The East and Southeast Asia Renewable Energy Statistics Training Workshop

Renewable Energy in Thailand

Energy Statistics Section Alternative Energy and Efficiency Information Center

December 12nd, 2016 Bangkok, Thailand





Asia-Pacific Economic Cooperation



Outlines

- Thailand Energy Situation in 2015
- Thailand Energy Balance Table
- ***** Renewable Energy Data Collection
- ***** Alternative Energy Development Plan (AEDP) 2015-2036
- Challenges for Renewable Energy Development in Thailand

Thailand's Energy Situation in 2015

Final Energy Consumption by Fuel Type



- Thailand' s final energy consumption by fuel type in 2015 was 77,881 ktoe, an increasing 2.7% from 2014.
- Commercial energy consumption including Petroleum products, Electricity, Coal and its product, Natural gas, was shared 82% of the total final energy consumption.
- While the rest 8.4% and 9.6% were renewable energy and traditional renewable energy in 2015
- The total value of final energy consumption was 999 Billion Baht.

Thailand's Energy Situation in 2015

Final Energy Consumption by Economics Sector



- Including manufacturing (27,696 ktoe), mining (133 ktoe) and construction (122 ktoe).
- p : preliminary data.

- The final energy consumption by economics sector in 2015 which the greatest shared 36.6% in transportation sector, was 28,501 ktoe, an increasing 6.3% from 2014.
- The second energy consumed in Industry sector shared 35.9% which are include manufacturing, mining and construction, the final energy consumption was 27,951 ktoe, an decreasing 0.6% from 2014.
- While the rest of final energy consumption were 14.9% in residential sector, 7.6% in commercial sector and 5.0% in agricultural sector respectively.

1,303

1,303

1,303

Fossil Fuels

149

1,154

Thailand Energy Balance Table

ดารางดุลยภาพพลังงานของประเทศไทยประจำปี ๒๙๙๘

TABLE THAILAND ENERGY BALANCE 2015¹⁷ พวะช : พันตันเรียบเท่าน้ำนับใน

33

พาสนำ

ด่ามพื้น ปิโครเอียนและผ่อิดภัณฑ์ปิโครเอียน ประเภท 5711 COAL & ITS PRODUCTS PETROLEUM & PETROLEUM PRODUCTS ปิโตรเลียม รวมพลังงาน อิกไปด์ ปิโตรเลียม สลิดภัณฑ์ปิโตรเลียม ร้าม เช็จพาณิชย์ LINE รวมน้ำมัน PETROLEUM PETROLEUM PRODUCTS ຊ່ານທີ່ນ LIGNITE สอิตภัณฑ์ NAMIN ล้องเม่ต เกมซิน สำเร็จรูป ก็กระรรมเราติ ปิโตรแลียม ไฟฟ้า NATURAL GAS GASOLINE มัฐหม่อ เป็ญ้าแห่ง ELECTRICITY TOTAL TOTAL GASOLICI TOTAL ETROLEUM COAL & TOTAL 2 COMMERCIAL ŝ. 8 ITS PETROLEUM 5 ETROLEUM ENERGY PRODUCTS PRODUCTS PRODUCTS การจัดหาและการใช้ (2) (3) (7) (11) (12) (13) (16) (1.5) (16) (17) (18) (19) (20) (21) (22) (23) (26) (2:5) (26) (27) (2a) (29) (55) (H) (3) (4) (6) (9) (10) (30) (4) (31) (32) (36) 0.78272 0.02618 0.02818 0.02618 0.02818 0.62619 0.24770 0.25760 0.43594 0.78272 0.96128 0.08521 et masternite 0.74509 0.62619 0.65392 0.56000 0.63014 0.74507 0.76507 0.76507 0.74507 0.74507 0.74507 0.81740 0.51740 0.56195 0.86198 0.96124 7,604 34,020 3,613 245 3,858 4,384 การแล้งกายในประเทศ 3,858 45.008 49,866 13,05010/ 15 43,690 728 การนำเข้า 123 6.753 6,955 13,846 13,846 1,40111 5841 103 156 59,767 1,228 2,299 74,841 การส่งออก (16)(0) (16) (0) (0) (16)(40 (95) (42) (1,064)(66) (0) (4) (1,241)(14) (5,318) (3,444) (404)(11,597) (11,732) (193) (11.941)ส่วนเปลี่ยนของสลี่ยก / ส่วนต่างทางสถิติ (23)(3.901)93 (2, 172)(6,003) (25) 150 125 (5,878) 4,974 (122 (11)(4) (157)54 (4) (578) (58) (1.085)(345) (151) (45) (2,291) 2,546 64 (3,332) รวมการจัดพาหลังงานขึ้นต้นทั้งหมด 4,990 84,020 (11, 589)5 2852 108 4,783 7,827 3,588 395 3,983 11,810 56.228 13 039 (1.234) 15 560 (3.439) [397] 96,589 1,035 109,434 84 ไรจกสันนำมัน (56.030)(247 1,772 1,071 444 2,989 2,508 1.062 236 6,166 1,108 24,463 5,380 1,327 48,526 (7,751) (7,751) ไรจมอกกัวข (26, 325)(13.039)33,508 1.912 855 4.193 4,193 1,104 1,104 ใจไฟฟ้า (2.672)(1, 147)(3.819) (3,588) (3,588) (T,A07) (25,267) (24) (184) (208)(25,475) 15,708 (17,174) ຫຍັງນຳ 330 330 (3,588) พอังความรัญ (2.672)(1.147) (3.819) (3,588) (7,407) (3, 338)(177)(182)(3,520) 5.011 (5,916) 11 กังพันก้าย (441) (450) 141 (9 (309) พธิเความรัญบร่วม 12 (21,486) (21.484)(z) 9,865 (11,621) 13 ดีเสอ (7) (15)(15) 2 (13) 14 เครื่องอนต์กำห (4) [4] 128 124 15 อื่น ๆ ²⁰⁷ 231 231 16 การแปรรูปอื่น ๆ 468 462 468 17 (247)52,979 (31,654) รวมการแปรรูปทั้งหม (2,672)(1, 147)(3.819)(3,588) (3,588) (7,407) (56,030)(26.325)(13.039) 8.241 1.913 855 6.433 24,435 5.196 1.327 15,708 (23, 353)(7.695) (418)(1.393)(284) ได้และ (1,393)(9,506) (9,790) 19 ខ្មរេឆ្នេ (198) (198) (1,004) (1,202) รวมการใช้พลังงานขั้นอุดท้ายทั้งหม 20 180 108 3,636 4,008 395 395 4,743 7,823 1.913 756 6.242 237 18.879 1.757 930 39 997 55.231 15,455 4.403 75.089 การใช้หลังงานขันสูดท้ายที่ไม่เป็นพลังงาน 4,743 1,818 1.912 756 1.086 930 2,016 11,245 11,245 การใช้หลังงานขั้นแหห้าย 22 6.005 237 1.757 37,981 43,986 15,455 84 180 108 3,636 4.008 395 395 4,403 5 156 374 2 995 2.446 1.126 4.932 18,879 63,844 3,842 **UNMONITED** 10 3,859 3,859 32 3,891 เหมืองแข่ 24 15 15 118 - 14 133 25 งคลาพกรรมการเลี้ย 84 180 108 3,636 4,008 395 395 4,403 3,322 693 18 9 A,396 593 5,733 9,055 6,436 19.894 26 การก่องร้าง 112 10 122 122 122 27 1,826 1,826 น้ำนอยู่อาคัย 1.826 3,531 5,357 สุรกิจการค้า 28 617 618 5,32815/ 617 1 5.946 29 2,682 2,020 การขนต่อ 42 374 2,986 2,421 1,120 237 4,932 10,514 9 1.154 25,809 28,491 10 28,501 30 พาสมก 2,682 2,020 42 374 2,986 2,421 1,120 237 10,289 9 19,498 22,180 10 22,190 31 หางอไท่ 76 -76 76 76 32 4,932 4,932 MIRCING 4,932 4,932

Renewable Energy

BALANCE

Thailand Energy Balance Table

**

*

เชื้อเพลิงชีวกาพ พลังงานหมุ่นเวียน[#] พลังงานพบุนเวียนตั้งเดิม⁵⁰ พลังงานอื่น ๆ TYPE BIOFUELS OTHER RENEWABLE ENERGY TRADITIONAL RENEWABLE ENERGY Renewable Energy are including ชื่อม่วล รวมทั้งสิ้น 5701 SOLID BIOMASS - Solar เสื้อเหลิง รวมหลังงาน รวมพลังงาน หมุ่นเวียนตั้งเสิม หมุ่นเวียน ชีวภาพ 97ai - Wind 8 Nevuin ชีวม่วล TOTAL - Hydro TOTAL TRADITONAL GRAND TOTAL TOTAL SOLID TOTAL ENEWARI RENEWABLE - Geothermal BIOFUELS BIOMASS ENERGY ENERGY SUPPLY AND CONSUMP - Biomass (Fuel wood, Paddy Husk, (35) (56) (50) (39) (60) (41) (42) (63) (66) (65) (66) (67) (48) (49) (50) (51) (52) (53) (54) (55) (56) (57) (58) 0.000023673 0.08521 0.08521 0.08521 0.36083 0.17836 0.30021 0.11693 0.00000049535 0.30021 0.86198 000025672 unit Bagasse, Agricultural waste) 25 305 607 5,330 3,271 225 704 10,87 11765 613 539 12,917 874 1.067 235 9,388 1,941 75,838 DOMESTIC PRODUCTION 74,928 IMPORTS - Municipal solid waste (MSW) (11.971)EXPORTS 31 (3.299) STOCK CHANGE/STATISTICAL DIFFERENCE 33 704 12,974 905 1,069 1,974 225 613 539 135.496 - Biogas 5.330 TOTAL PRIMARY ENERGY (905) (1,069) (1.974)(9,725) PETROLEUM REFINERIES 1.104 6. PROCESSING PLANT: Traditional Renewable Energy are (137) (209)(305) (427)(2,144)(3,398) (4,305 (235) (21,714)OWER PLANTS (ON GRID (305) (330 (25) (3,451 (137) (235) including [427] (2.099)(3,314) (9,602 STEAM THERMA GAS TURBINE (309 (11,621) COMBINED CYCL - Fuel wood (45) (209)(293 GAS ENCINE (84) - Charcoal (231 OTHERS 14 (203)(8.143)(5,511) (5.043) OTHER CONVERSION 14 TOTAL TRANSFORMATION - Paddy Husk (2.144)(137)(209)(5,511)(905) (1,974) (235)(35,378 (3,398)(4.30)(1.069)(9,790) OWN USES (1.202)16 LOSSES - Agricultural waste 495 2,444 304 7.463 TOTAL FINAL ENERGY CONSUM Biofuels are including Ethanol and 11.243 FINAL NON-ENERGY LISES 495 6,574 3,622 77,881 0.55 3 186 2 444 5 990 2,998 304 539 7,463 AGRICULTUR 3,891 Biodiesel 88 180 1.80 3 186 5,990 495 6.57 295 539 1.225 27,696 MANUFACTURIN Others Energy are including Black CONSTRUCTION 3,227 2,998 6,23 RESIDENTIAL 11.591 5,947 COMMERCIAL liquor and Residual gas TRANSPORTATION 28,501 22,190 ROAD RAIL 76 4,932 29 AIR 1,303 30 WATERWAY

Publications

- •Energy Balance of Thailand
- Thailand Alternative Energy Situation
- Thailand Energy Efficiency Situation







http://www.dede.go.th

Renewable Energy Data Collection

- Thailand Energy balance is a tool for analyzing the country's energy situation in each year and also presenting the energy structure of Thailand which are including energy production, energy import, energy export, energy transformation and final energy consumption by economics sector in term of physical unit and energy unit.
- We are collecting energy data to make the national energy balance table under the IEA's concept. The energy statistics information is a secondary data that we have received from the various sources such as government agencies, private energy companies and other related agencies with a excellent cooperation by monthly or annually.
- In case of renewable energy data collection we have collected them from the various sources also. However, the entering data in national energy balance is very complicated because we have some unavailable data as well as we will receive information from the study research and analysis based on statistical methodology because there are no regulations for reporting about renewable energy consumption.

Alternative Energy Development Plan (AEDP) 2015-2036



* Alternative fuels = Bio-oil, Hydrogen



Alternative Energy Development Plan (AEDP) 2015-2036

Goal Target 30% Renewables in Total Final Energy Consumption by 2036



Performance on Alternative Energy Policy in 2015

Alternative Energy	Unit	Performance				Target 2026
		2012	2013	2014	2015	Target 2050
Electricity	MW	2,786.27	3,788.46	4,494.03	7,962.79	19,684.40
	ktoe	1,138.00	1,341.00	1,467.00	1,556.00	5,588.00
1. Solar Energy	MW	376.72	823.46	1,298.51	1,419.58	6,000.00
2. Wind Energy	MW	111.73	22.71	224.47	233.90	3,002.00
3. Small Hydro Power	MW	101.75	108.80	142.01	172.12	376.00
4. Biomass	MW	1,959.95	2,320.78	2,451.82	2,726.60	5,570.00
5. Biogas	MW	193.40	265.23	311.50	372.51	1,280.00
6. Municipal Solid Waste	MW	42.72	47.48	65.72	131.68	550.00
7. Large Hydro Power	MW	-	-	-	2,906.40	2,906.40
Heat	ktoe	4,886.00	5,279.00	5,775.00	6,579.00	25,088.00
1. Solar Energy	ktoe	3.50	4.54	5.13	5.72	1,200.00
4. Biomass	ktoe	4,346.00	4,694.00	5,144.00	5,990.00	22,100.00
5. Biogas	ktoe	458.00	495.00	528.00	495.00	1,283.00
6. Municipal Solid Waste	ktoe	78.00	85.00	98.00	88.00	495.00
5. Alternative Heat Energy	ktoe	-	-	-	-	10.00
Biofuels	ktoe	1,270.00	1,612.00	1,783.00	1,942.00	8,712.00
1. Ethanol	million litre/day	1.40	2.60	3.21	3.51	11.30
2. Biodiesel	million litre/day	2.80	2.90	2.89	3.37	14.00
3. Pyrolysis Oil	million litre/day	-	-	-	-	0.53
4. Compressed Bio-methane Gas	ton/day	-	-	-	-	4,800.00
5. Alternative Fuels	ktoe/day	-	-	-	-	10.00
Alternative Energy Consumption (ktoe)		7,294.00	8,232.00	9,025.00	10,077.00	39,389.00
Final Energy Consumption (ktoe)		73,316.00	75,214.00	75,804.00	77,881.00	131,000.00
Percentage of Alternative Energy Consumption (%)		9.95	10.94	11.91	12.94	30.00



Main activities to support RE development







Biofuel





Area-based RE power generation target must be related to RE potential (RE Grid Capacity)

Develop and support for power generation from unutilized fuel (e.g. agricultural waste, industrial waste, fast growing crop)

Support competitive bidding for power purchasing system

Promote and support RDF transformation for municipal waste management

Promote and support biomass-derived fuel (e.g. biomass pellet, bio-coal)

Support biogas generation from waste water or solid waste

Promote heat utilization in building by building code establishing

Promote utilization of B10, B20 in both transportation and industrial sector

Promote gasohol utilization

Promote CBG utilization for vehicle and industry

Promote biofuel production efficiency improvement



Challenges for RE development in Thailand

- Uncertainty of RE supply and feedstock price, especially for biomass
- The high potential RE supply resources are located away from the high energy demand area
- ✤ High investment cost of RE as compared to conventional fuel
- Rules and regulation related to RE development, including the long approval processing time for power purchase agreement
- ✤ Limited Grid capacity to serve RE power generation



Key success factors

Waste To Energy

- Effective waste management/waste sorting system
- Effective collaboration among relevant waste to energy responsible parties

Biomass	Successful improvement of biomass supply chain system
	Successful improvement of biomass logistic/collection system
X	Successful development of community-scale biomass energy technology

Energy Crop Successful development of energy crop pilot project that can be used as business model

Solar PV Advancement of solar PV technology development to the stage in which its the levelised cost of electricity (LCOE) cost can be competitive with fossil fuel cost



Successful development of wind turbine technology that is suitable for low wind speed potential in Thailand



Thank you for your attention.

