

Energy

in Thailand :

Facts & Figures **2013**

- Primary Energy Supply
- Final Energy Consumption
- Alternative and Renewable Energy
- Green Electricity
- Bioenergy
- Biofuels
- Energy Efficiency
- CO₂ Emissions



Department of Alternative
Energy Development and Efficiency

MINISTRY OF ENERGY

Energy in Thailand :

Facts & Figures



The policy on alternative energy development and energy efficiency improvement is continued to conduct in the year 2014 due to Thailand is still to rely on energy import as the bill in 2013 was 1,379 thousand million baht.

The promotion of alternative energy development, aiming for 25% usage within 10 years (2012-2021), is to increase alternative consumption comprising of solar, wind, small hydro power, biomass, biogas, MSW and biofuels (ethanol and biodiesel) to replace fossil energy. As for energy efficiency improvement, Thailand has the current 20-year energy efficiency development with the target to reduce energy usage by 25% in 2030, compared to that in 2010, or the equivalent of a reduction of final energy consumption by 20% in 2030.

In 2013, Thailand's final energy consumption has increased 2.6% from the previous year whereas final alternative energy consumption has grown 12.6% and energy intensity has decreased from the year 2010 (base year) 2.4%

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Primary Energy Supply : Facts & Figures

Primary Energy Supply 2013

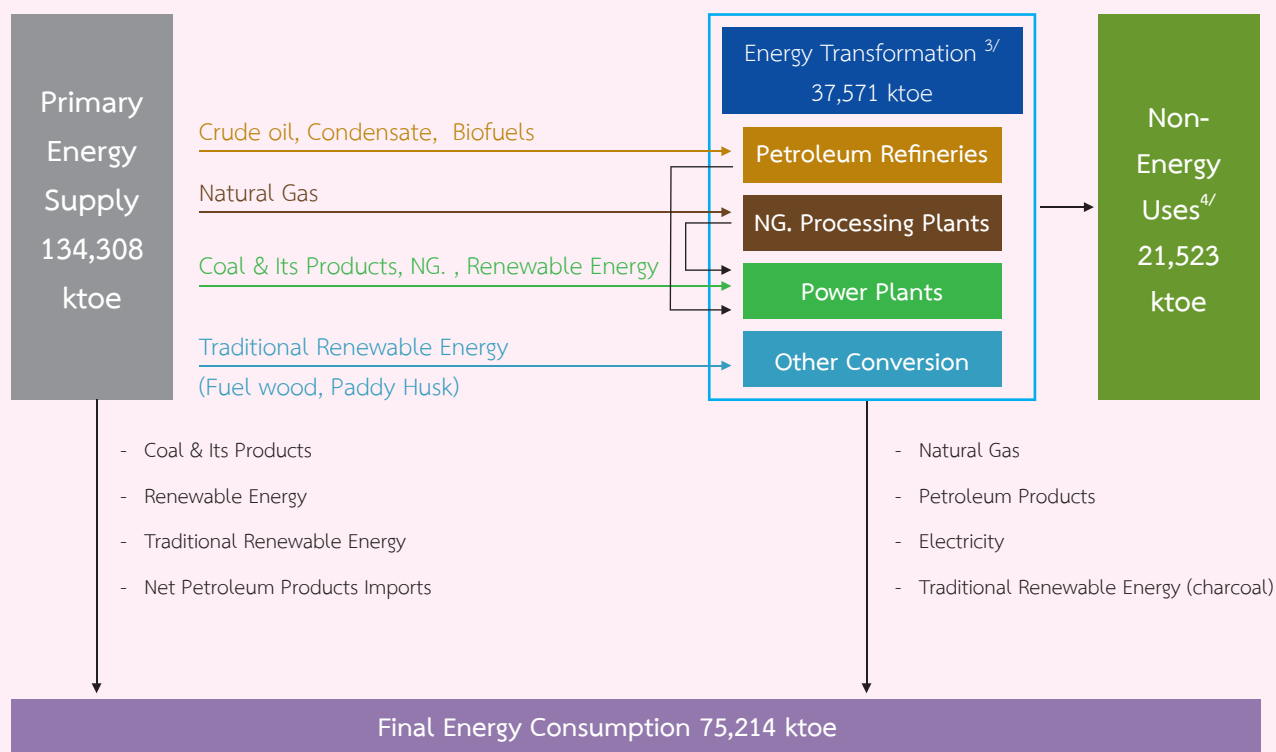


unit : ktoe

Primary Energy Supply ^{1/}	Domestic Production	Imports	Exports	Stock change	Total
Coal & Its Products	4,459	10,852	7	(1,492)	13,812
Crude oil & NGL	7,363	43,322	1,606	4,153	53,232
Condensate	4,509	1,206	-	(244)	5,471
Natural Gas	36,405	10,470	-	-	46,875
Petroleum products	-	3,186	13,694	(884)	(11,392)
Electricity	-	1,071	109	-	962
Renewable Energy	9,993	-	-	-	9,993
Traditional Renewable Energy ^{2/}	13,739	125	29	-	13,835
Biofuels	1,609	-	48	(41)	1,520
Total	78,077	70,232	15,493	1,492	134,308

1/ Primary Energy Supply is domestic production, plus imports, less exports and plus/less stock change.

2/ Comprising of fuel wood, charcoal, paddy husk, and agricultural waste using in residential and industrial household.



3/ Including own uses and losses .

4/ Non Energy Uses are used as raw material for Petrochemical Industries.

Final Energy Consumption : Facts & Figures

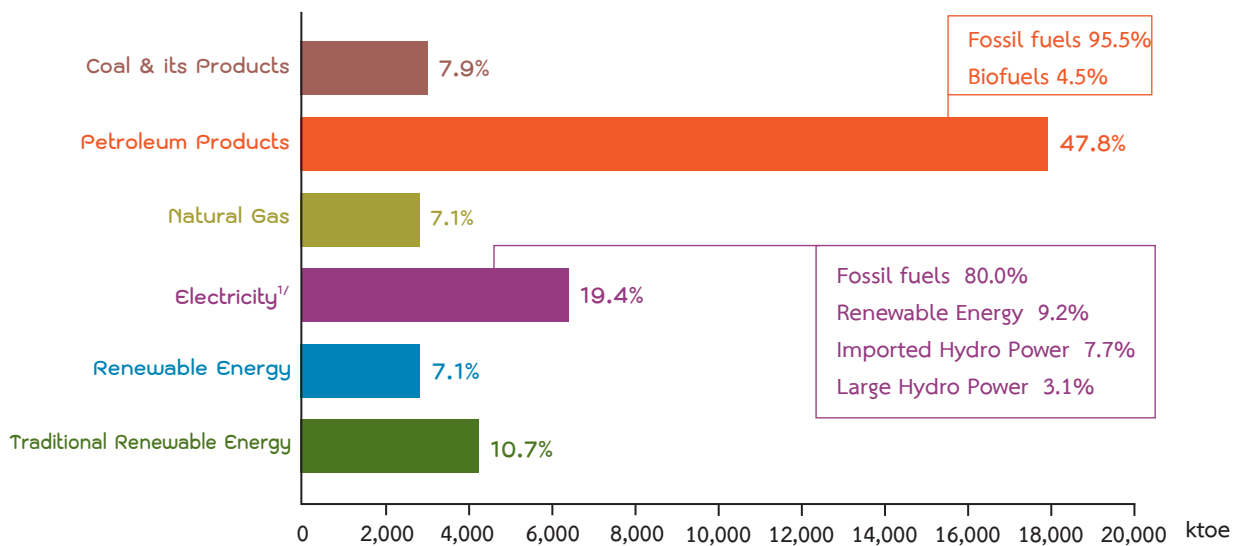
Final Energy Consumption 2013



unit : ktoe

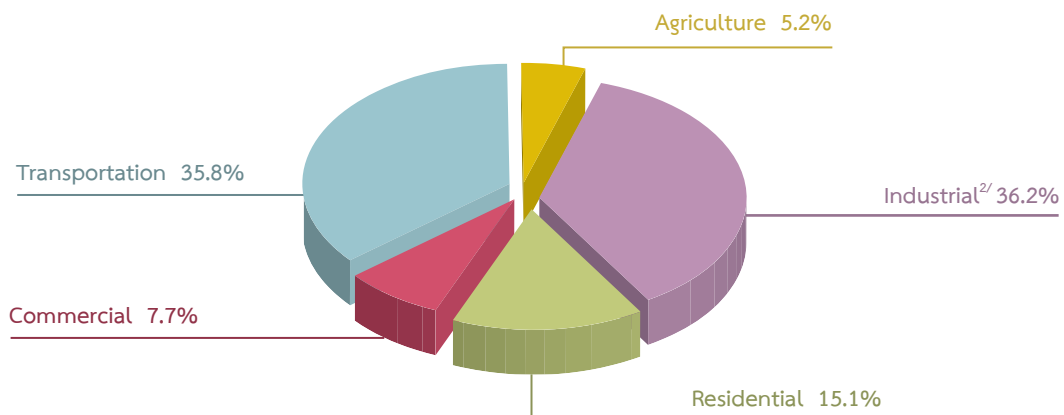
Final Energy Consumption	Agriculture	Industry ^{2/}	Residential	Commercial	Transportation	Total
Coal & its Products	-	5,947	-	-	-	5,947
Petroleum Products	3,876	5,041	1,903	908	24,220	35,948
Natural Gas	-	2,629	-	1	2,709	5,339
Electricity ^{1/}	30	6,470	3,220	4,892	14	14,626
Renewable Energy	-	5,274	-	4	-	5,278
Traditional Renewable Energy	-	1,832	6,244	-	-	8,076
Total	3,906	27,193	11,367	5,805	26,943	75,214

Final Energy Consumption by Fuels 2013



^{1/}Including off grid power generation.

Final Energy Consumption by Economic Sectors 2013



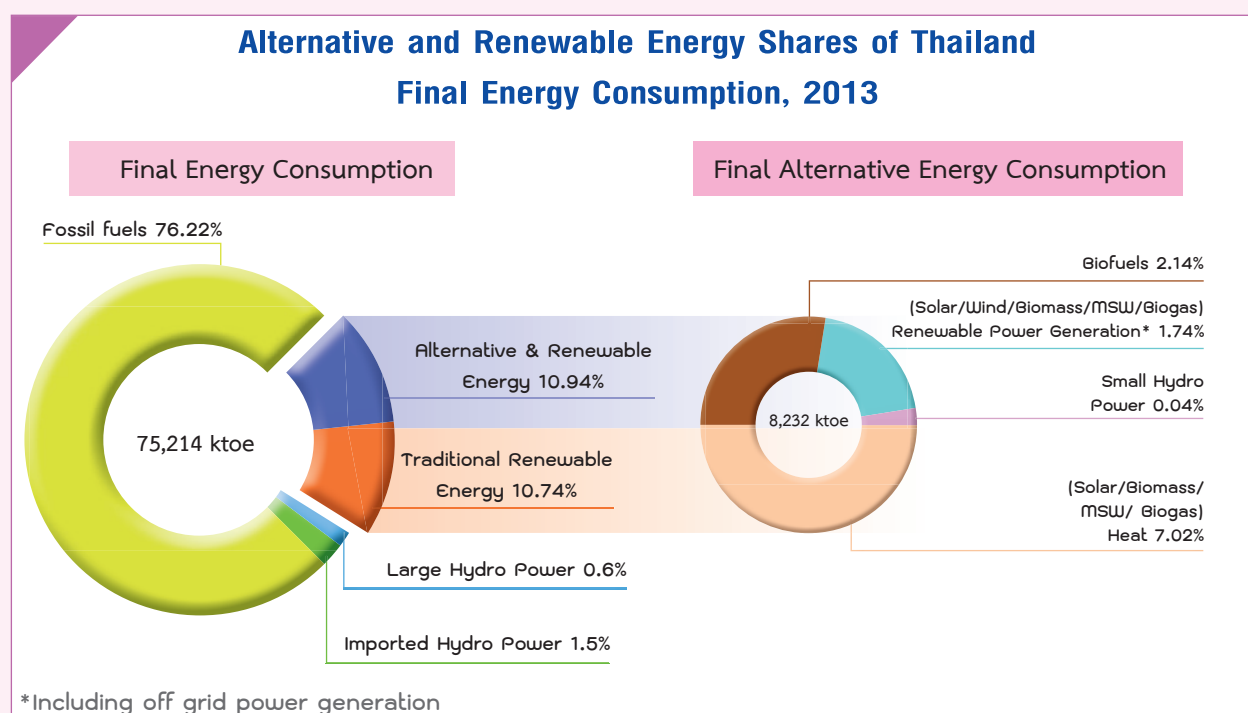
^{2/}Including mining, manufacturing and construction.

Alternative and Renewable Energy : Facts & Figures

Performance on Alternative and Renewable Energy Policy 2013

TYPES OF ENERGY	Unit	Target 2021	2012	2013	2013			
					Q ₁	Q ₂	Q ₃	Q ₄
Electricity	MW ^{1/} ktoe	13,927	2,786 1,138	3,788 1,341	3,032 303	3,343 326	3,465 344	3,788 368
Solar	MW	3,000	376.72	823.46	486.30	554.45	619.87	823.46
Wind	MW	1,800	111.73	222.71	215.18	215.18	222.71	222.71
Small Hydro Power	MW	324	101.75	108.80	101.75	101.75	104.73	108.80
Biomass	MW	4,800	1,959.95	2,320.78	1,988.85	2,185.05	2,210.25	2,320.78
Biogas	MW	3,600	193.40	265.23	196.95	239.64	260.33	265.23
MSW	MW	400	42.72	47.48	42.72	46.68	46.98	47.48
New energy	MW	3	-	-	-	-	-	-
Heat	ktoe	9,800	4,886	5,279	1,246	1,373	1,208	1,459
Solar ^{1/}	ktoe	100	3.5	4.54	1	3	4.27	4.54
Biomass	ktoe	8,500	4,346	4,694	1,112	1,222	1,065	1,295
Biogas ^{2/}	ktoe	1,000	458	495	113	128	118	136
MSW	ktoe	200	78	85	20	20	21	24
Biofuels	mL/day ktoe	39.97	4.1 1,270	55 1,612	5.1 375	5.3 386	5.5 408	6.2 443
Ethanol	mL/day	9	1.4	2.6	2.3	2.6	2.7	2.8
Biodiesel	mL/day	7.20	2.7	2.9	2.8	2.7	2.8	3.4
New Energy Replacing Diesel	mL/day	3.00	-	-	-	-	-	-
Compressed Bio-methane Gas	ton	1,200	-	-	-	-	-	-
%AE		25%	9.9%	10.9%	10.3%	10.8%	11.1%	11.3%

^{1/}Data was accumulated. ^{2/}Data was revised.



Green Electricity : Facts & Figures

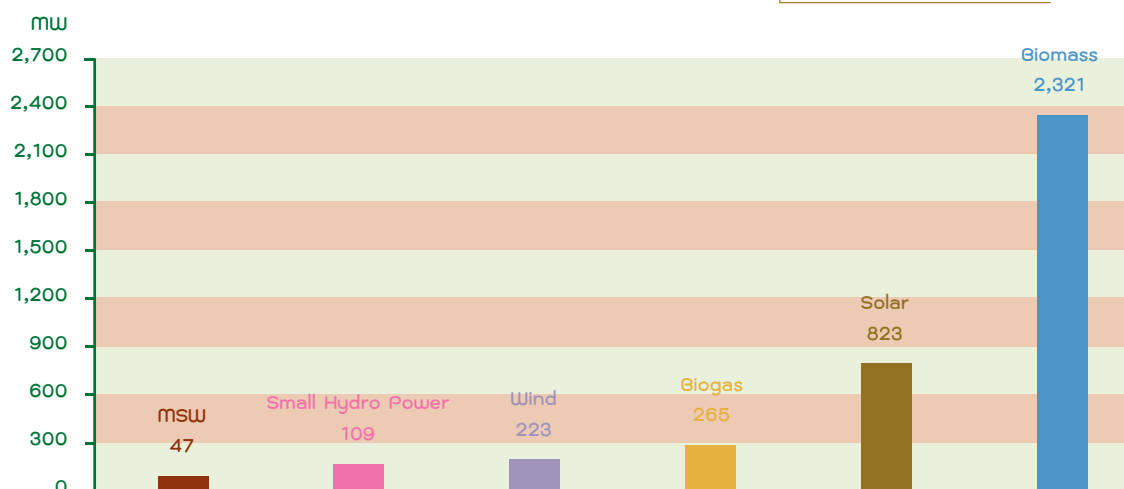
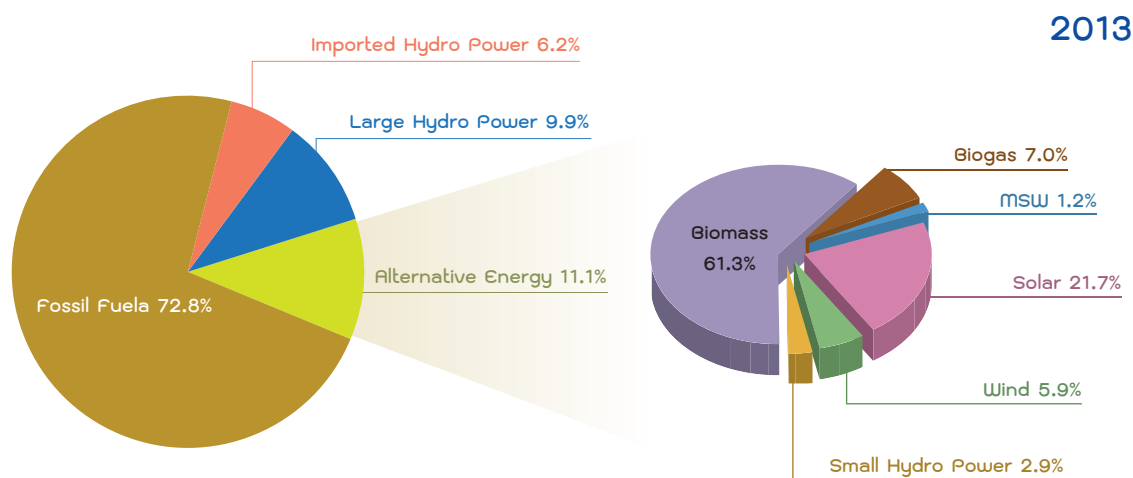
Green Electricity 2013



The installed capacity of renewable energy in 2013 was 3,788 MW, accounting for 11.1% of total power capacity in Thailand.

Install capacity of renewable power generation^{1/}

Types of Energy	2012		2013		2013							
	MW ^{2/}	ktoe	MW ^{2/}	ktoe	Q ₁		Q ₂		Q ₃		Q ₄	
					MW ^{2/}	ktoe	MW ^{2/}	ktoe	MW ^{2/}	ktoe	MW ^{2/}	ktoe
Solar	376.72	42	823.46	92	486.30	13	554.45	18	619.87	21	823.46	40
Wind	111.73	12	222.71	26	215.18	6	215.18	6	222.71	7	222.71	7
Small Hydro Power	101.75	27	108.80	28	101.75	7	101.75	6	104.73	7	108.80	8
Biomass	1,959.95	951	2,320.78	1,039	1,988.85	250	2,185.05	254	2,210.25	266	2,320.78	269
Biogas	193.40	87	265.23	131	196.95	22	239.64	36	260.33	36	265.23	37
MSW	42.72	19	47.48	25	42.72	5	46.68	6	46.98	7	47.48	7
Total	2,786.27	1,138	3,788	1,341	3,031.75	303	3,342.75	326	3,464.87	344	3,788	368

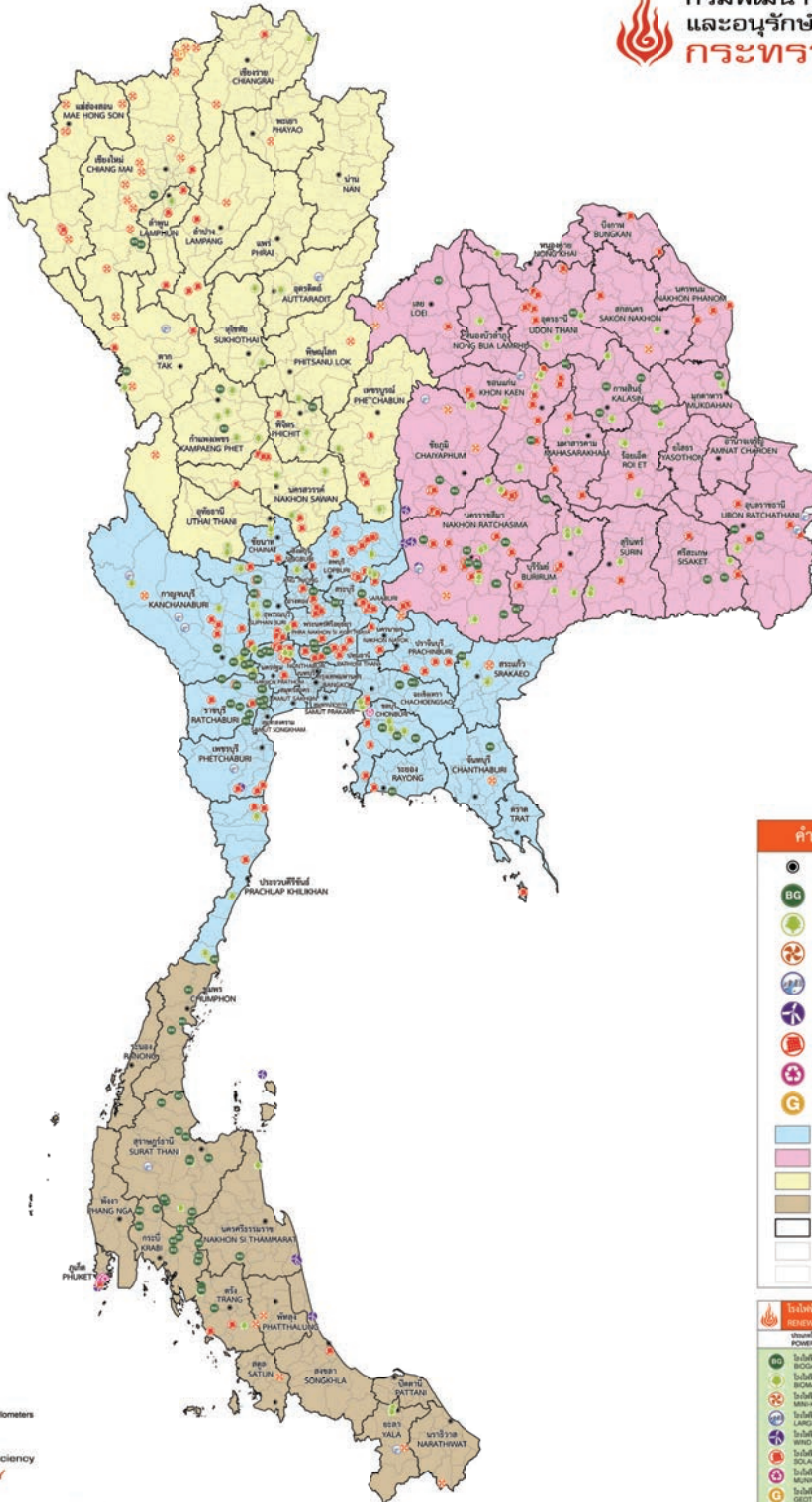


^{1/}Including off grid power generation.(only Renewable)

^{2/}Data was accumulated.

แผนที่แสดงที่ตั้งโรงไฟฟ้าพลังงานทดแทนในประเทศไทย

MAP OF RENEWABLE ENERGY POWER PLANT IN THAILAND



คำอธิบายสัญลักษณ์ LEGEND

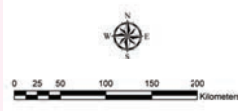
- กรุงเทพมหานคร
- โรงไฟฟ้าชีวมวล
- โรงไฟฟ้าชีวมวล
- โรงไฟฟ้าพลังน้ำขนาดเล็ก
- โรงไฟฟ้าพลังน้ำขนาดใหญ่
- โรงไฟฟ้าพลังงานลม
- โรงไฟฟ้าพลังงานแสงอาทิตย์และโซลาร์รูฟท็อป
- โรงไฟฟ้าจากขยะมูลฝอย
- โรงไฟฟ้าพลังงานความร้อนใต้พิภพ

ภาคเหนือ
 ภาคตะวันออกเฉียงเหนือ
 ภาคกลาง
 ภาคใต้

ขอบเขตจังหวัด
 ขอบเขตอำเภอ
 ขอบเขตตำบล

โรงไฟฟ้าพลังงานทดแทนในประเทศไทย
RENEWABLE ENERGY POWER PLANT IN THAILAND

ประเภทโรงไฟฟ้า	จำนวนโรงไฟฟ้า	กำลังการผลิต (MW)
โรงไฟฟ้าชีวมวล	136	136
โรงไฟฟ้าชีวมวล	994	994
โรงไฟฟ้าพลังน้ำขนาดเล็ก	91	91
โรงไฟฟ้าพลังน้ำขนาดใหญ่	1,024	1,024
โรงไฟฟ้าพลังงานลม	194	194
โรงไฟฟ้าพลังงานแสงอาทิตย์และโซลาร์รูฟท็อป	787	787
โรงไฟฟ้าจากขยะมูลฝอย	18	18
โรงไฟฟ้าพลังงานความร้อนใต้พิภพ	0	0
รวมทั้งหมด	2,256	5,646



Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY

กรมพัฒนาพลังงานทดแทนและอนุรักษ์พลังงาน
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หมายเหตุ : กำลังผลิตที่รายงาน เป็นเดือนธันวาคม 2556 Note : On grid capacity as of December, 2013

Bioenergy : Facts & Figures

Bioenergy 2013



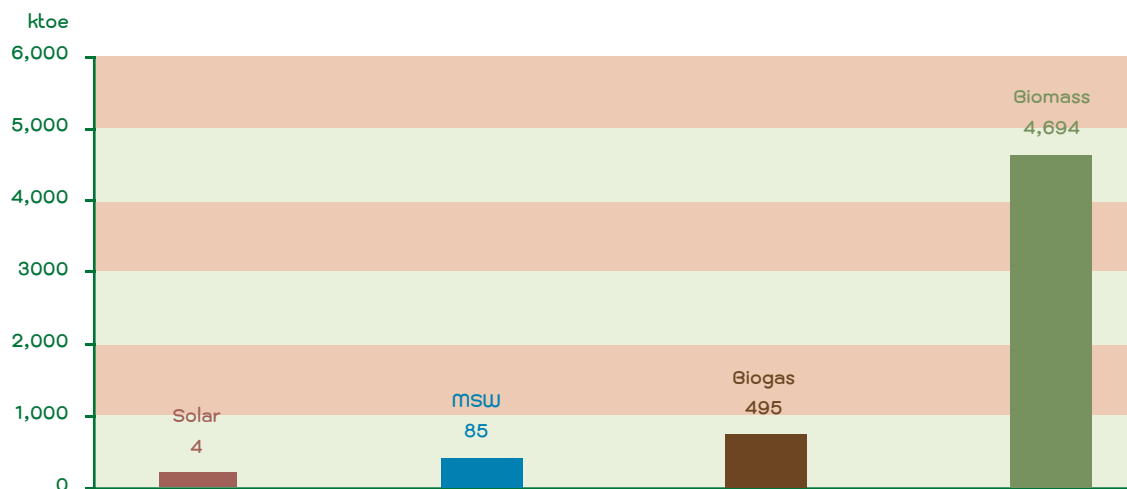
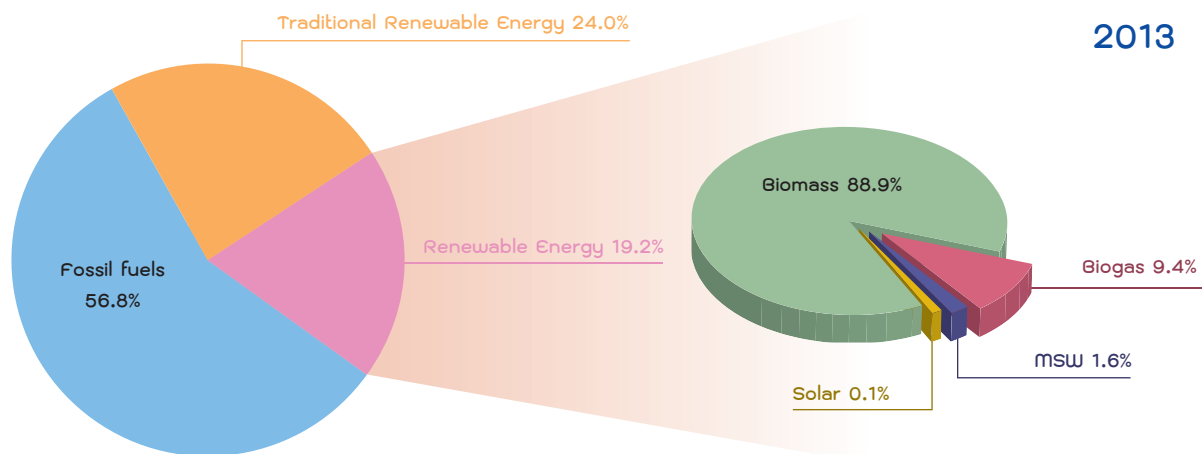
Heat consumption from renewable energy in 2013 has reached 5,278 ktoe, accounting for 19.2% of total heat consumption in Thailand.

Heat consumption from renewable energy

Types of Energy	2012		2013		2013							
	physical unit	ktoe	physical unit	ktoe	Q ₁		Q ₂		Q ₃		Q ₄	
					physical unit	ktoe	physical unit	ktoe	physical unit	ktoe	physical unit	ktoe
Solar ^{1/}	168,990	3.5	191,788	4.54	54,982	1.21	76,039	3.34	168,976	4.27	191,788	4.54
Biomass (thousand tons)	21,677	4,346	20,997	4,694	5,417	1,112	5,747	1,222	4,764	1,065	5,793	1,295
Biogas ^{2/} (m ³)	924,524,112	458	1,422,607,973	495	228,103,111	113	258,382,284	128	339,126,749	118	390,857,948	136
MSW (thousand tons)	679	78	740	85	175	20	175	20	183	21	209	24
Total		4,886		5,279		1,246		1,373		1,208		1,459

^{1/}Data was accumulated.

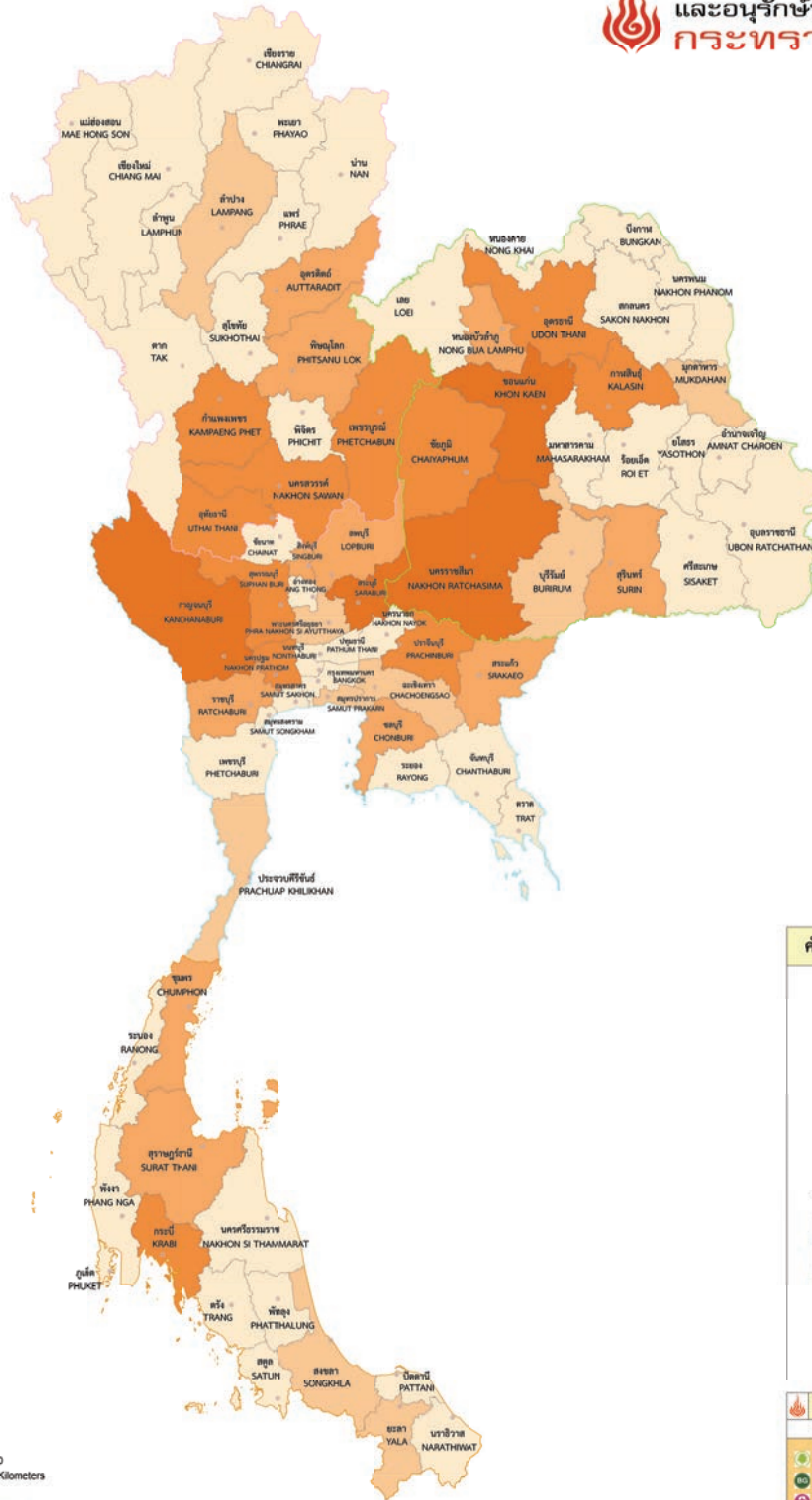
^{2/}Data was revised.



แผนที่แสดงการใช้พลังงานความร้อนจากพลังงานทดแทนในประเทศไทย 2556

MAP OF HEAT CONSUMPTION FROM RENEWABLE ENERGY IN THAILAND 2013

กรมพัฒนาพลังงานทดแทน
และอนุรักษ์พลังงาน
กระทรวงพลังงาน



คำอธิบายสัญลักษณ์ LEGEND

- ศาลากลางจังหวัด CITY HALL
- ภาคกลาง CENTRAL
- ภาคตะวันออกเฉียงเหนือ NORTHEASTERN
- ภาคเหนือ NORTHERN
- ภาคใต้ SOUTHERN
- ขอบเขตจังหวัด PROVINCE BOUNDARY

การใช้พลังงาน ktoe (พื้นที่เทียบเท่าน้ำมันดิบ)

- 0.000 - 21.000
- 21.001 - 65.170
- 65.171 - 131.290
- 131.291 - 265.400
- 265.401 - 511.600

การใช้พลังงานความร้อนจากพลังงานทดแทนในประเทศไทย 2556	
HEAT CONSUMPTION FROM RENEWABLE ENERGY 2013	
ประเภทพลังงานทดแทน	ปริมาณ (กิโลวัตต์-ชั่วโมง)
ประเภทพลังงานทดแทน	ปริมาณ (กิโลวัตต์-ชั่วโมง)
ชีวมวล Biomass	4,694
ก๊าซชีวภาพ Biogas	495
เขื่อนพลังน้ำ MSW	85
พลังงานแสงอาทิตย์ Solar	4.54
รวม Total	5,278

Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY

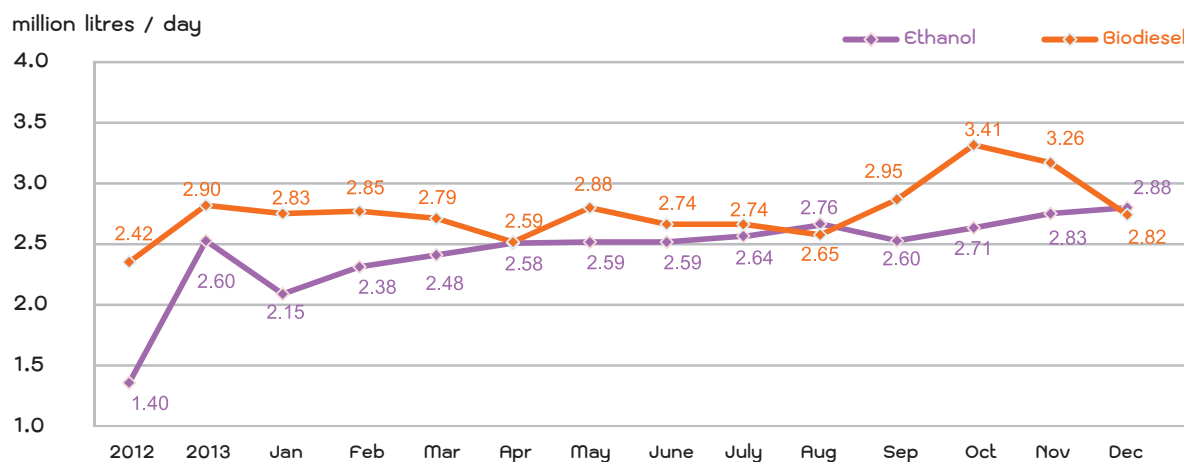
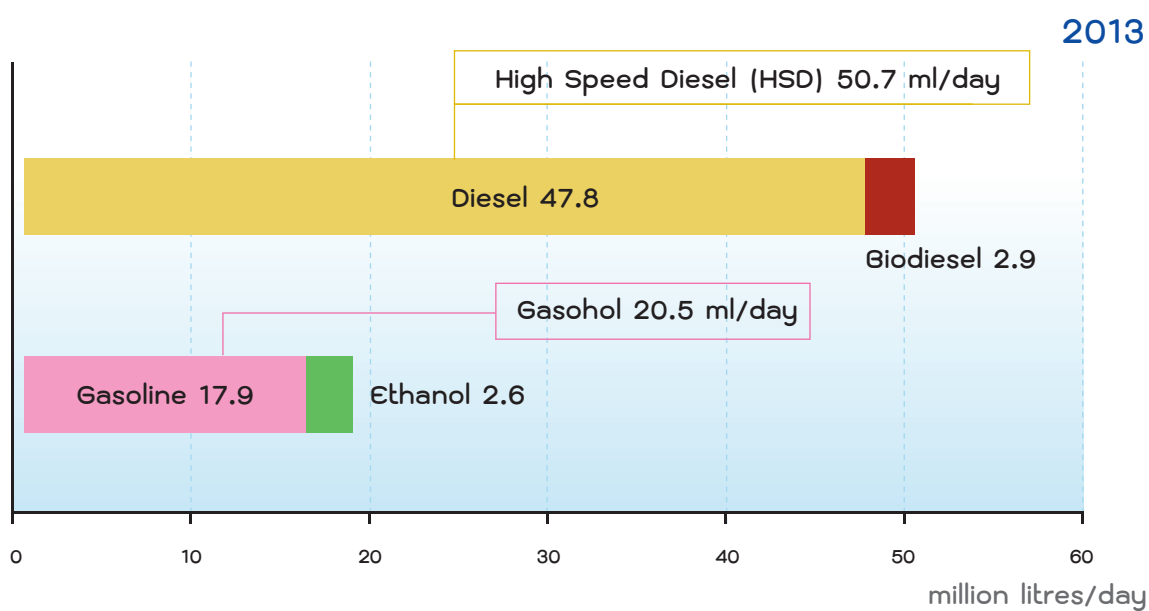
Biofuels : Facts & Figures

Biofuels 2013



Biofuels consumption in 2013 reached 5.5 million litres/day, accounting for 7.7% of Gasohol and High Speed Diesel (HSD) consumption in 2013.

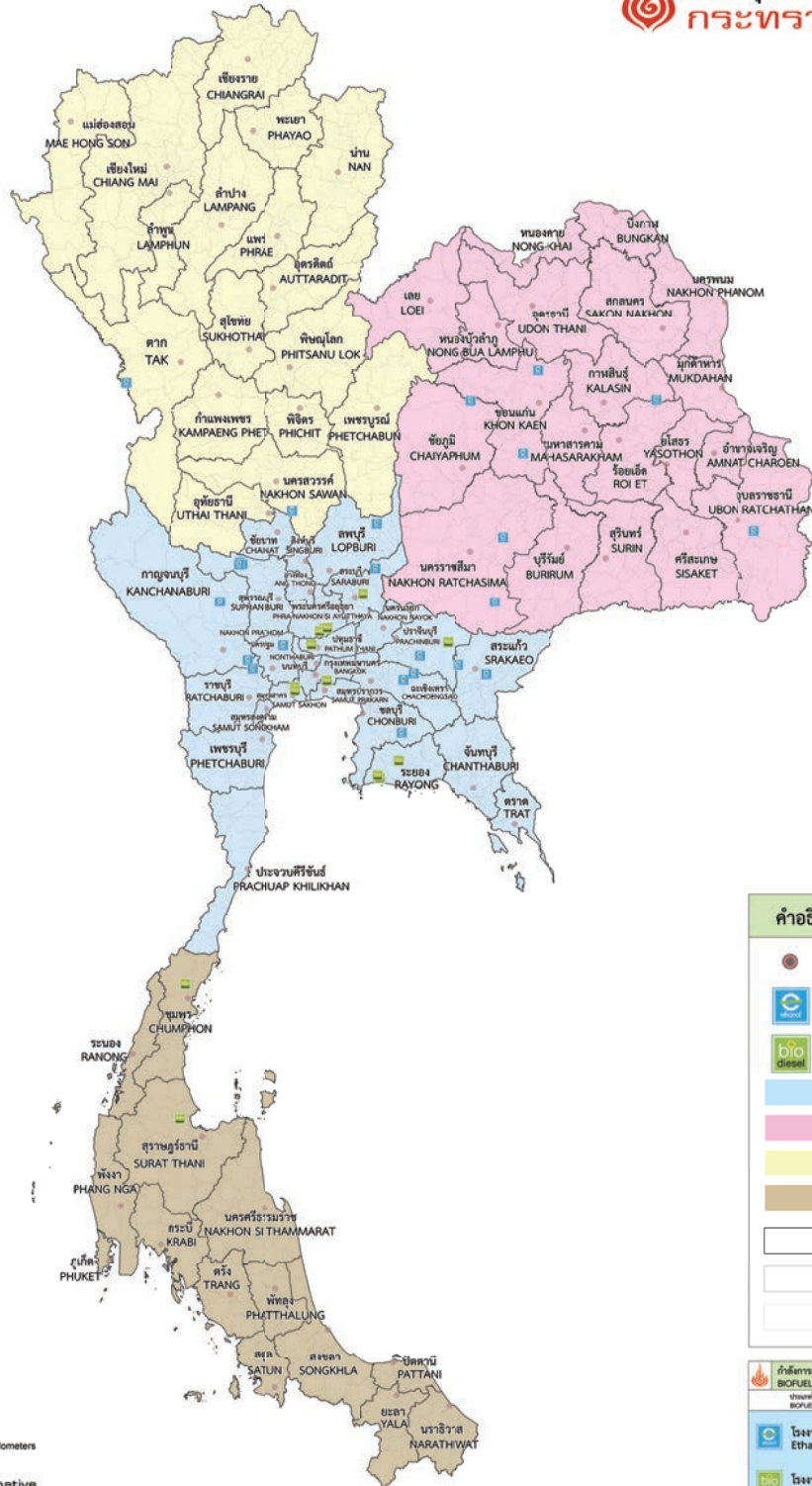
Types of Energy	2012		2013		2013							
	million litres/day	ktoe	million litres/day	ktoe	Q ₁		Q ₂		Q ₃		Q ₄	
					million litres/day	ktoe	million litres/day	ktoe	million litres/day	ktoe	million litres/day	ktoe
Ethanol	1.4	430	2.6	707	2.3	157	2.6	175	2.7	183	2.8	192
Biodiesel	2.7	840	2.9	905	2.8	218	2.7	211	2.8	225	3.4	251
Total	4.1	1,270	5.5	1,612	5.1	375	5.3	386	5.5	408	6.2	443



แผนที่แสดงที่ตั้งโรงงานผลิตเชื้อเพลิงชีวภาพในประเทศไทย

MAP OF BIOFUEL PLANTS IN THAILAND

กรมพัฒนาพลังงานทดแทน
และอนุรักษ์พลังงาน
กระทรวงพลังงาน



คำอธิบายสัญลักษณ์ LEGEND

- ศาลากลางจังหวัด CITY HALL
- ☐ โรงงานเอทานอล ETHANOL PLANT
- ☐ โรงงานไบโอดีเซล BIODIESEL PLANT
- ภาคกลาง CENTRAL
- ภาคตะวันออกเฉียงเหนือ NORTHEASTERN
- ภาคเหนือ NORTHERN
- ภาคใต้ SOUTHERN
- ▭ ขอบเขตจังหวัด PROVINCE BOUNDARY
- ▭ ขอบเขตอำเภอ DISTRICT BOUNDARY
- ▭ ขอบเขตตำบล ADMINISTRATIVE BOUNDARY

กำลังการผลิตเชื้อเพลิงชีวภาพ BIOFUEL PRODUCTION CAPACITY

ชนิดของพืช BIOFUEL PLANT TYPES	กำลังการผลิต Biofuel Capacity (ล้านลิตรต่อวัน)
☐ โรงงานเอทานอล Ethanol Plant	5.3
☐ โรงงานไบโอดีเซล Biodiesel Plant	5.2

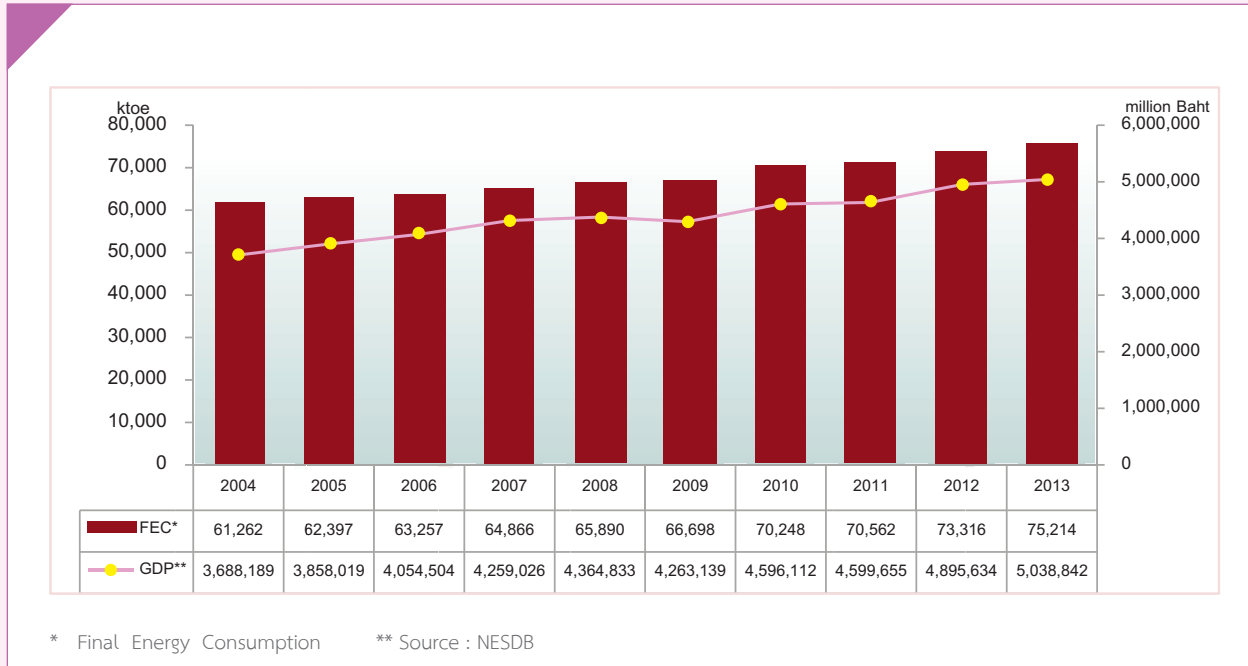
*million litre per day

Department of Alternative Energy Development and Efficiency
MINISTRY OF ENERGY

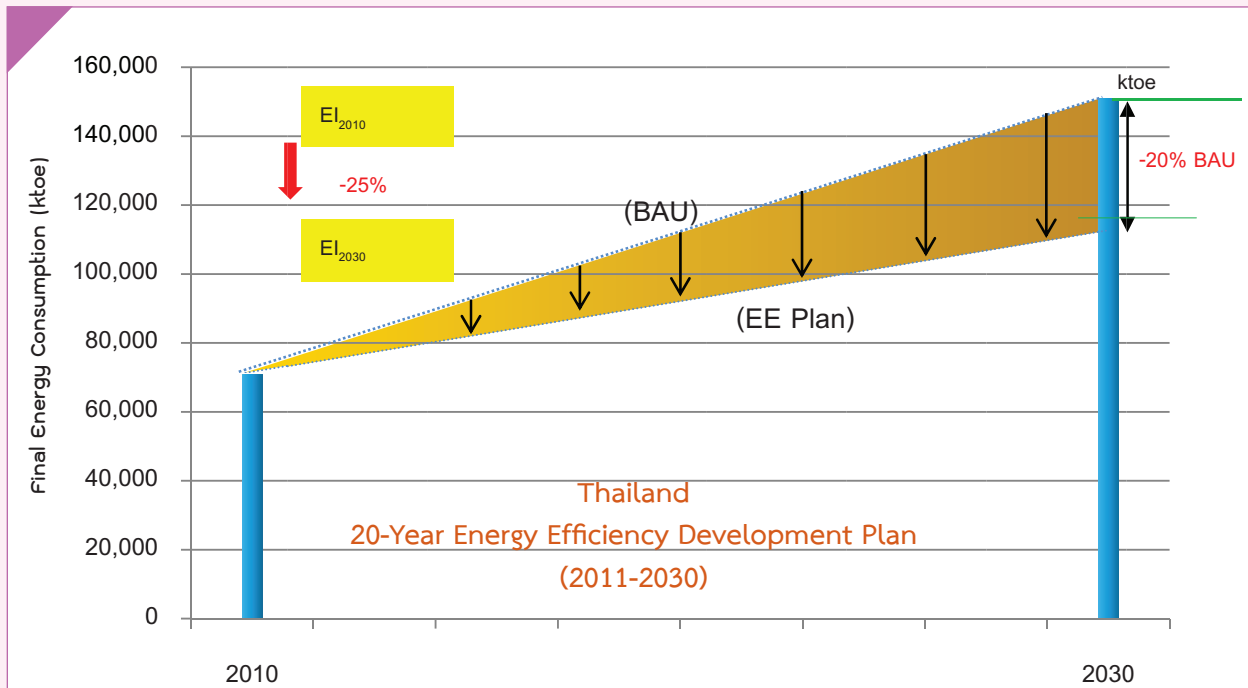
Energy Efficiency : Facts & Figures



As a result of economic growth, energy consumption in Thailand has also increased significantly as seen from below.

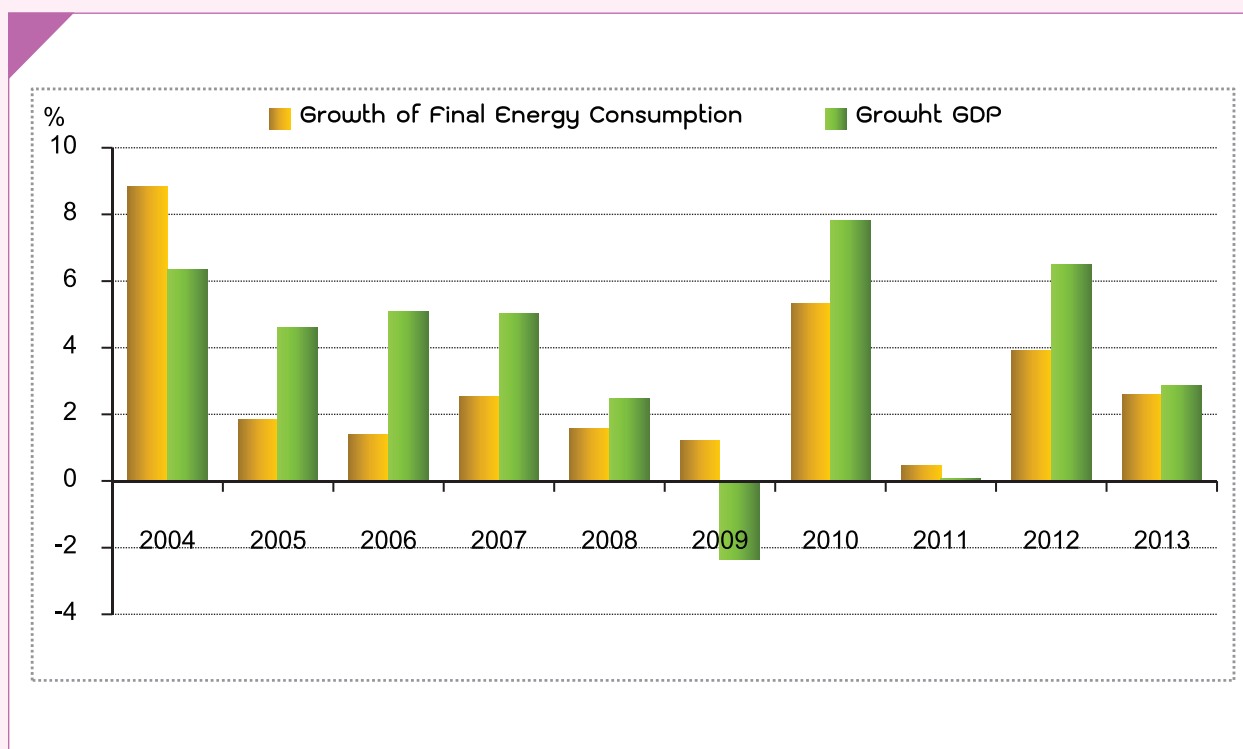
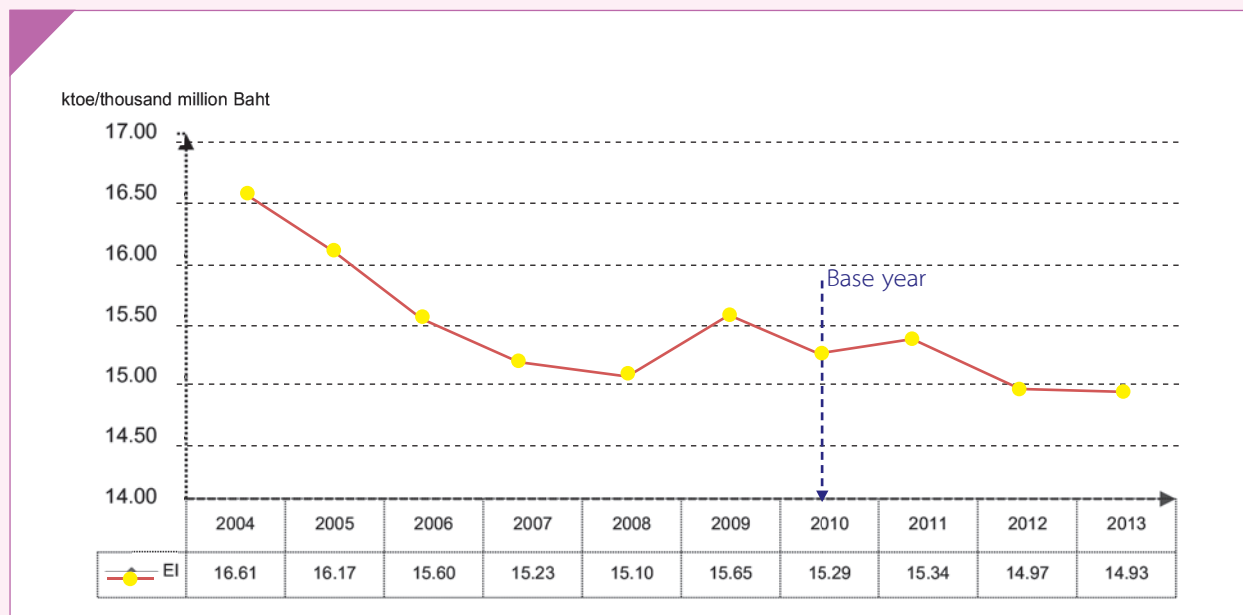


Thai Government has, therefore, set up the policy to improve energy efficiency in all economic sectors by decreasing of energy intensity.



Performance on Energy Efficiency Measures 2013

Energy Efficiency Results in 2013



- ✓ reduce energy consumption 2.4%.
- ✓ save over 44 thousand million Baht in energy imports.
- ✓ reduce CO_2 5.7 million tons.

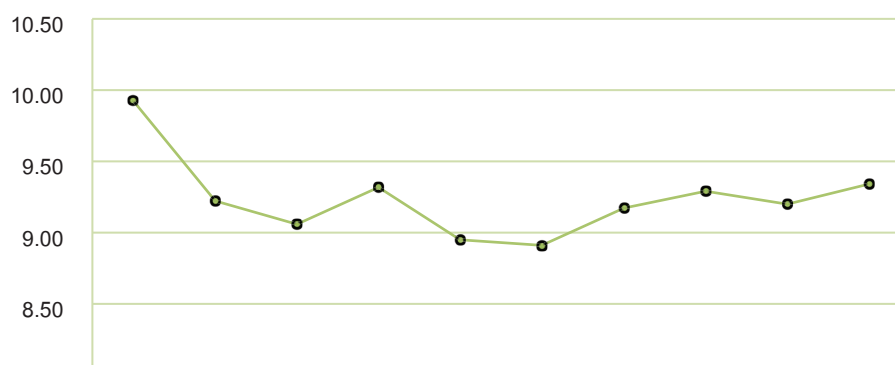
Energy Intensity by Economic Sectors : Facts & Figures

Energy Intensity in Agriculture

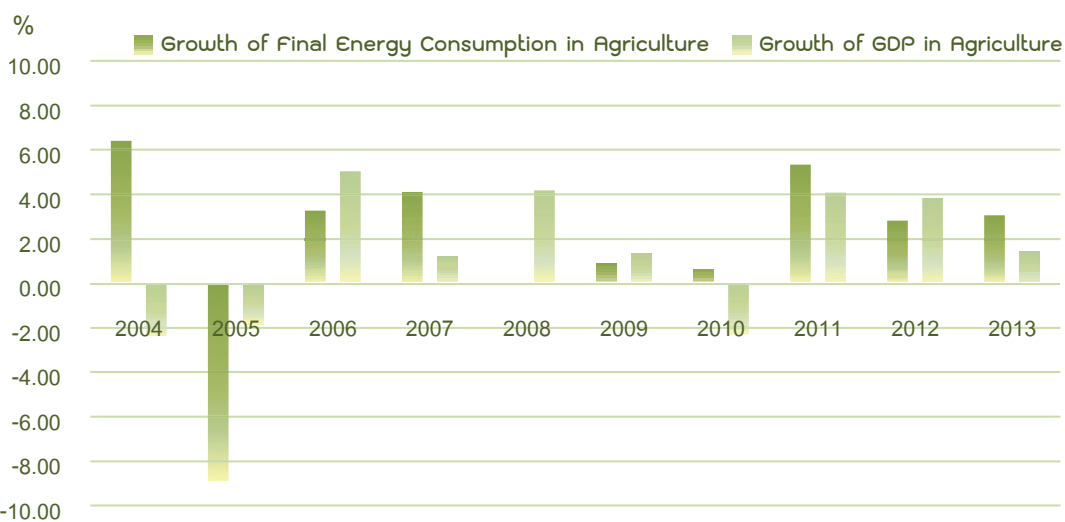


FEC in Agriculture	3,520	3,207	3,312	3,448	3,446	3,477	3,499	3,686	3,790	3,906
GDP in Agriculture	354,431	347,892	365,428	369,772	385,225	390,362	381,401	396,951	412,175	418,001

ktoe/thousand million baht

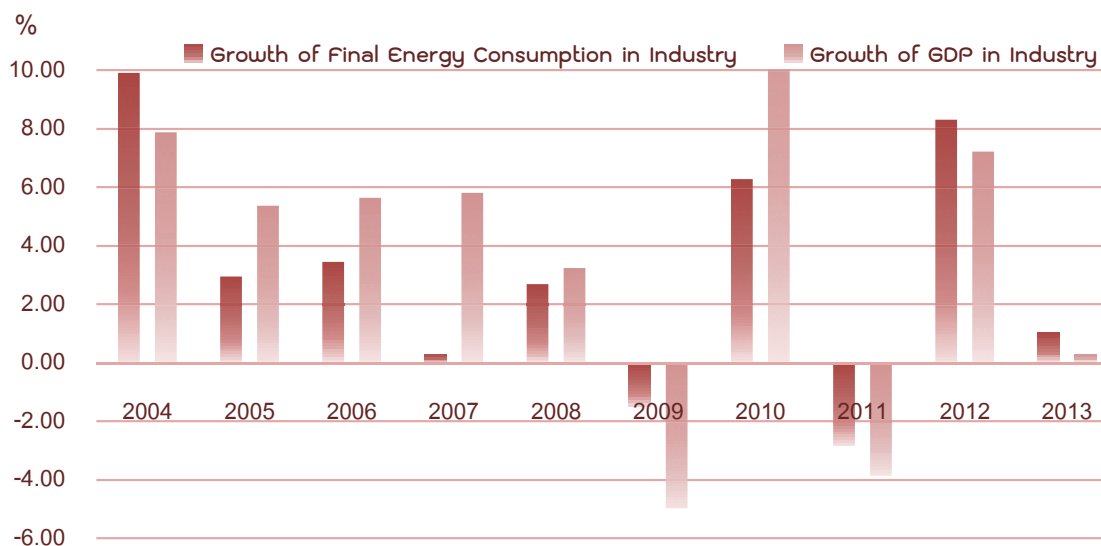
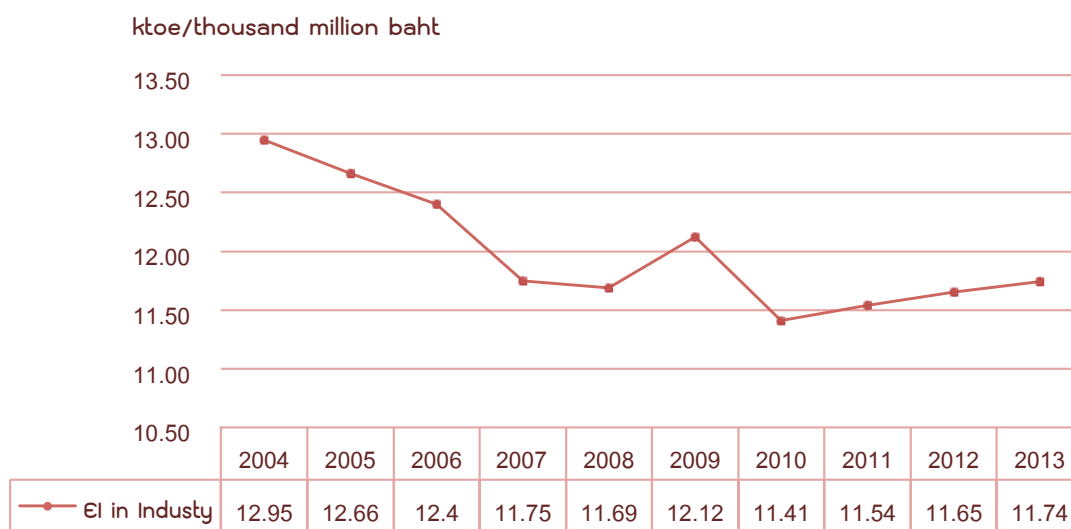


EI in Agriculture	9.93	9.22	9.06	9.32	8.95	8.91	9.17	9.29	9.2	9.34
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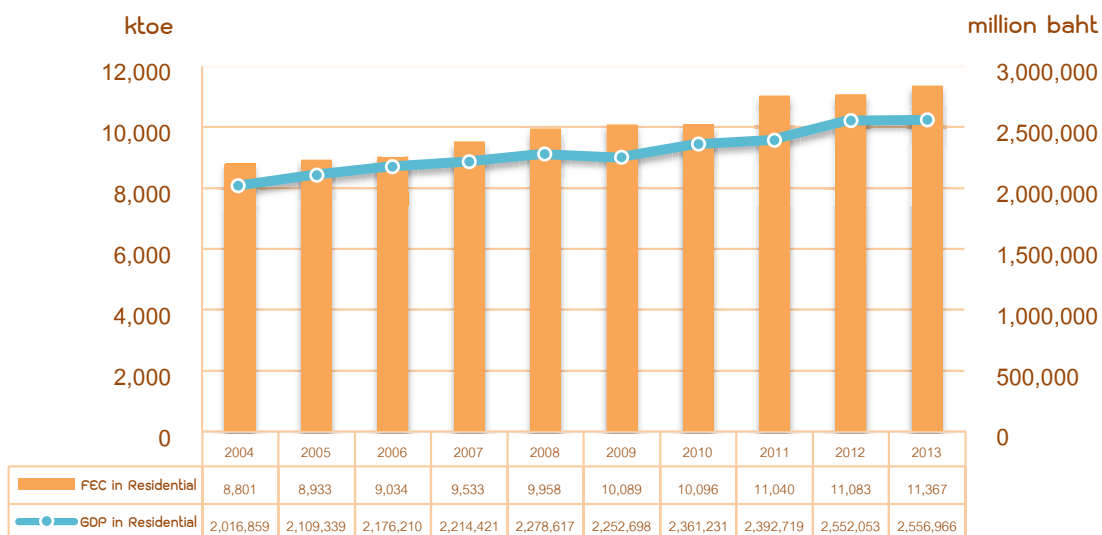
Energy Intensity by Economic Sectors : Facts & Figures

Energy Intensity in Industry

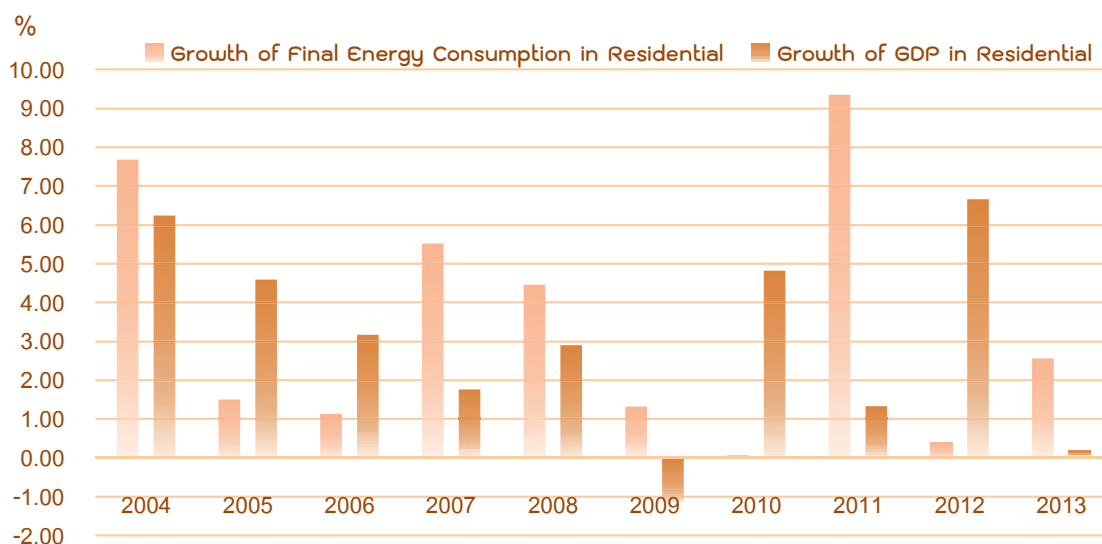
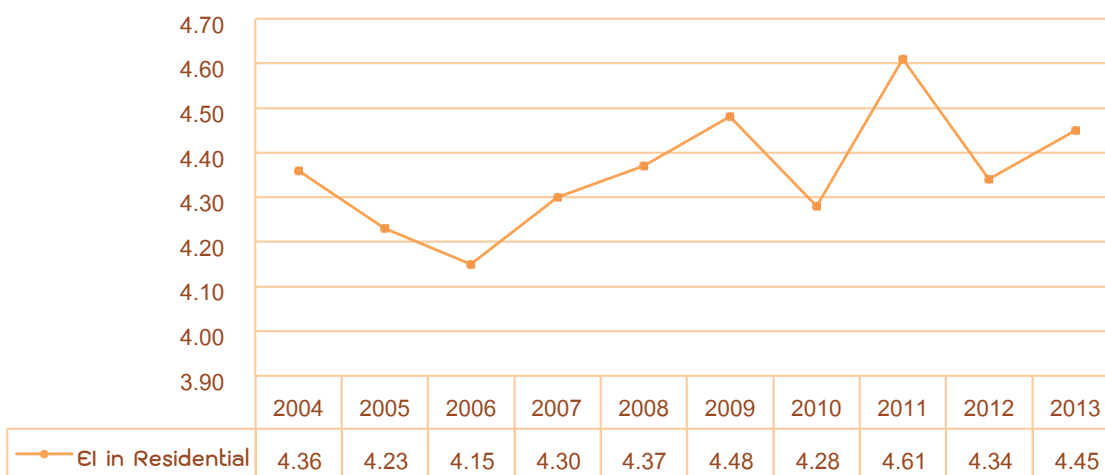


Energy Intensity by Economic Sectors : Facts & Figures

Energy Intensity in Residential

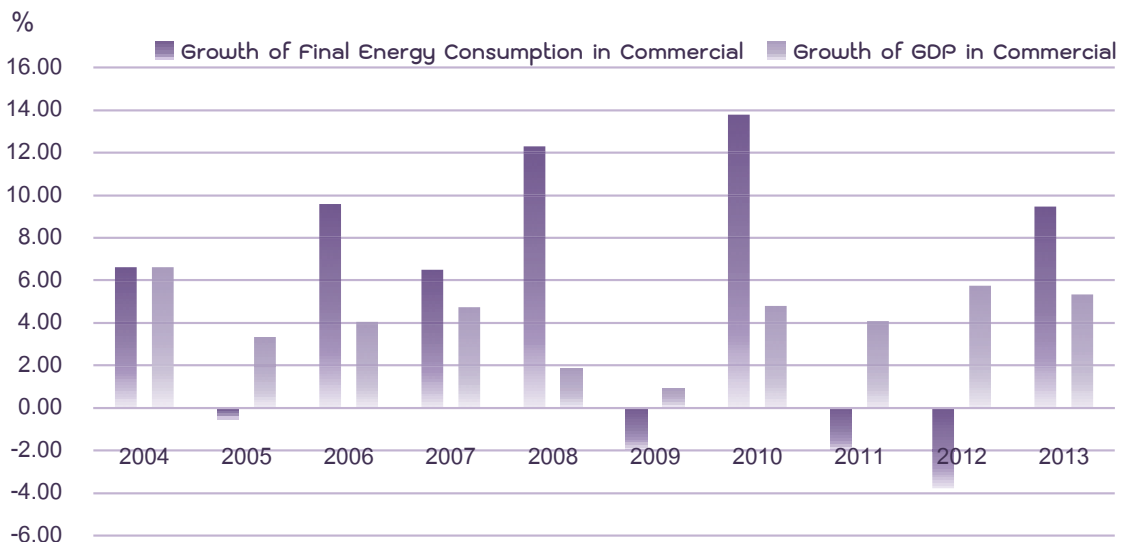
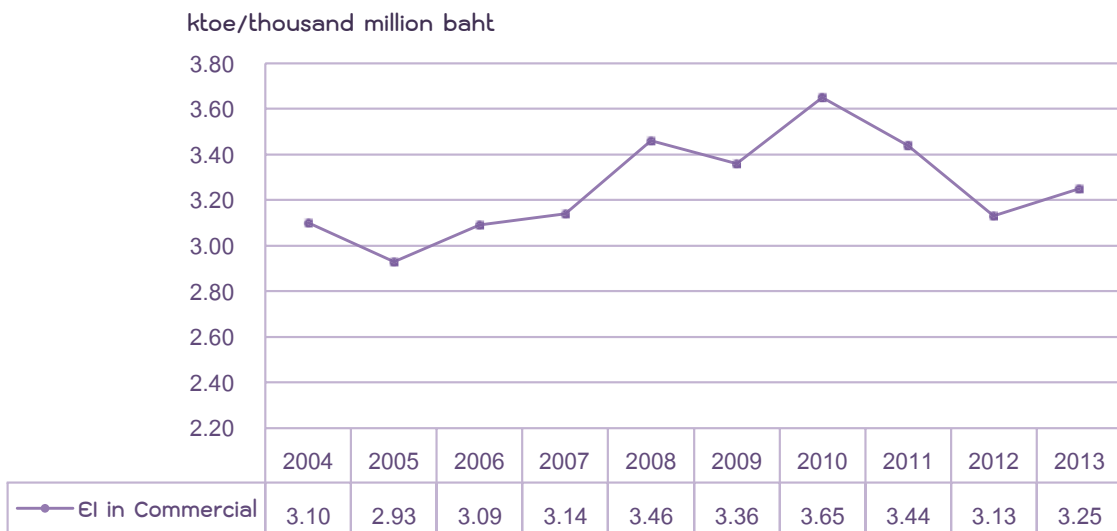


ktoe / thousand million baht



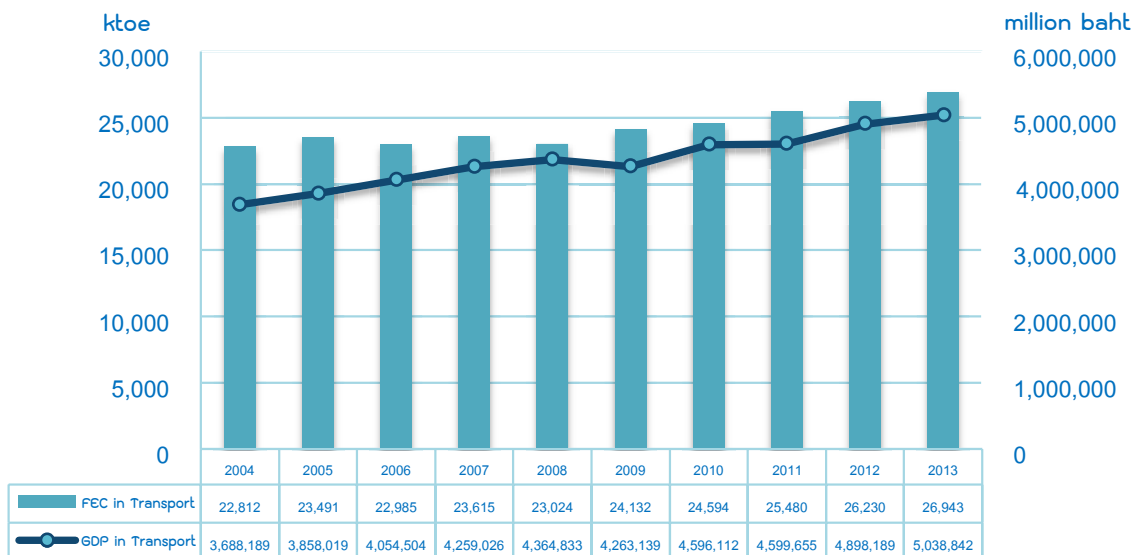
Energy Intensity by Economic Sectors : Facts & Figures

Energy Intensity in Commercial

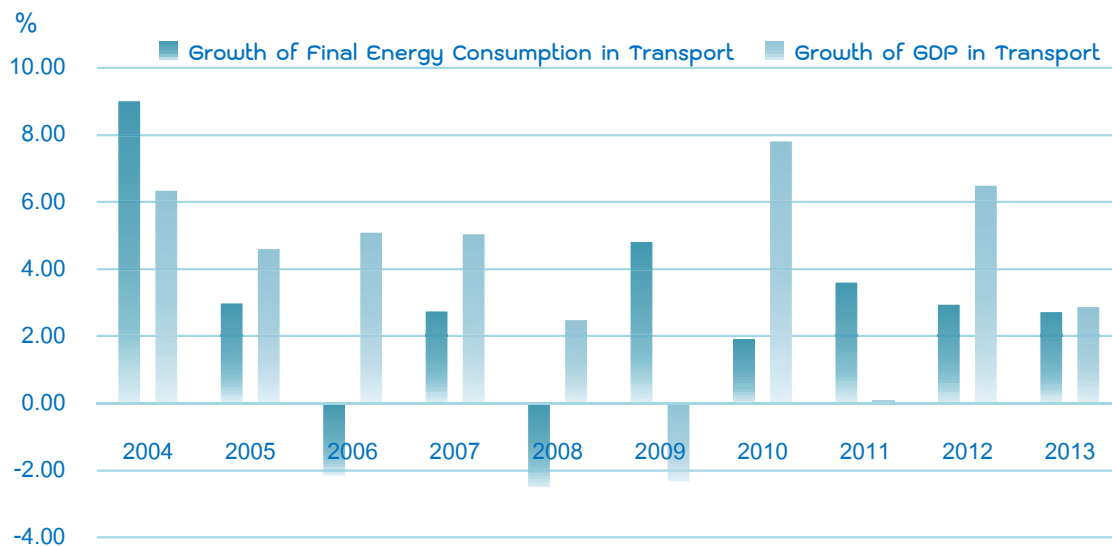
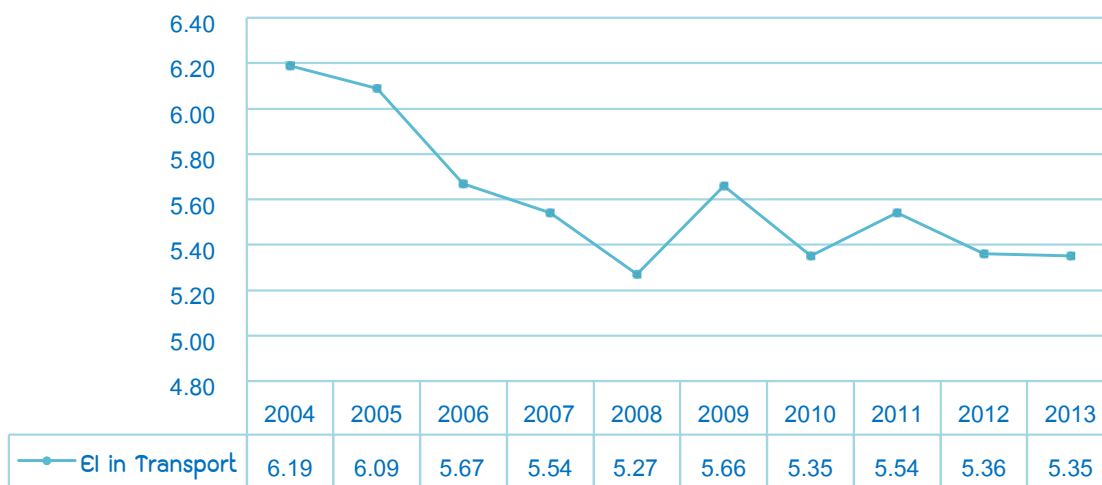


Energy Intensity by Economic Sectors : Facts & Figures

Energy Intensity in Transport



ktoe/thousand million baht



Energy Efficiency Indicators : Facts & Figures

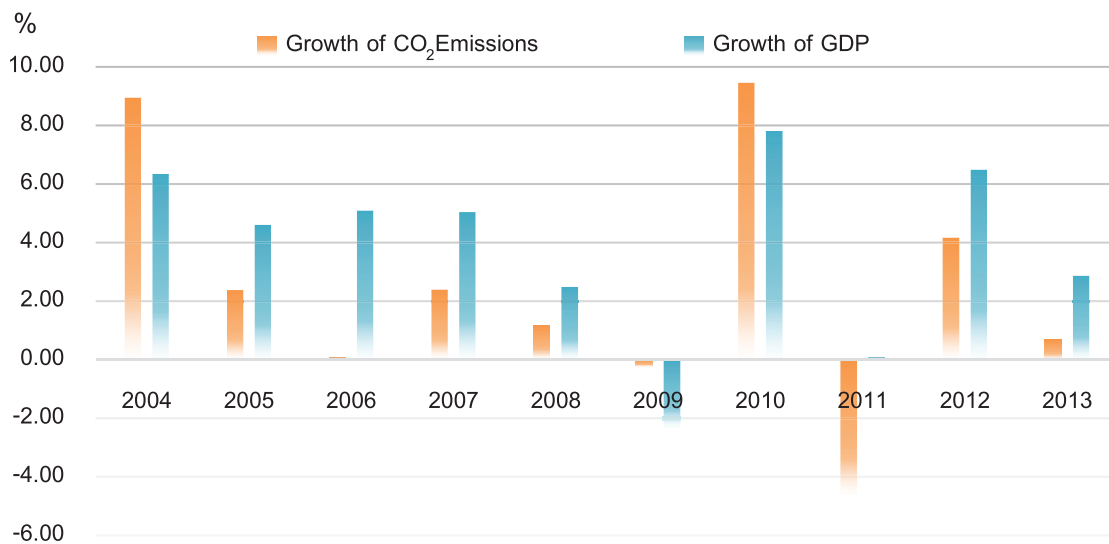
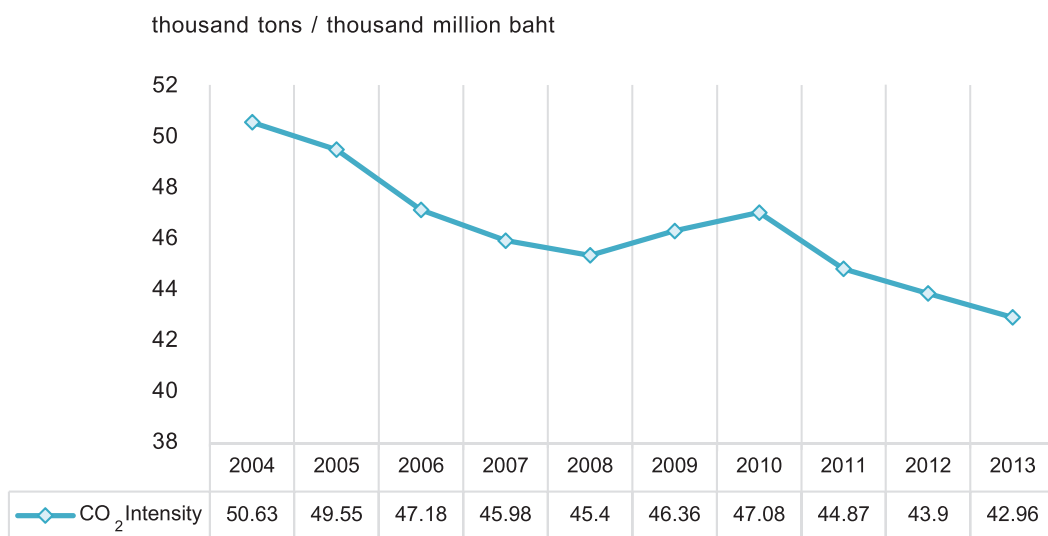
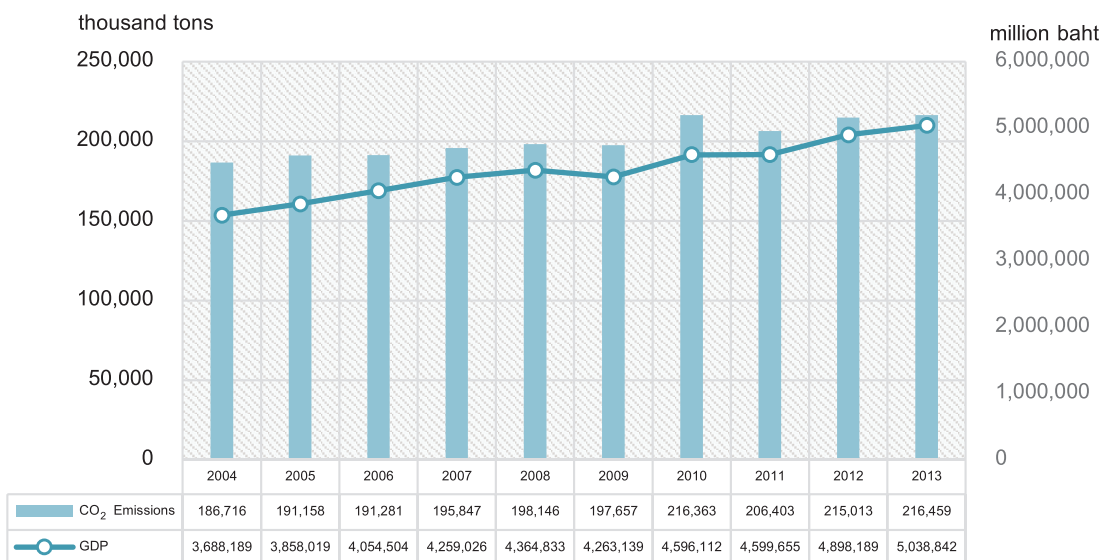
Energy Efficiency Indicators



Indicators	2009	2010	2011	2012	2013
Primary Energy Supply (ktoe)	112,904	123,544	122,418	126,720	134,308
Growth (%)	2.2	9.4	(1.1)	3.7	5.9
GDP (million baht)	4,263,139	4,596,112	4,599,655	4,898,189	5,038,842
Growth (%)	(2.3)	7.8	0.1	6.5	2.9
Energy Intensity (ktoe/thousand million baht)	26.48	26.88	27.57	26.71	26.65
Final Energy Consumption (ktoe)	66,698	70,248	70,562	73,316	75,214
Growth (%)	1.2	5.3	0.4	3.9	2.6
GDP (million baht)	4,263,139	4,596,112	4,599,655	4,898,189	5,038,842
Growth (%)	(2.3)	7.8	0.1	6.5	2.9
Energy Intensity (ktoe/thousand million baht)	15.65	15.29	15.34	14.97	14.93
Final Energy Consumption in Agricultural (ktoe)	3,477	3,499	3,686	3,790	3,906
Growth (%)	0.9	0.6	5.3	2.8	3.1
GDP in Agricultural (million baht)	390,362	381,401	396,951	412,175	418,001
Growth (%)	1.3	(2.3)	4.1	3.8	1.4
Energy Intensity (ktoe/thousand million baht)	8.91	9.17	9.29	9.20	9.34
Final Energy Consumption in Industry (ktoe)	24,060	25,571	24,845	26,910	27,193
Growth (%)	(1.5)	6.3	(2.8)	8.3	1.0
GDP in Industry (million baht)	1,985,551	2,240,249	2,153,712	2,309,104	2,315,680
Growth (%)	(5.0)	12.8	(3.9)	7.2	0.3
Energy Intensity (ktoe/thousand million baht)	12.12	11.41	11.54	11.65	11.74
Final Energy Consumption in Commercial (ktoe)	4,940	5,621	5,511	6,081	5,805
Growth (%)	(2.0)	13.8	(2.0)	10.3	(4.5)
GDP in Commercial (million baht)	1,469,727	1,540,336	1,603,262	1,695,404	1,785,925
Growth (%)	0.9	4.8	4.1	5.7	5.3
Energy Intensity (ktoe/thousand million baht)	3.36	3.65	3.44	3.13	3.25
Final Energy Consumption in Transport (ktoe)	24,132	24,594	25,480	26,230	26,943
Growth (%)	4.8	1.9	3.6	2.9	2.7
GDP in Transport (million baht)	4,263,139	4,596,112	4,599,655	4,898,189	5,038,842
Growth (%)	(2.3)	7.8	0.1	6.5	2.9
Energy Intensity (ktoe/thousand million baht)	5.66	5.35	5.54	5.36	5.35
Final Energy Consumption in Residential (ktoe)	10,089	10,096	11,040	10,305	11,367
Growth (%)	1.3	0.1	9.4	(6.7)	10.3
GDP in Residential (million baht)	2,252,698	2,361,231	2,392,719	2,552,053	2,556,966
Growth (%)	(1.1)	4.8	1.3	6.7	0.2
Energy Intensity (ktoe/thousand million baht)	4.49	4.28	4.61	4.34	4.45

CO₂ Emissions : Facts & Figures

CO₂ Intensity

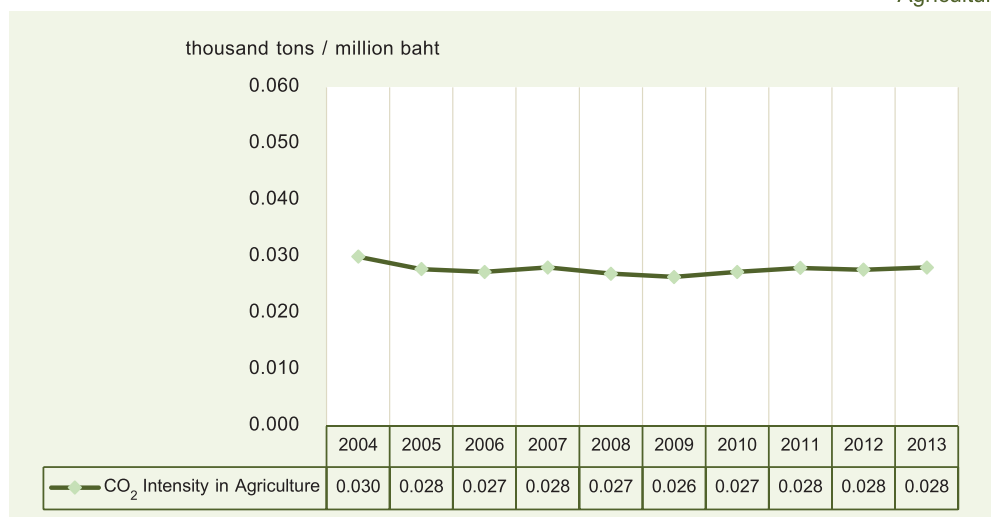


CO₂ Emissions : Facts & Figures

CO₂ Intensity by Economic Setors



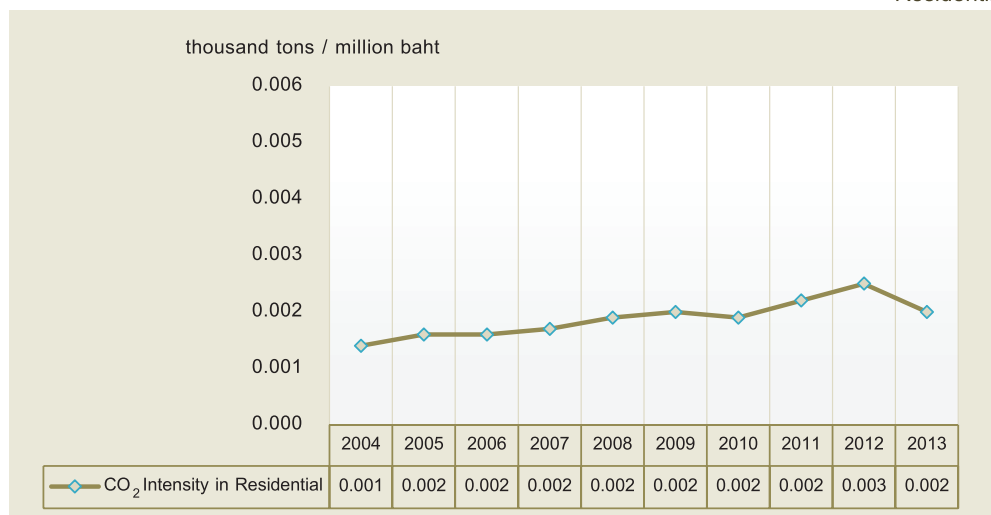
Agriculture



Industry



Residential

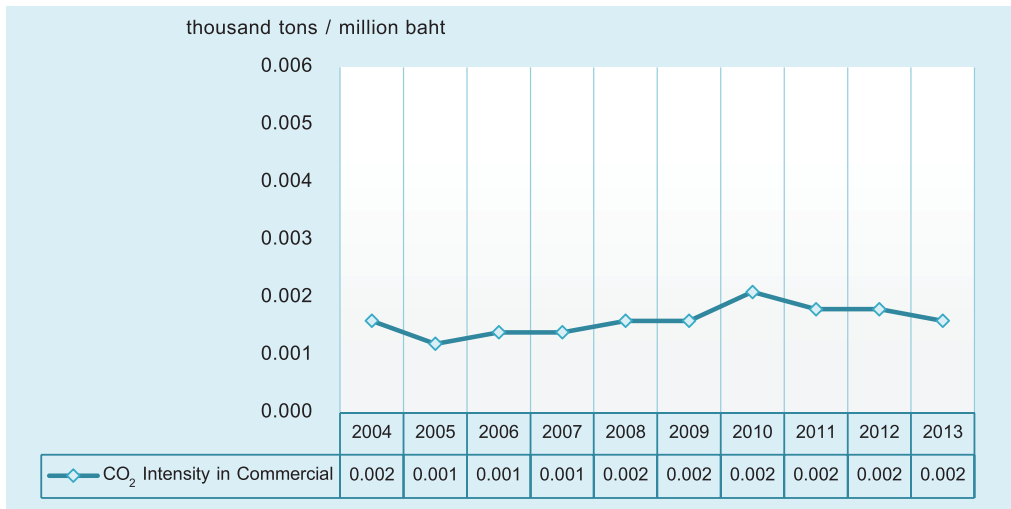


CO₂ Emissions : Facts & Figures

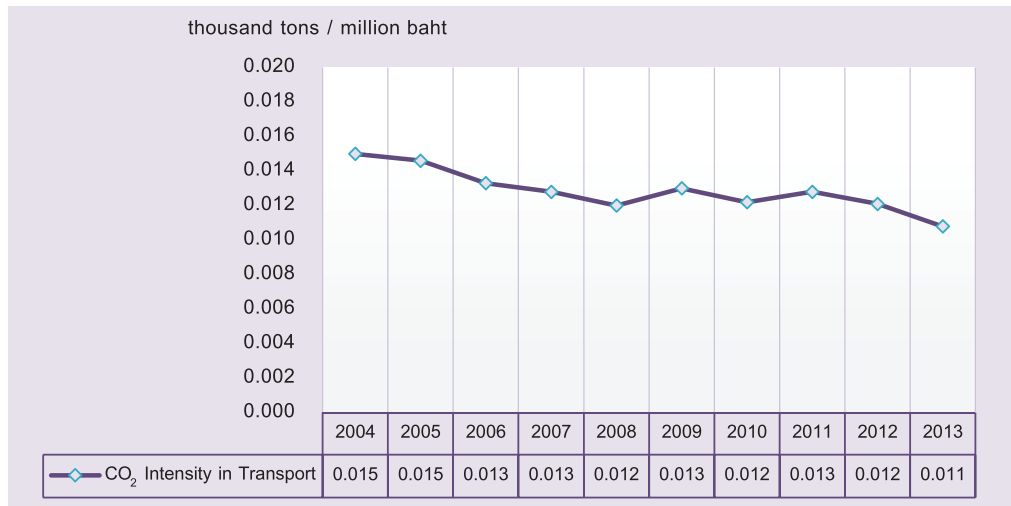
CO₂ Intensity by Economic Setors



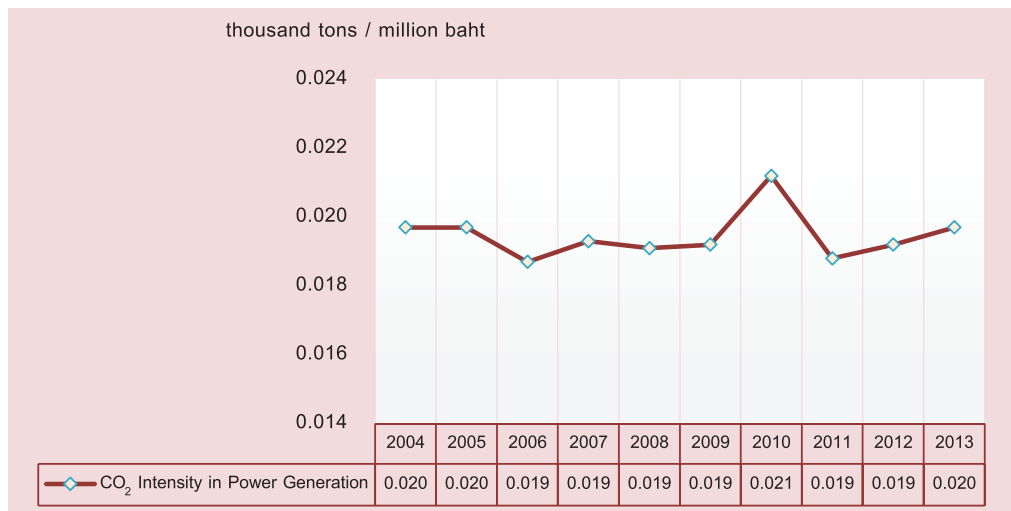
Commercial



Transport



Power Generation



CO₂ Emissions : Facts & Figures

CO₂ Emissions Indicators



Indicators	2009	2010	2011	2012	2013
Total CO ₂ Emissions (thousand tons)	197,657	216,363	206,403	215,013	216,459
Growth (%)	(0.25)	9.46	(4.60)	4.17	0.67
GDP (million baht)	4,263,139	4,596,112	4,599,655	4,898,189	5,038,842
Growth (%)	(2.33)	7.81	0.08	6.49	2.87
CO ₂ Intensity (thousand tons / million baht)	0.046	0.047	0.045	0.044	0.043
CO ₂ Emissions in Agricultural (thousand tons)	10,301	10,417	11,105	11,399	11,761
Growth (%)	(0.78)	1.13	6.60	2.65	3.18
GDP in Agricultural (million baht)	390,362	381,401	396,951	412,175	418,001
Growth (%)	1.33	(2.30)	4.08	3.84	1.41
CO ₂ Intensity in Agricultural (thousand tons / million baht)	0.026	0.027	0.028	0.028	0.028
CO ₂ Emissions in Industry (thousand tons)	43,301	44,882	42,828	41,869	41,997
Growth (%)	(4.64)	3.65	(4.58)	(2.24)	0.31
GDP in Industry (million baht)	1,985,551	2,240,249	2,153,712	2,309,104	2,315,680
Growth (%)	(4.97)	12.83	(3.86)	7.22	0.28
CO ₂ Intensity in Industry (thousand tons / million baht)	0.022	0.020	0.020	0.020	0.020
CO ₂ Emissions in Residential (thousand tons)	4,615	4,381	5,359	6,323	5,054
Growth (%)	8.28	(5.07)	22.32	17.99	(20.07)
GDP in Residential (million baht)	2,252,698	2,361,231	2,392,719	2,552,053	2,556,966
Growth (%)	(1.14)	4.82	1.33	6.66	0.19
CO ₂ Intensity in Residential (thousand tons / million baht)	0.002	0.002	0.002	0.002	0.002
CO ₂ Emissions in Commercial (thousand tons)	2,302	3,163	2,864	3,107	2,940
Growth (%)	(0.78)	37.40	(9.45)	8.48	(5.37)
GDP in Commercial (million baht)	1,469,727	1,540,336	1,603,262	1,695,404	1,785,925
Growth (%)	0.91	4.80	4.09	5.75	5.34
CO ₂ Intensity in Commercial (thousand tons / million baht)	0.002	0.002	0.002	0.002	0.002
CO ₂ Emissions in Transport (thousand tons)	55,342	56,108	58,865	59,138	54,557
Growth (%)	5.65	1.38	4.91	0.46	(7.75)
GDP in Transport (million baht)	4,263,139	4,596,112	4,599,655	4,898,189	5,038,842
Growth (%)	(2.33)	7.81	0.08	6.49	2.87
CO ₂ Intensity in Transport (thousand tons / million baht)	0.013	0.012	0.013	0.012	0.011
CO ₂ Emissions in Power Generation (thousand tons)	81,797	97,384	86,382	94,092	99,155
Growth (%)	(1.89)	19.06	(11.30)	8.93	5.38
GDP in Power Generation (million baht)	4,263,139	4,596,112	4,599,655	4,898,189	5,038,842
Growth (%)	(2.33)	7.81	0.08	6.49	2.87
CO ₂ Intensity in Power Generation (thousand tons / million baht)	0.020	0.021	0.019	0.019	0.020



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