

Sector: Government
Institute: Ministry of Energy, Thailand
SDG Goal 11: Make cities and human settlements inclusive, safe, resilient and sustainable
Target 1.1: By 2030, ensure access for all to adequate, safe and affordable housing and basic services and upgrade slums

INTRODUCTION

At the *United Nations Conference on Sustainable Development* in 2012 (a.k.a. Rio+20 Summit), the guidelines on green economy policies and a process to develop a set of Sustainable Development Goals (SDGs) building upon the Millennium Development Goals (MDGs) and converging with the post-2015 development agenda were initiated. The change in the institutional landscape for environmental governance from 1992-2012 *versus* 2013 onwards signifies not only the coordination at the inter-government and inter-agency level, but also the addition of new financial mechanisms. In response to this international agenda, the Cabinet Office of Thailand set up 'the National Committee for Sustainable Development (CSD)' to oversee all SDGs-related activities. This committee is comprised of 37 members from the public sector, private sector, academia, and civil society, with the Secretary-General of the National Economic and Social Development Board (NESDB) as the secretariat (UN-DESA 2017; NESDB 2016). In January 2016, CSD's first meeting resolved the ownership for individual goals; hence each SDG is led by a particular Ministry(s) and supported by specific organisations (NESDB 2017a).

SDG 11 is co-led by the Ministry of Interior and the Ministry of Social Development and Human Security. Legal measures, particularly land ownership and land distribution, are reflected in a 10-year housing development strategy. And to cope with informal settlement, an affordable housing plan is being implemented with short-, mid-, and long-term targets with 5,000 new households by 2017; 76,710 households by 2021; and 310,000 households by 2030 (NESDB 2017b).

Though SDG 11 is to be highlighted as a core discussion theme, the inter-related issues across SDGs will provide broader perspectives of how city plays an important role in the quality of life for people, as well as the well-being of the planet. Thus, besides physical housing provision and land use/ land management practices, other basic services are equally important. Since electricity is one fundamental enabler of modern society, the Ministry of Energy - Thailand is selected as a case study. Even though this analysis may closely relate to SDG 7 (Ensure access to affordable, reliable, sustainable and modern energy for all), the perspective aims to address practicality in energy provision and consumption, particularly in urban setting.

BACKGROUND of Thailand's electricity sector

Prior the country's long-term energy plan, the National Energy Policy Council (NEPC) was set up based on the National Energy Policy Council Acts in 1992 (MoE 1992) to provide an initial framework for energy resources management and related industry. From 1998, a reform of the electricity supply industry has shaped the current structure of Thailand's electricity sector, evolving from a government monopoly to a semi-unbundled structure referred to the Enhanced Single Buyer model (NEPO 1999). A state enterprise, the Electricity Generating Authority of Thailand (EGAT), is the major producer, the sole owner of the transmission

system, and the supplier of electricity mainly for state-owned distribution systems – namely the Metropolitan Electricity Authority (MEA) and the Provincial Electricity Authority (PEA) (EGAT 2015). The government, via the National Energy Policy Council (NEPC), has the authority and duties to determine policies on energy industry management, and implement these policies through the Ministry of Energy. Meanwhile, the Energy Regulatory Commission (ERC) has the authority and duties to regulate energy industry operations in compliance with the policy framework of the government. The amended law in 1992 allowed the private participation of Independence Power Producer (IPP) and Small Power Producer (SPP) in the electricity market, and EGAT could purchase up to 90MW capacity from each SSP. During the 1997 Asian financial crisis, the regulations on SPP were loosened so as to attract more private participation. The Very Small Power Producer (VSPP), within 1MW capacity, was initiated in 2002 and then increased to within 10MW capacity in 2006, in accordance with the Adder Program implementation – which subsequently accommodated the proliferation of renewable energy (RE) projects.

INITIATIVE 1: Thailand Integrated Energy Blueprint (TIEB)

Regarding the long-term national energy policies, separate plans based on energy resources are overseen by different government divisions. The lack of policy integration prompted an urge for policy alignment and in 2015 *the Thailand Integrated Energy Blueprint* was approved to promote RE and utilisation energy conservation for long-term plan 2015-2036, as shown in Table 1 (MoE 2017). The blueprint integrated plans are essential to execute and align all energy projects under the same timeframe, focusing on suitable energy balance.

The core elements are:

(1) Stability

- Electricity and gas reserve capacity at sufficient and stable levels
- Long term electricity reserve margin set at around 15%
- 2P reserves (proven & probable reserves) set at around 11-12 years.

(2) Prosperity, and sustainability

- Reasonable energy prices compared to neighbouring countries
- Reduce energy intensity (EI) by at least 30%

(3) Sustainability

- Reduce GHG emissions and energy consumption
- Increase RE earnestly to at least 30% of primary energy consumption

Table 1 Thailand Integrated Energy Blueprint

National Energy Plans	Government bureaucracy	NEPC approval date
Power Development Plan (PDP 2015)	EPPO / EGAT	14 May 2015
Energy Efficiency Plan (EEP 2015)	EPPO	13 August 2015
Natural Gas Plan	EPPO / PTT	17 September 2015
Oil Plan	EPPO / PTT	
Alternative Energy Development Plan (AEDP 2015)	DEDE	

Note: DEDE Department of Alternative Energy Development and Efficiency, MoE

EPPO Energy Policy and Planning Office, MoE

EGAT Electricity Generating Authority of Thailand

PTT PTT Public Company Limited

Evaluation:

Though the TIEB established a better alignment between different government entities and strategic plans, numerous hurdles were embedded in the implementation process. For decades, natural gas has long been a major source of electricity generation (more than 60%). As the domestic natural gas production is depleting, at present the government is planning to introduce more coal into the energy mix, despite increasing public concerns on environment issues and 'not-in-my-backyard' (NIMBY) mindsets. The cheaper cost of coal is one government propagandised argument, but the externality cost has never been incorporated into any government agenda. Thus, natural gas may be a better option as 'transitional fuel', given that either coal or natural gas must be imported anyway. And due to a monopoly nature embedded in some businesses, the free market may not a practical solution (or at least not yet). Third-party access to natural gas pipelines and the electricity grid are under government consideration, because the open-market may hamper national energy security. In the transportation sector, electricity serves as a better energy medium for city transportation; yet, there is limited usage within Bangkok CBD, despite having the Skytrain and metro systems. Natural gas vehicle (NGV) and mandate-blended biofuels are widely adopted for public bus service and personal vehicles, respectively. And the growth of electric vehicle (EV) is included within PDP plan.

INITIATIVE 2: Alternative Energy Development Plan 2015-2036

Renewable energy (RE) was firstly stated in the national agenda in 1992. However, early RE activities were merely demonstration projects in remote areas (MoE 1992). Until 26 December, 2006, NEPC approved EGAT purchasing power from generators using renewable energy (RE), and instructed EGAT to revise its regulations accordingly. On 18 April, 2007, EGAT announced Regulations for the Purchase of Power from the Small Power Producers (SSP) exclusively for RE generation. A policy directive was initiated as the 'Adder Programme' – distinguishing not only the six different RE technologies, but also installed capacity and geography. On 28 January, 2009, the Cabinet approved a 15-year Renewable Energy Development Plan (REDP 2008-2022), and on 9 March, 2009, NEPC approved additional tariff adders for certain categories of alternative energy. The announced goal was for RE to constitute up to 20% of final energy consumption by 2022 (equivalent to 5607.50MW). In 2010, the Adders' rates were reviewed and adders for new solar power projects were no longer offered. In 2011, REDP was subsequently replaced by a 10-year Alternative Energy Development Plan (AEDP 2012-2021) aiming to increase the RE share to 25% of final energy consumption (equivalent to 9201MW). In 2013, the AEDP target increased to 13927MW with six-fold biogas target and 50% wind and solar target increment; and by 2015 the total RE target was set at 19684MW (DEDE 2015). Concurrently, the Feed-in Tariff (FiT) programme was piloted for biogas, solar rooftop and solar community projects (Tongsopit and Greacen 2013).

Evaluation:

The AEDP plan aims for a higher proportion of renewable energy - to reduce greenhouse gas emissions in the power sector. Besides the Adder program in 2007-2010 and the Feed-in Tariff in 2013, no further government incentives/subsidies for RE technology adoption are offered. In addition, RE plans have suffered from complexity in both implementation and through multiple policy revisions. The summary of the RE plans, potentials, targets and achievement as of August 2018 is elucidated in Table 2 (DEDE 2015; EPP0 2018). At present, Thailand's electricity system structure is based mainly on centralised generation. However, some RE technologies allow decentralised generation for self-consumption and/or selling to others in nearby areas. Though a prosumer—the concept of self-generation & self-consumption—will strengthen the notion of energy independence, particularly at a household level, a broader perspective of the national grid system security may not be positive. And currently, no regulatory framework is applied.

Table 2 Summary of RE potential, plan targets, and status as of Aug 2018

	Total Potential	Target				Current capacity* (Aug 2018)
		REDP 2008-2022	AEDP 2011-2021	AEDP 2011-2021 (revised in 2013)	AEDP** 2015-2036	
Biogas	657.58	120	600	3600	1280	433.2
Biomass	8492.01	3700	3630	4800	5570	3986.4
Hydro – small	410.00	324	1608	324	376	155.4
Hydro – large	2906.40				2906.4	2906.4
Waste	697.01	160	160	400	550	412.8
Solar	42356.67	500	2000	3000	6000	3249.6
Wind	14141.00	800	1200	1800	3002	1515.5
Others***		3.50	3	3		95.6
Total		5607.50	9201.00	13927.00	19684.40	12754.9

Note: *Current RE generation included off-grid power generation;

**AEDP 2015-2036 includes the existing large hydropower

***Others type of energy i.e. hydrogen, waste heat

REDP Renewable Energy Development Plan

AEDP Alternative Energy Development Plan

INITIATIVE 3: Energy Efficiency Plan 2015-2036

The Energy Efficiency Plan 2015-2036 (EEP2015) aims to reduce energy intensity (EI) at least 30% in the year 2030, compared to the year 2010 – which is equivalent to the final energy consumption reduction of 56,142 ktoe (from the estimated BAU of 187,142 ktoe). The four target economic sectors are Industry (EI -22%), Large commercial buildings (EI -34%), Small commercial buildings/households (EI -8%), and Transportation (EI -46%). There are three approaches and ten driven strategies displayed in Table 3 (EPPO 2016).

Table 3 Summary of EEP2015 approaches and strategies

Approaches	Strategies
<i>Compulsory programme</i>	(1) Designed factories/building enforcement (2) Building energy code enforcement (3) Machineries/equipment standard and labelling (4) Energy efficiency (EE) resources standard for energy producer and distributor
<i>Voluntary programme</i>	(5) support and subsidise EE projects and/or implementation (6) Light Emitting Diode (LED) for EE promotion (7) EE in transportation sector (8) EE technology R&D
<i>Complementary programme</i>	(9) Human resource development and capacity building (10) Public awareness campaign for enhancing energy knowledge and changing behaviour

Evaluation:

Thanks to the detailed strategies and measurements, many energy indicators have improved significantly. By 2017, energy Intensity reduced to 8.5toe/MTHB; electricity per GDP reduced to 18.1GWh/MTHB; GHGs emission per capita was 25.29 tons CO₂eq/MTHB. However, the final energy consumption and electricity consumption per capita was high at 1.32 toe and 2796kWh, respectively (EPPO 2018). These indicators imply better performance from industry, presumably through compulsory programme; whereas buildings and the residential sector have room for improvement. Transportation could be one lagging behind sector because of a dependence on fossil fuels and no better alternatives. Stringent transportation policy, together with the extended public transportation network at an affordable price are essential.

CONCLUSION

To make cities and human settlements sustainable in terms of energy, the energy pyramid provides concise summary: *conserving energy, energy efficiency, and renewable energy (RE)*. Reduction in fossil fuels consumption and promotion of RE will be a critical pathway towards a low carbon society. The national strategic plan and government supporting policy are prerequisite elements, and Initiative 1 and 2 addressed such a transition. Initiative 3 demonstrated government intervention by means of regulations, industrial standards, and market-based support mechanisms which can induce new technological adoption and create market dynamics. The proper balance between compulsory and voluntary mechanisms are essential. And, timely policy design and adjustment are urgently required to accommodate such rapid societal changes.

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