



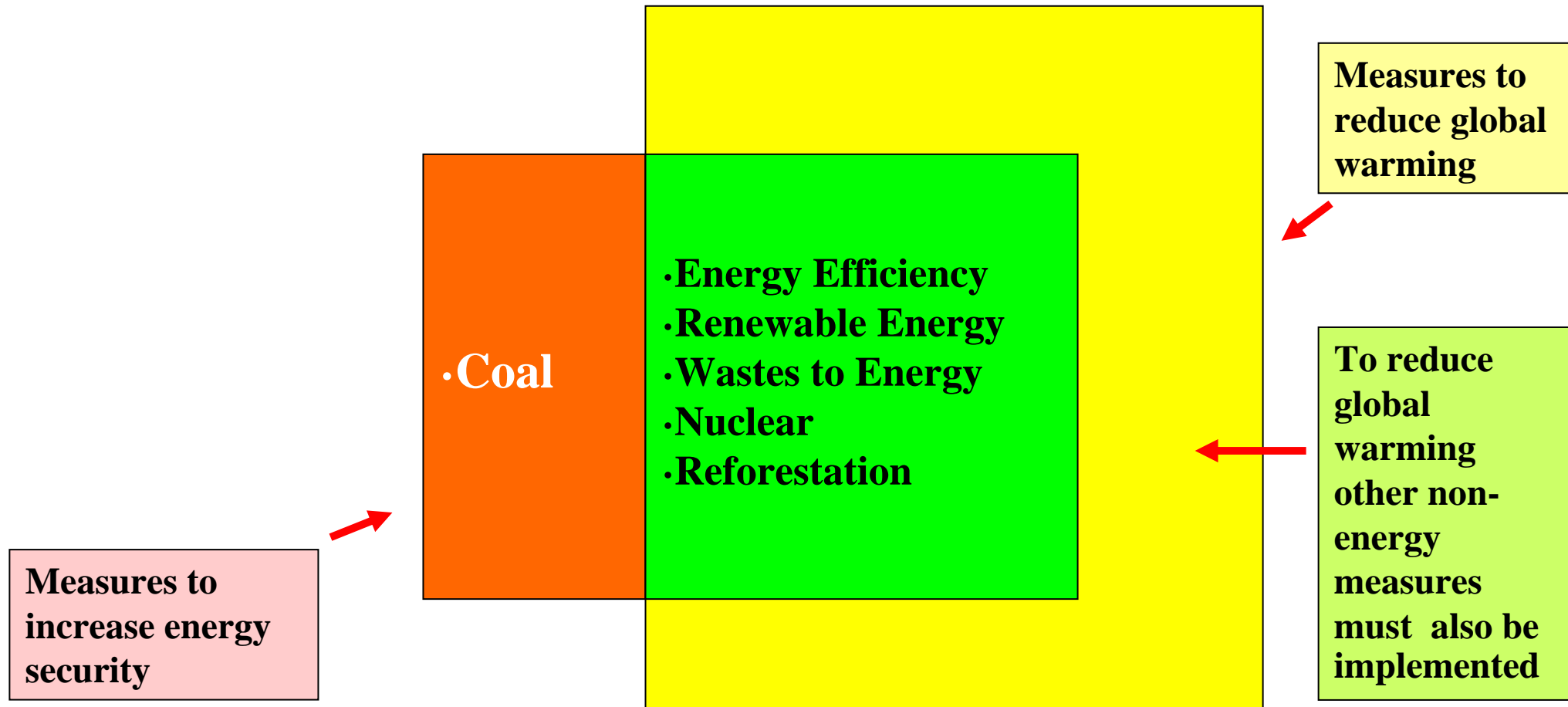
“Thailand’s Long-term Energy Security and Climate Change Challenges”

Piyasvasti Amranand
Chairman of the Advisory Panel to the CEO
Kasikorn Bank

Dinner Talk Celebrating
10th Anniversary of JGSEE
Sofitel Centara Grand Hotel, Bangkok
26 July 2008



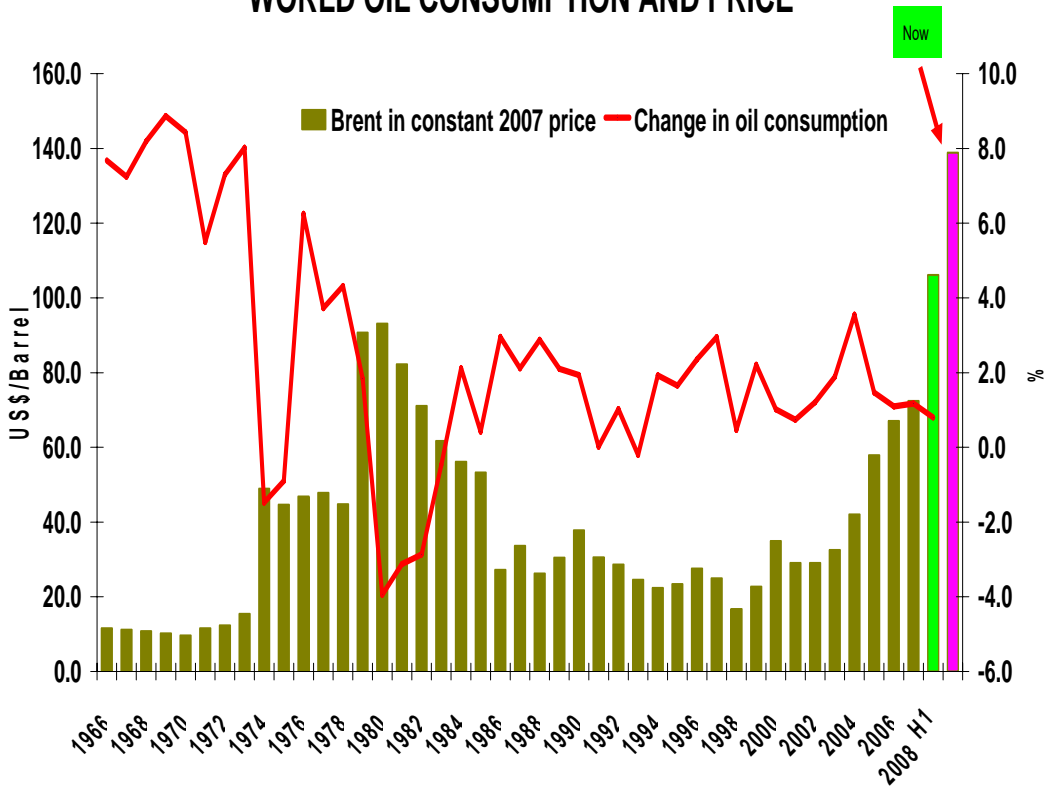
Energy Security and Global Warming



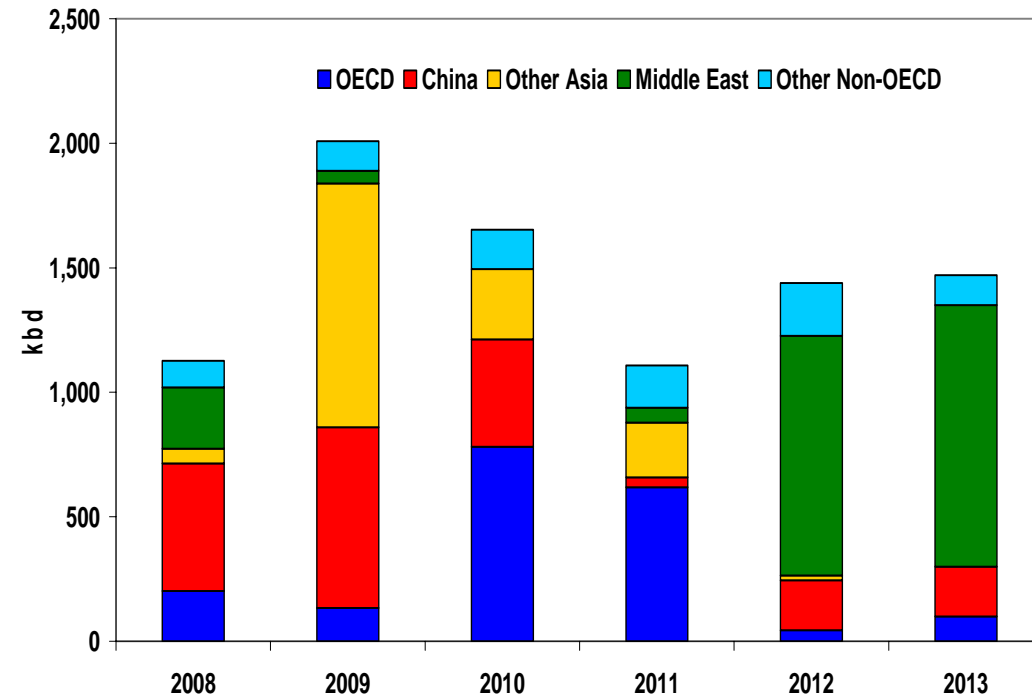


Oil price may be easing in the short run

WORLD OIL CONSUMPTION AND PRICE



Global Crude Distillation Capacity Additions

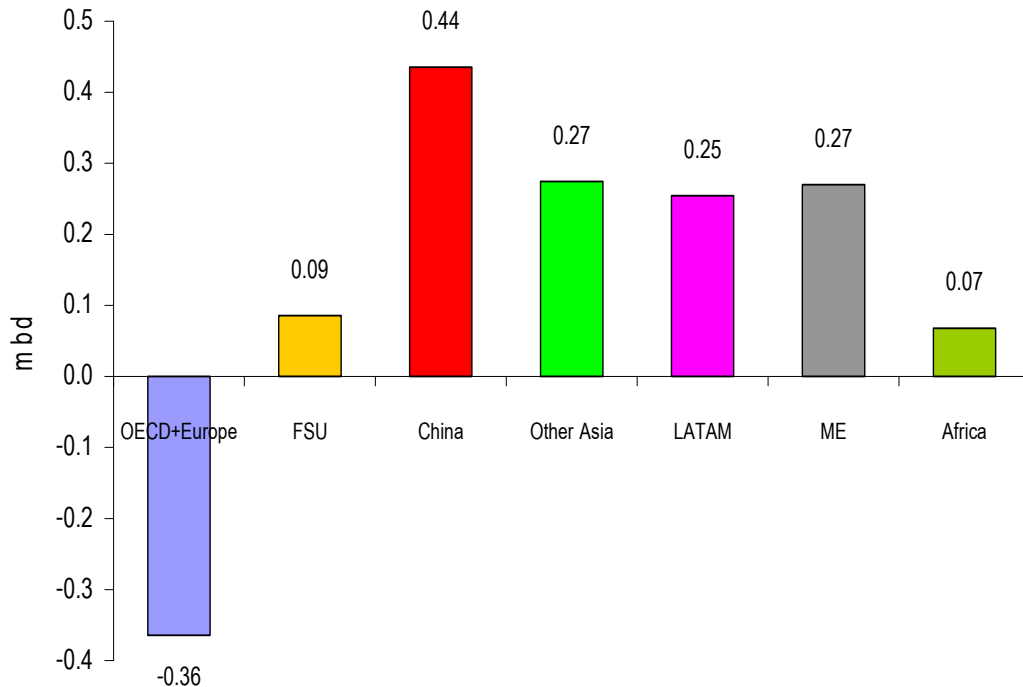


Source: IEA



But in the long run demand will rise significantly

Average Annual Change in World Oil Demand 2006 - 2008 Q1



Total vehicle and passenger car ownership in 2004

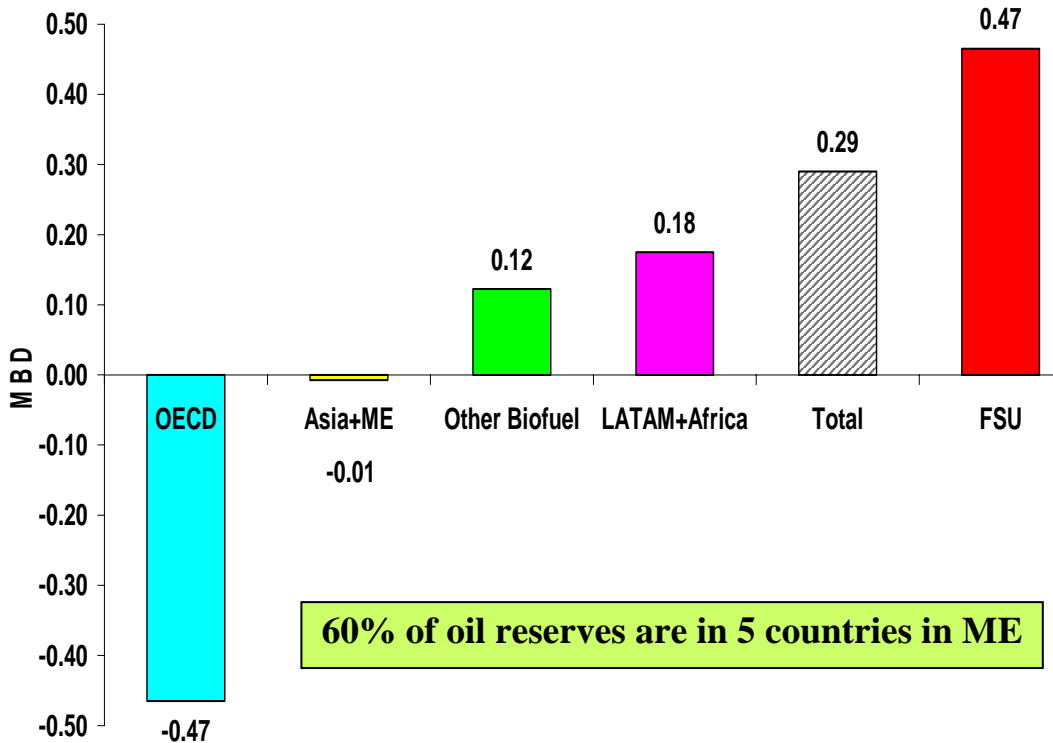
	vehicles per 1,000	population millions	vehicles millions
North America	641	437	280
Western Europe	473	532	252
OECD Pacific	462	200	92
OECD	534	1,169	624
Latin America	138	417	57
Middle East & Africa	36	762	27
South Asia	12	1,459	17
Southeast Asia	135	391	53
China	18	1,314	23
Opec	50	551	29
DCs	42	4,893	207
FSU	172	286	49
Other Europe	239	55	13
World	140	6,403	894

Source: World Road Statistics, International Road Federation, OPEC



OPEC is the only speculator with real market power

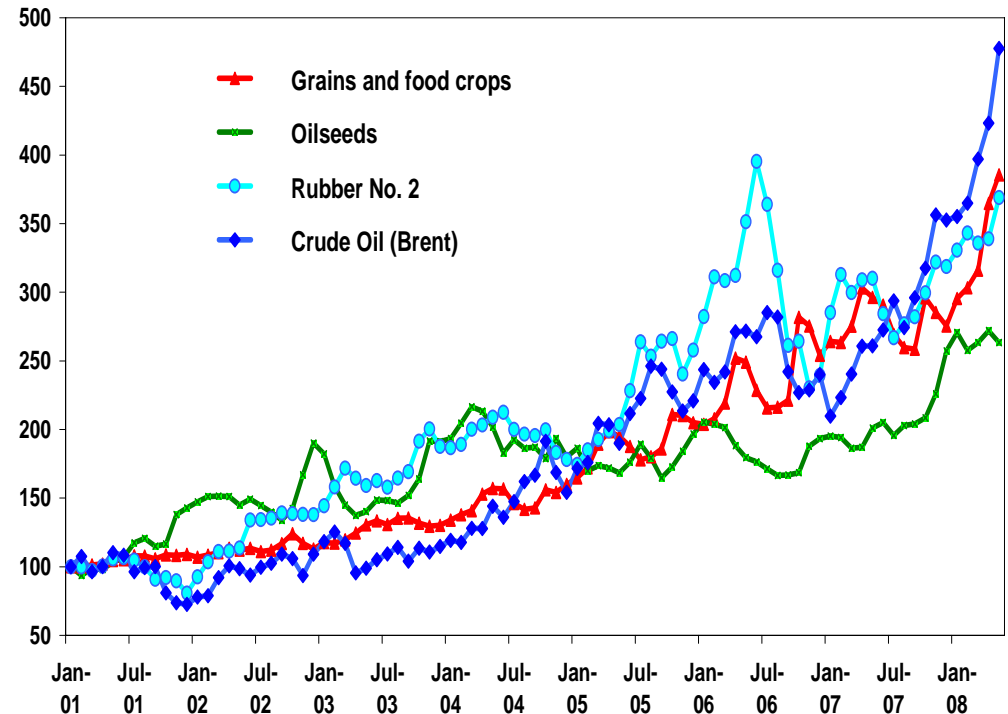
Average Annual Change in Non-OPEC Crude Oil Production 2005-8



60% of oil reserves are in 5 countries in ME

Biofuels and RE are facing supply constraints

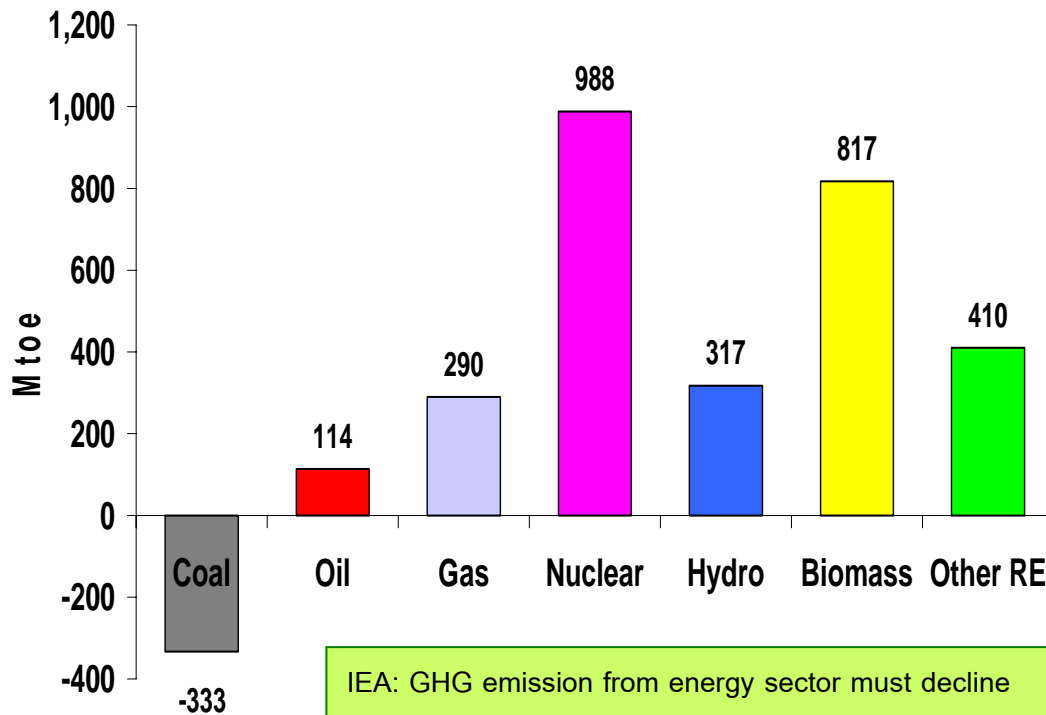
AGRICULTURE AND OIL PRICE INDICES
(Jan.2001=100)





Drastic change in energy consumption needed to combat global warming

Change in World Energy Demand 2005-2030
(CO₂ stabilised at 450 ppm)

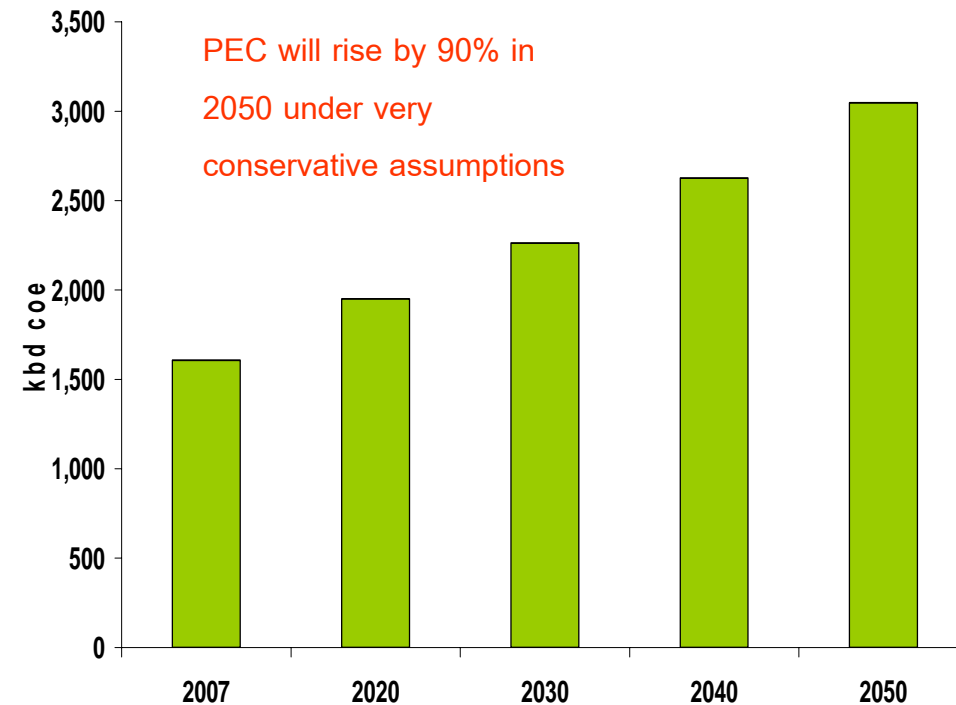


Source: IEA

IEA: GHG emission from energy sector must decline from 2012 with levels in 2030 and 2050 being lower than 2005 level by 13.5% และ 48% respectively

This will be very tough for Thailand

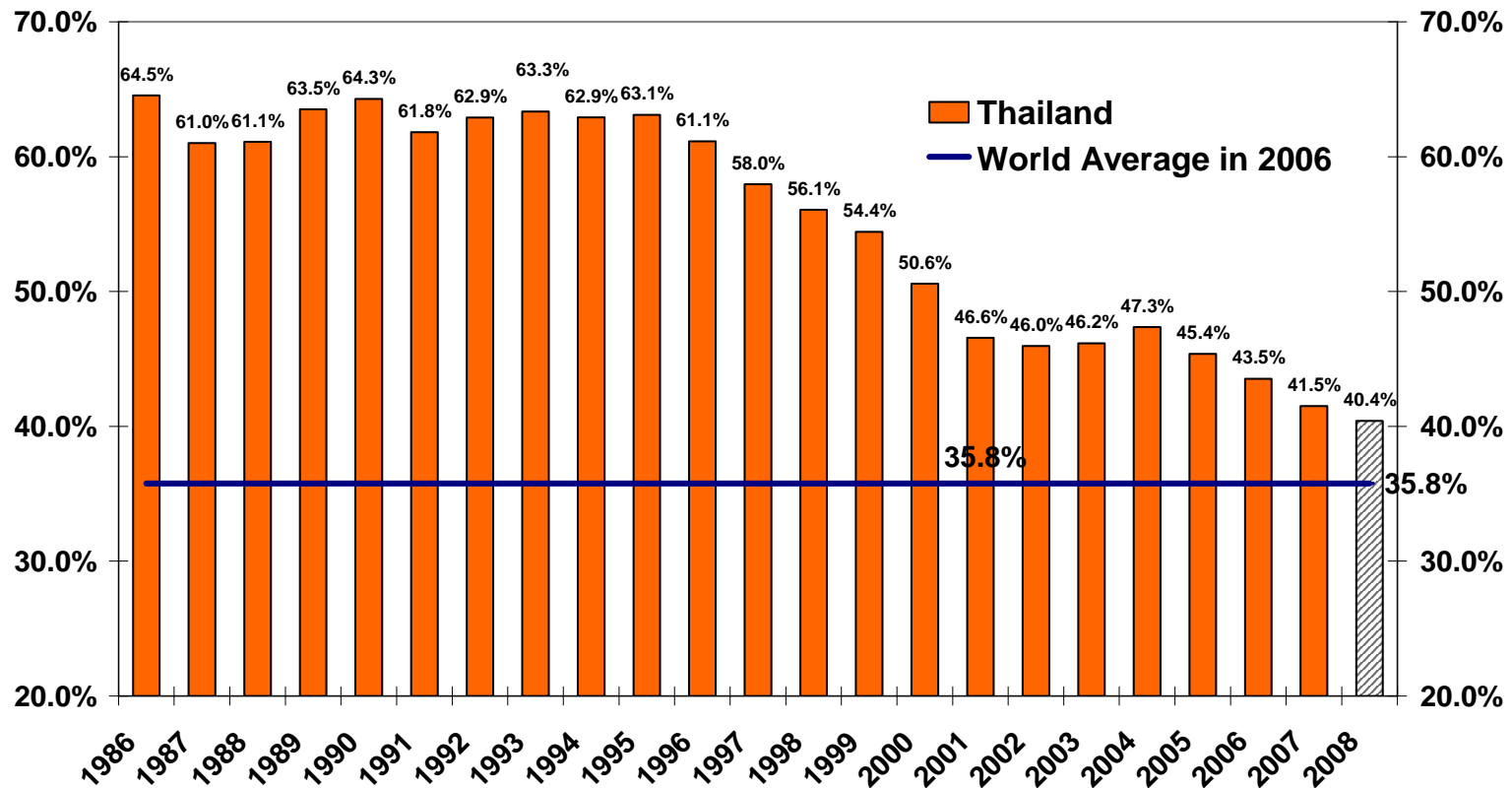
Thailand's Primary Energy Consumption





Thailand must reduce oil consumption

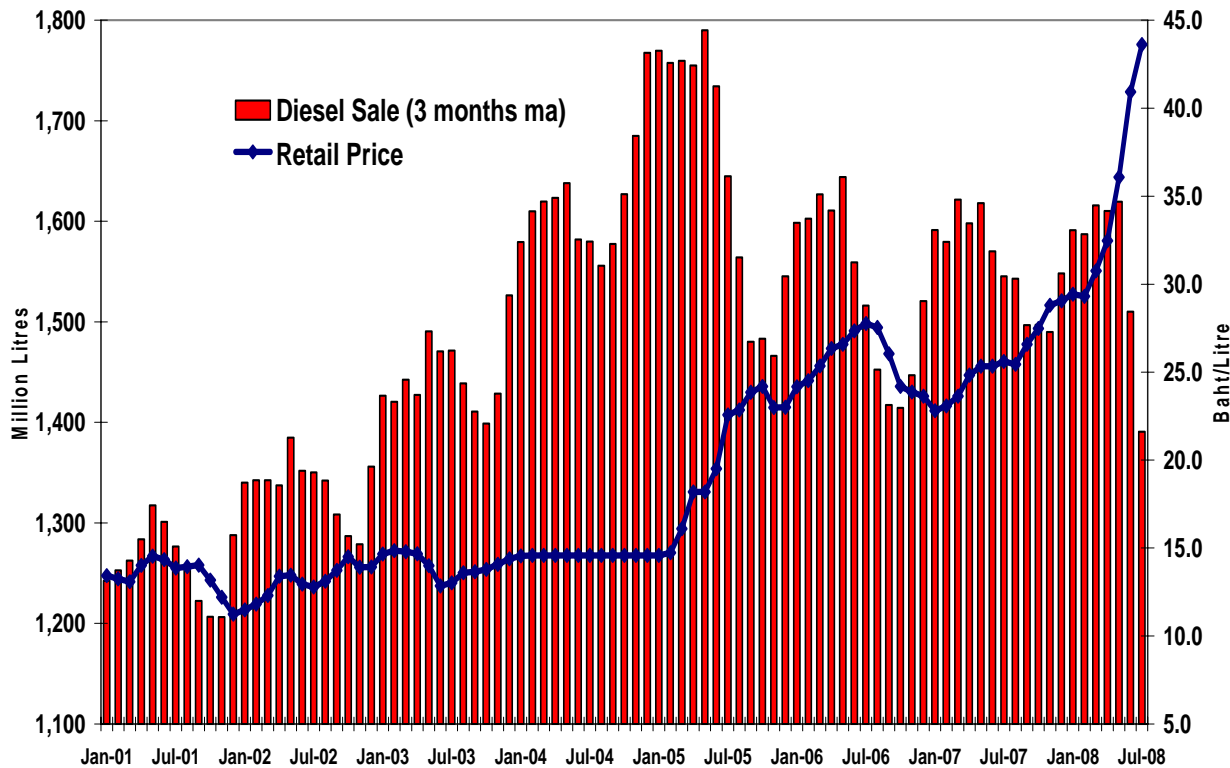
Proportion of Oil in Primary Energy Consumption (%)





Domestic energy price must reflect true cost

DIESEL SALE AND RETAIL PRICE

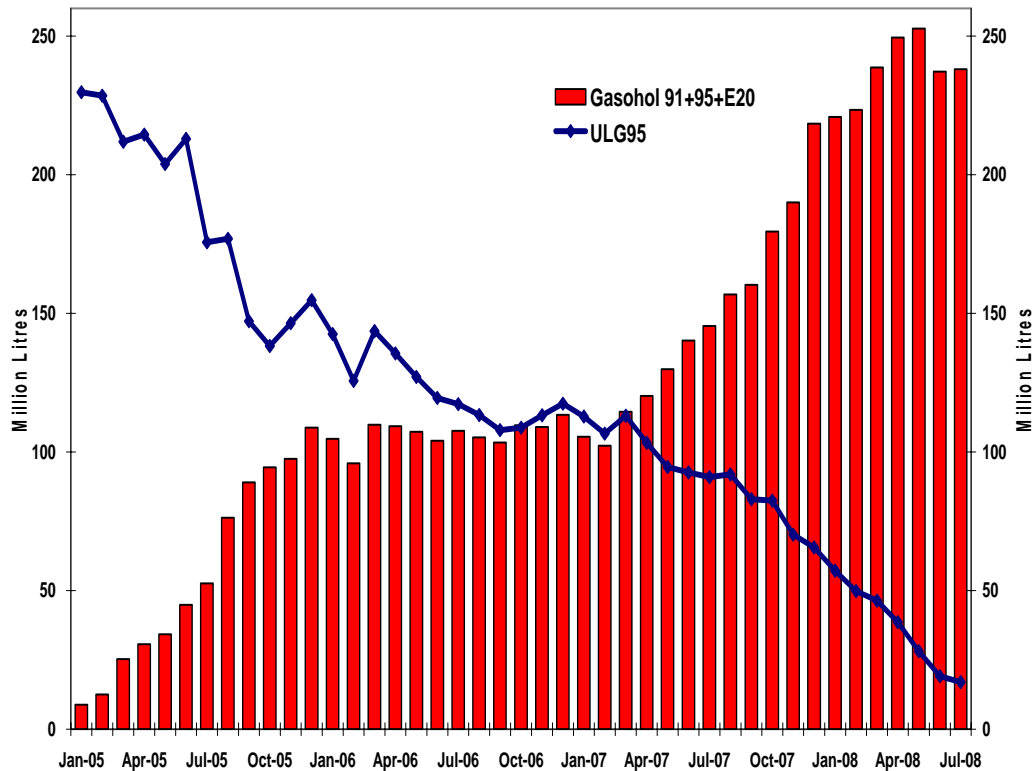


LPG Consumption as Fuel					
	2007 (Ktons)	Annual Growth Rate (%)			
		2005	2006	2007	5M 2008
Cooking	1,884	6.01%	7.30%	9.48%	13.08%
Industry	602	2.06%	13.57%	17.83%	21.76%
Auto	572	34.48%	51.60%	24.66%	19.94%
Total	3,058	8.15%	14.18%	13.65%	16.1%

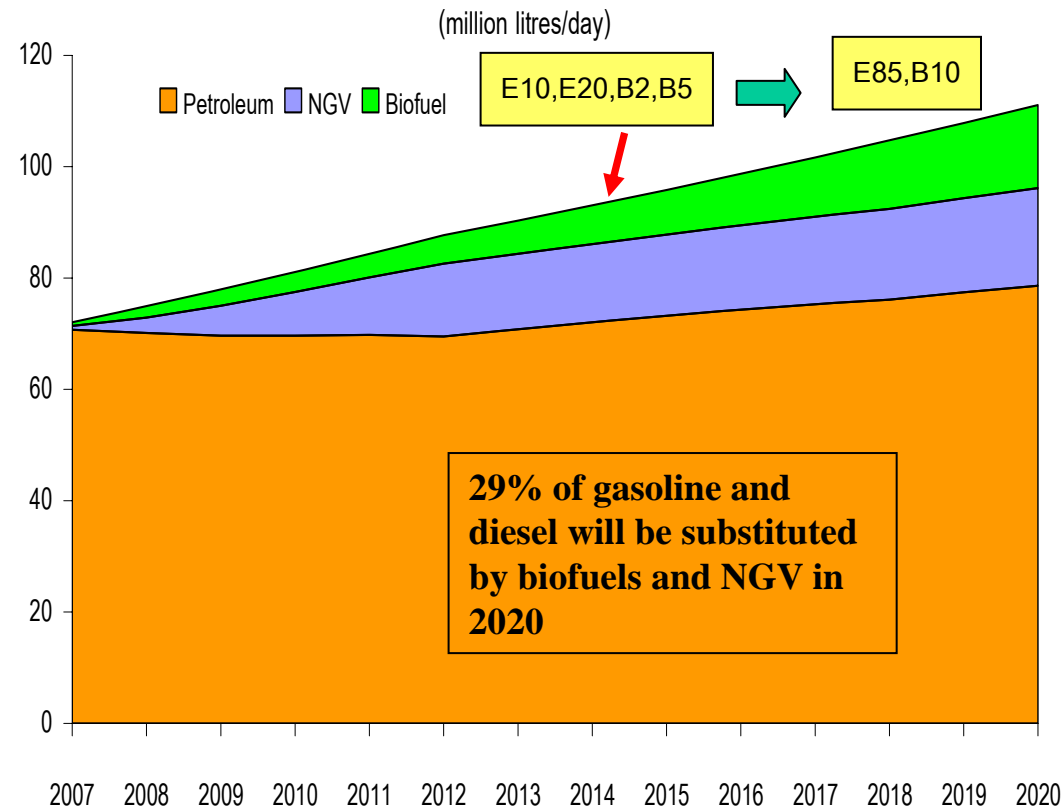


Biofuels and NGV can partially help

SALES OF GASOHOL AND UNLEADED GASOLINE 95



Consumption of Gasoline and Diesel





Price response by renewable energy is remarkable

Generation of Power by Non-Conventional Energy as of June 2008

	Projects Approved			Projects Supplying Power to the Grid		
	Number of Projects	Gen. Capacity (MW)	Sale to Grid (MW)	Number of Projects	Gen. Capacity (MW)	Sale to Grid (MW)
SPP	40	950	536	31	721	382
VSPP	289	1,472	1,021	99	531	212
Subtotal	329	2,422	1,557	130	1,252	594
SPP-Mixed fuel	4	476	233	4	476	233
Total	333	2,898	1,790	134	1,728	827

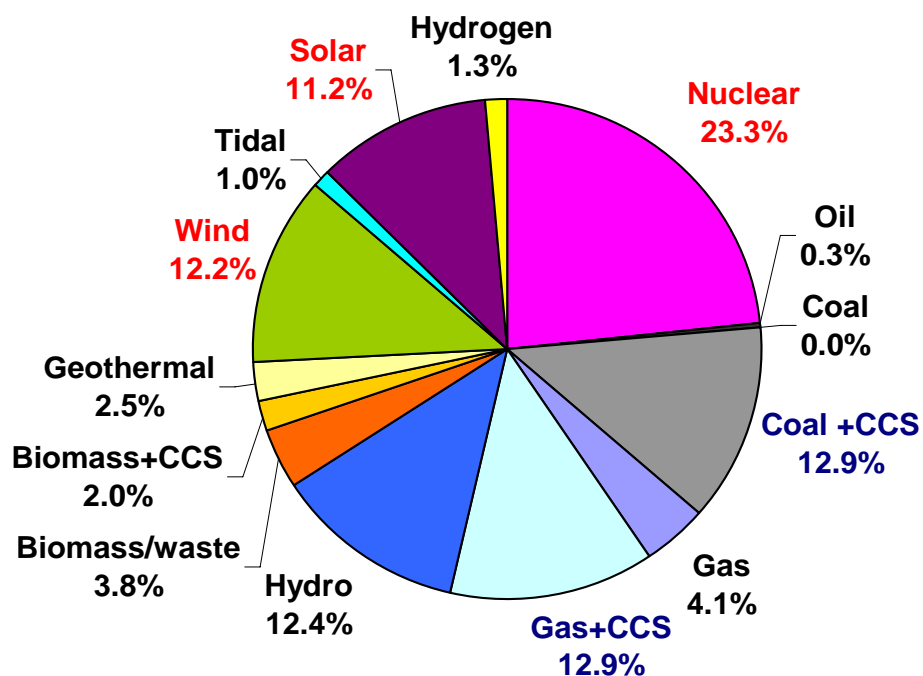
VSPSP Proposals Submitted to Electric Utilities (June 2008)

	Number of Projects	Generating Capacity (MW)	Sale to the Grid (MW)
Solar	219	928	893
Solar Roof Top	64	1	1
Solar PV Farm	60	320	288
Solar thermal/CSP	95	607	604
Wind	6	21	21
Biomass	137	1,335	757
Paddy husk	45	407	319
Bagasse	31	603	176
Wood, saw dust	25	144	123
Palm Waste	16	89	65
Rice Straw	8	3	3
Corn Cob	4	26	22
Other Biomass	8	63	49
Biogas	49	62	52
Animal waste	14	3	3
Industrial Waste Water	35	59	49
MSW	19	110	97
Hydro	4	5	5
Biodiesel	1	0	0
Total	435	2,461	1,825



Nuclear energy is essential for Thailand (and the world)

Global Electricity Production by Type in 2050



Source: IEA



Much more effort is needed on energy efficiency

Proposed Energy Efficiency Standards in New Very Large Buildings (> 10,000 sq.m.)				
kWh/sq.m./year	Current average	New Standard	Future Standard	%New/Current
Office	146.4	98.7	82.3	-32.6%
Hotel	173.2	117.0	101.7	-32.4%
Hospital	148.8	123.9	112.0	-16.7%
Shopping Centre	556.0	438.6	394.7	-21.1%
Educational Institute	94.0	79.3	67.2	-15.6%
Condominium	118.4	105.3	92.7	-11.1%
Hypermarket	394.7	300.9	248.7	-23.8%
Others	139.7	117.2	100.0	-16.1%

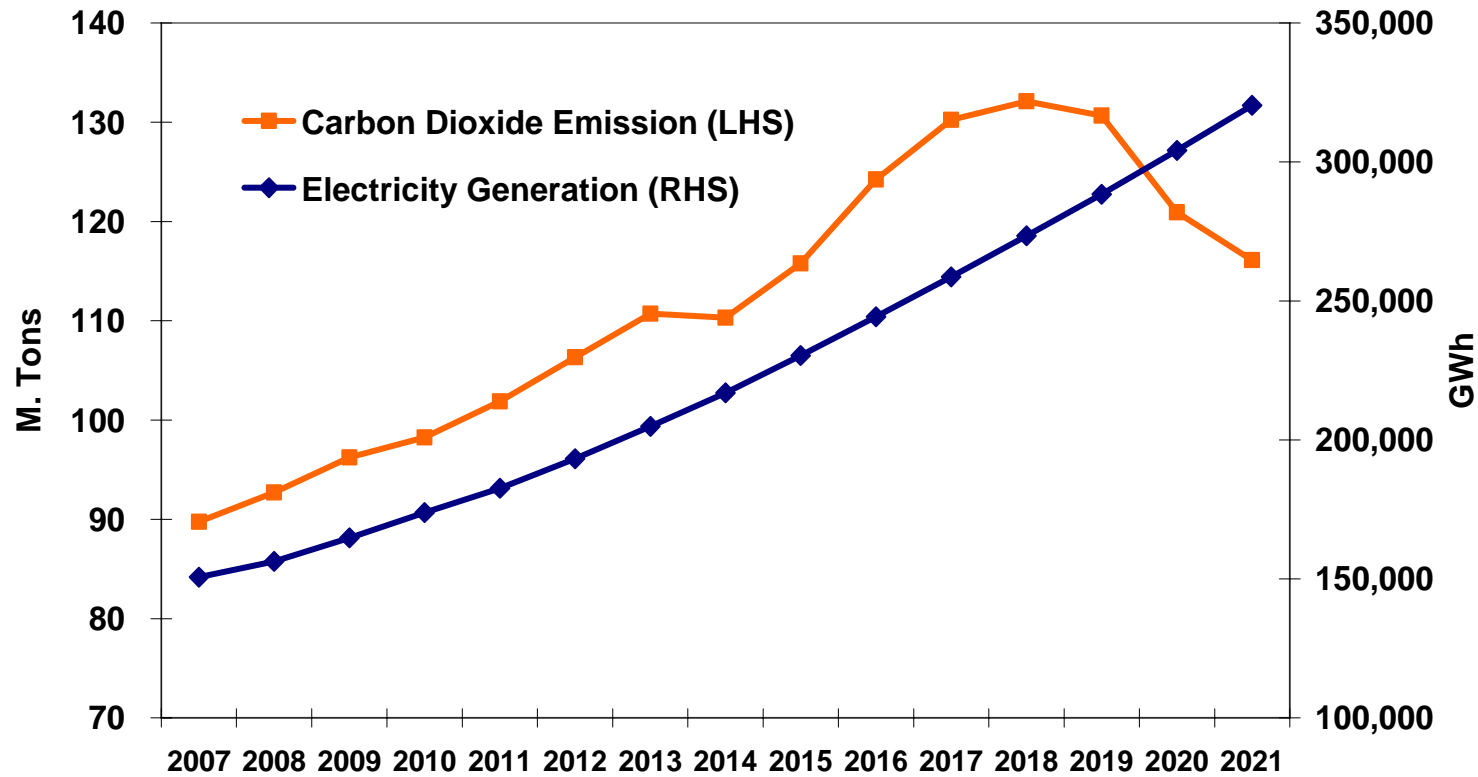
Note: New standard was approved by the Cabinet in December 2007 and is expected to become law soon

Energy demand elasticity has declined from 1.067 during 1986-2005 to 0.51 during 2006-7, but more can be done



CO₂ Emission from power sector in PDP 2007 (adjusted)

Electricity Generation and Carbon Dioxide Emission





But this is not enough...To alleviate global warming we need..

New Technologies

- **Carbon Capture and Storage (CCS)**
- **Non Conventional Oil, Oil Shale, Natural Gas Hydrate**
- **2nd generation biofuels**
- **Solar (PV, CSP, Heating), Wind, other RE**
- **Hybrid vehicles, electric vehicles, hydrogen fuel cell vehicles**
- **Mass Transit**
- **Energy efficiency technologies**

General Public

**Change in behaviours
in all aspects of our
daily lives**

Government

**Create awareness,
consensus and drive
changes which will
involve unpopular
measures**



ธนาคารกสิกรไทย

KASIKORNBANK 泰华农民银行