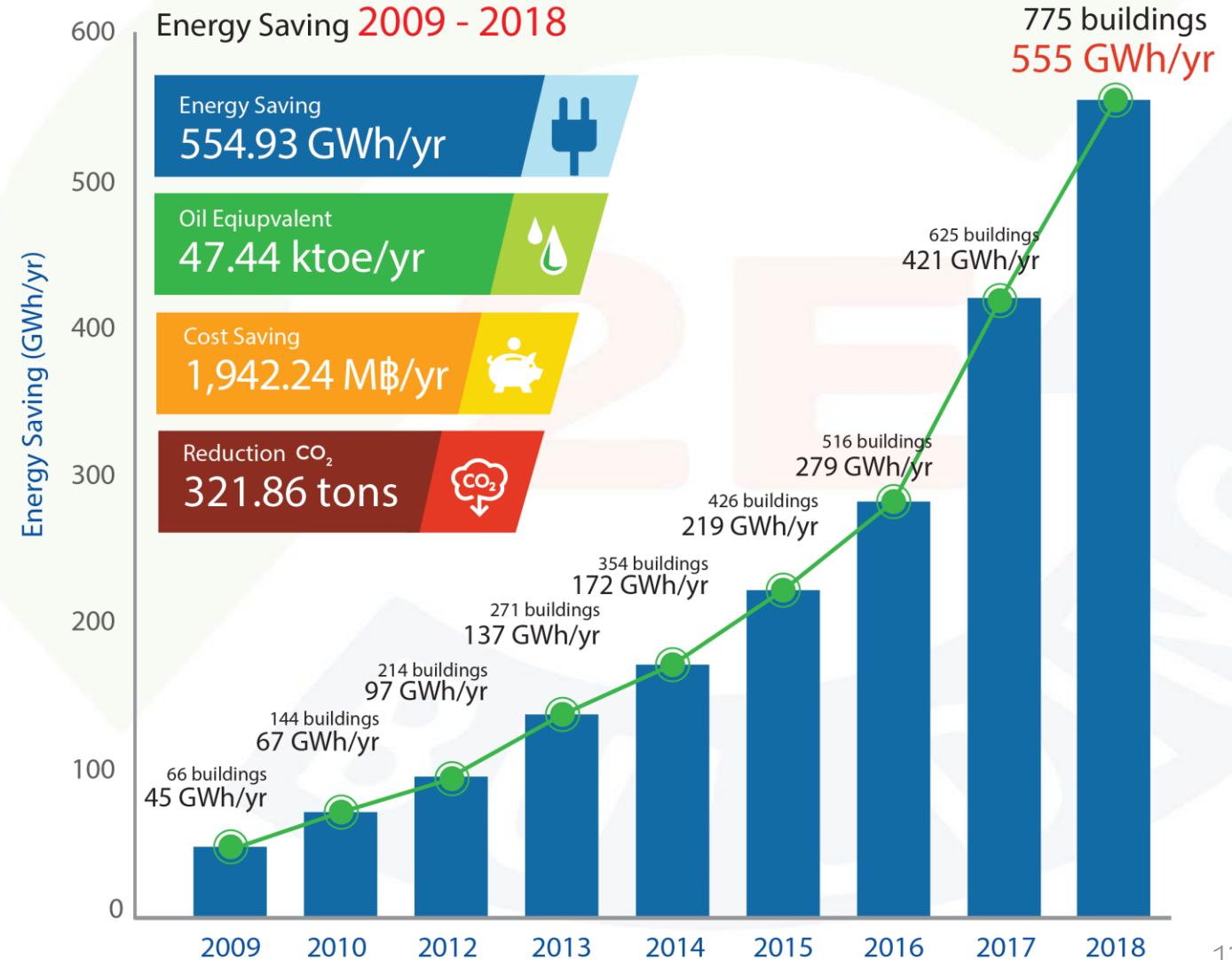
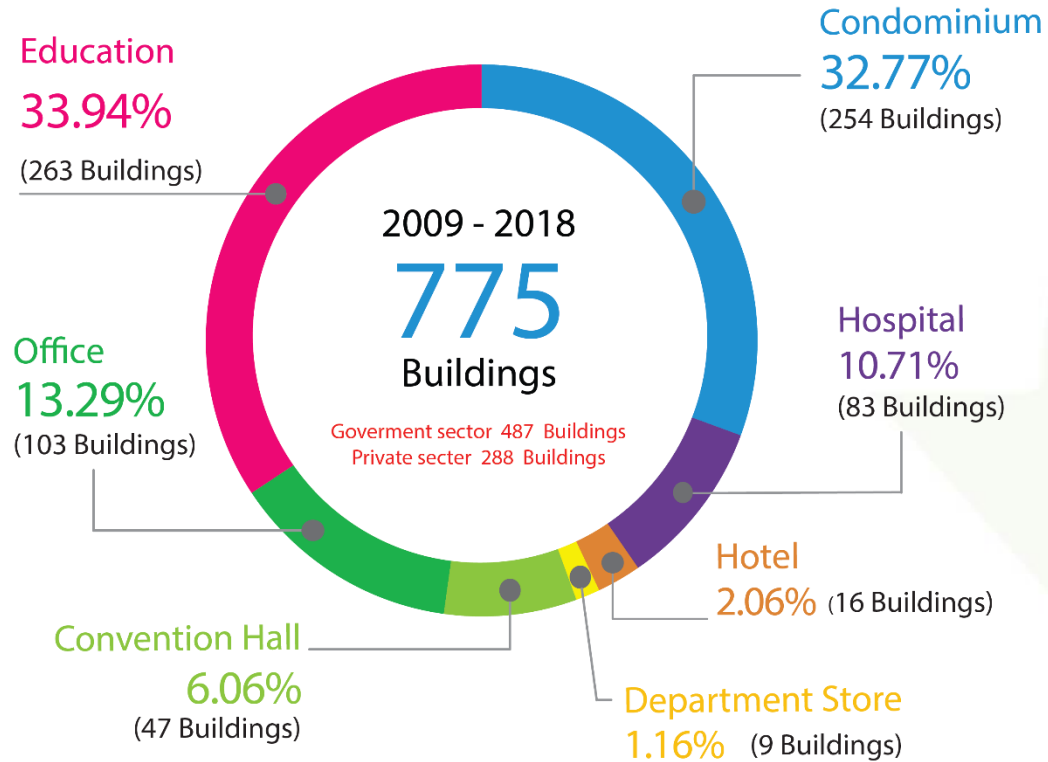


Implementation

- Revise Energy conservation Act and set standard for energy consumption on building design plan (Expect enforced start on 2020)
- Training and certified "Energy Conservation Building Auditor"
- Educate stakeholders such as Institute, building design engineer & architect
- Promote Energy efficiency Building Design (enforced gov-buildings, voluntary private buildings)
- Improve database system for encon building construction materials & appliances
- Promote BEC Award to public



Result of the Evaluation of Energy Conservation Building Design



Key measures in Building sector according to EEP2015

- ✓ Enforce BEC for Tall and large buildings first ($\geq 10,000 \text{ m}^2$) and down to small buildings ($2,000 \text{ m}^2$) in 3 Years
- ✓ Promote BEC Awards for gov & com new buildings
- ✓ Subsidy to retrofit Buildings break though BEC
- ✓ Pilot Net Zero Buildings For government Buildings

Future Development

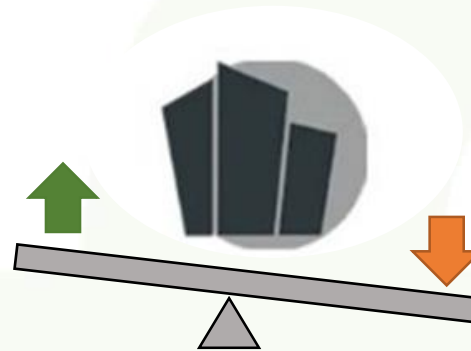
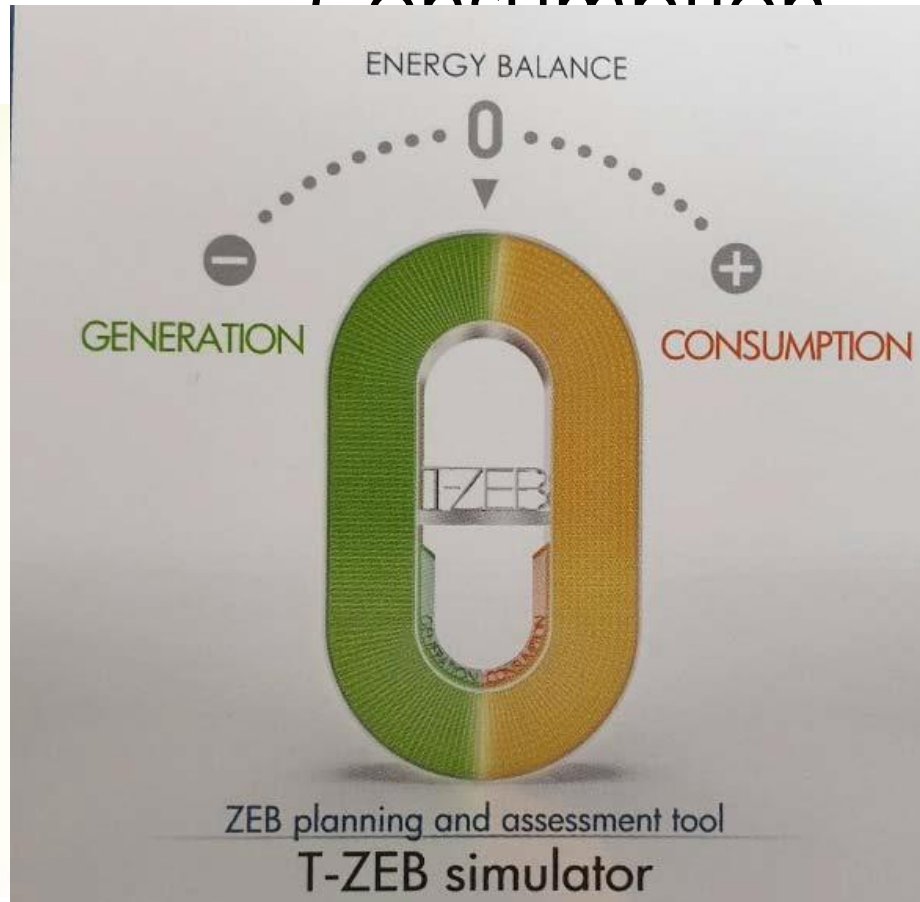


ZEB in Thailand

“ZEB is the building with ZERO energy annual consumption”

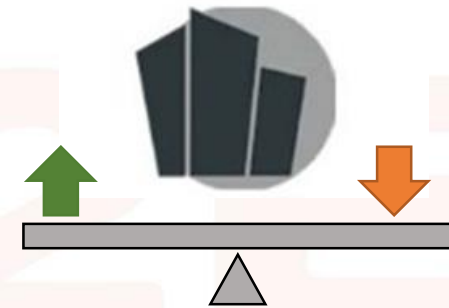
↑ generation ↓ Consumption

$$\text{generation} - \text{Consumption} = \boxed{\text{ZERO}}$$



Econ

A very highly energy performing building with renewable energy generation covering most of its annual needs.



Zero Energy Building

A very highly energy performing building with renewable energy generation covering all of its annual needs.



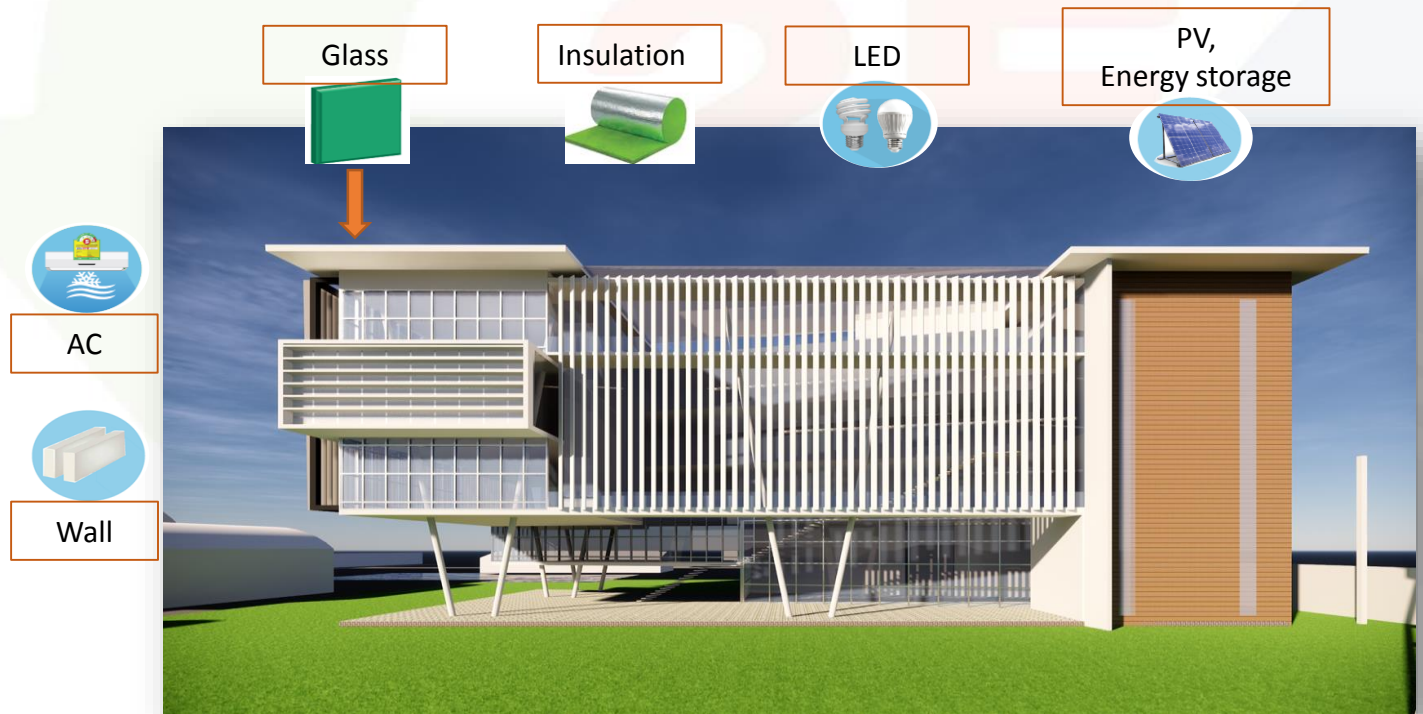
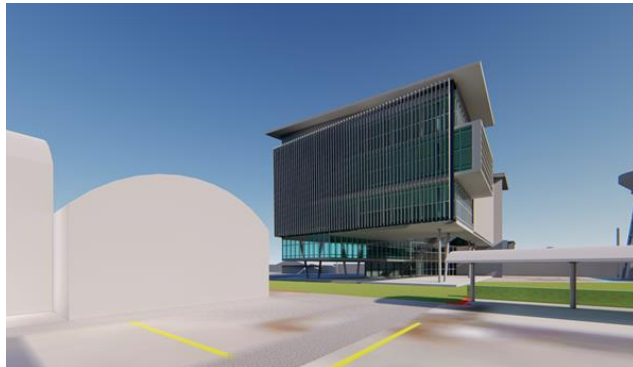
Communication Affairs Division 2014,
Khon Kaen University

Pilot Net Zero Buildings For government Buildings by DEDE

- 2019 study and design Phase (gov building 2,000 m²) **In progress**
- 2020 budget request (approx. 60 million baht/building)
- 2021-2022 construction & commissioning phase

Net ZEB target Criteria

- OTTV \leq 20 W/m²
- RTTV \leq 12 W/m²
- COP \geq 5.45
- LPD \leq 2 W/m²
- EUI \leq 75 kWh/m² ASHRAE 2019
- PV Gen 98 % ZERO CODE 2018

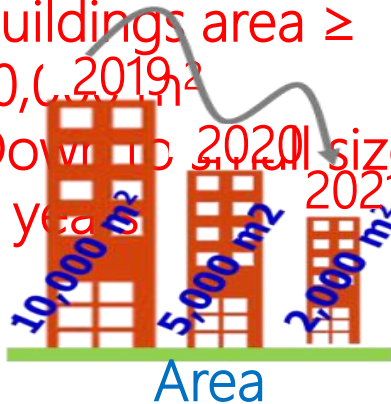


Roadmap BEC to ZEB

1. Enforcement of the Ministerial Regulation

- Enforcement BEC standard
- Development of BEC auditor training
- Tightening BEC standard and step up

- ✓ 9 types of new buildings
- ✓ In 2019, Starting enforce with new buildings area $\geq 10,000 \text{ m}^2$
- ✓ Down to 2020 size in 3 years



2. Supporting new & retrofit energy conservation building

- Energy building labels
- Financial support such as incentives, subsidy for new & retrofit building

- ✓ To support the new projects receive formal green building certification as LEED

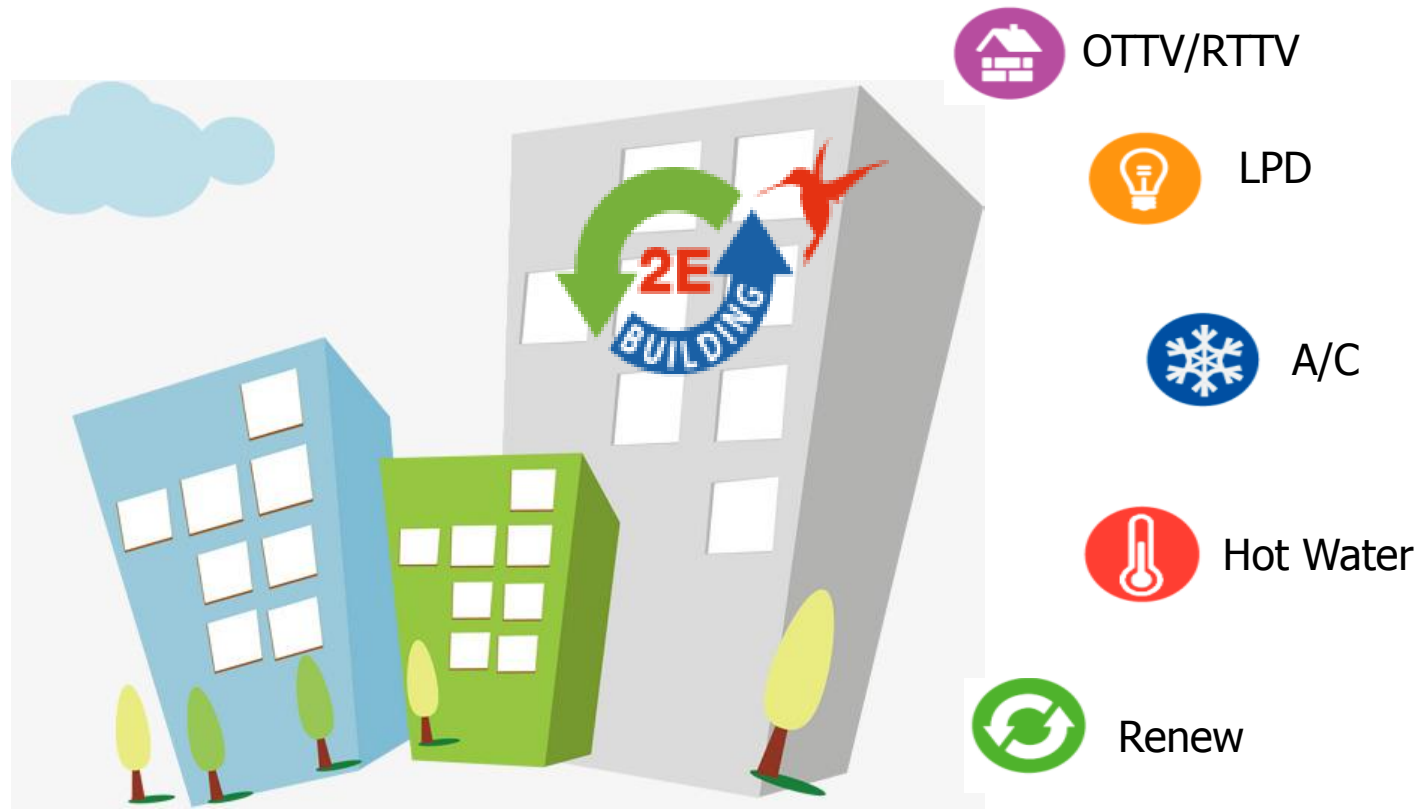


3. Zero Energy Building

- Study ZEB criteria design, economic value and the climate change of Thailand
- Set Zero Energy Building strategy Plan

Target: Government and private new building total a

- Envelop system
- Lighting system
- Air conditioning



Thank you for your attention

**Department of Alternative Energy Development and Efficiency
Ministry of Energy, Thailand
www.dede.go.th**