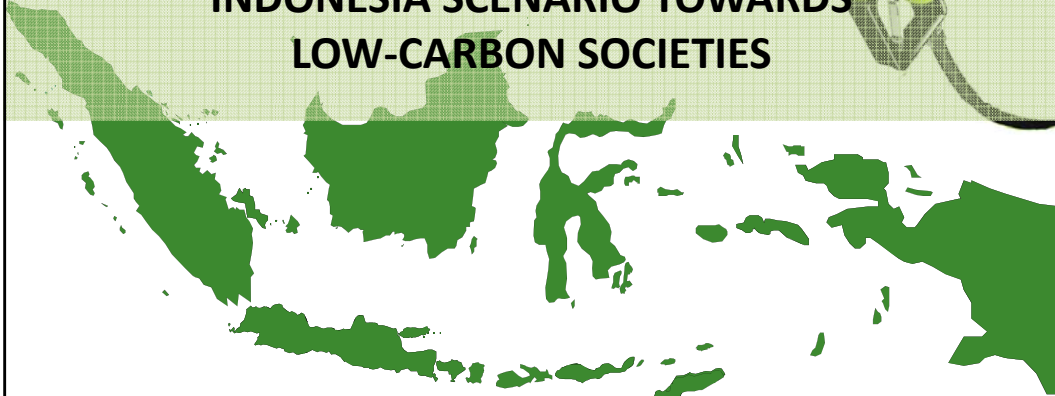


New Delhi, 22 – 23 October 2009



INDONESIA SCENARIO TOWARDS LOW-CARBON SOCIETIES



By

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OUTLINE

- Background
- Existing condition of GHGs and energy sector
- Path to achieve LCS: Indonesian View
- BAU scenario
- Counter Measure Scenario
- Summary

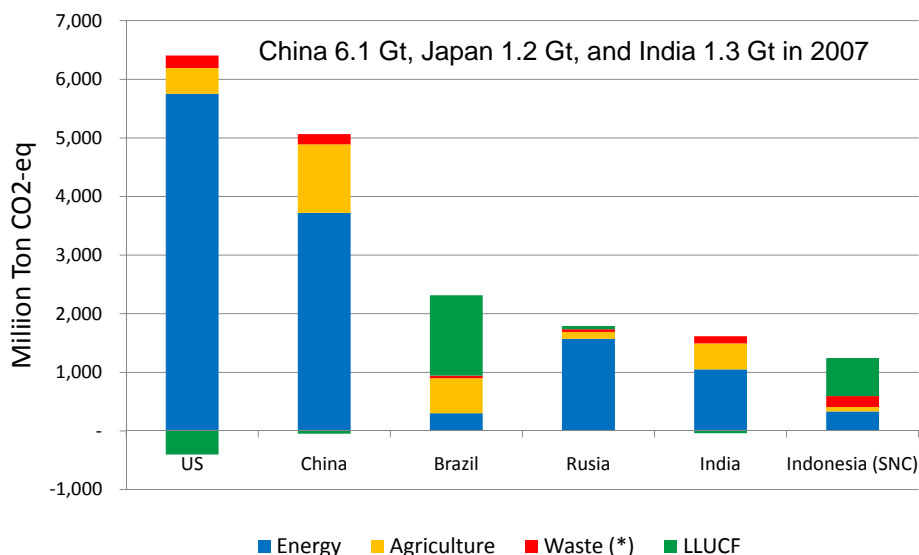
- Retno Gumilang Dewi (ITB - Indonesia)
- Indra (IPB - Indonesia)
- Takuro Kobashi (IGES - Japan)



Background

- Indonesia CO₂ emission generation (2005) is relatively high: 1,55 ton C (5,67 ton CO₂-eq) per capita and it will be achieved 3,22 ton C per capita in 2050 in line with the population and GDP growth if there is 'do nothing' (BAU) with CO₂ emission reduction.
- Other countries: (a) Japan, UK, Germany 2.5 (b) USA 5.5; Canada 4.2; (c) India 0.3; China 0,6; (d) World 1.0 – 1.1 ton C/capita in 2005.
- World's LCS target (2050): 0,5 ton C (2,0 CO₂-eq) per capita. Indonesia's LCS dream is meeting the World's LCS target
- Baseline and scenario to achieve LCS
 - BAU scenario: do nothing with CO₂ emission reduction, energy sector foccuses only for the sector improvement to achieve national energy supply security (least cost, economic, resource availability)
 - Moderate: consider clean technology and less GHG energy; but still in line with government target for supply mix (2025)

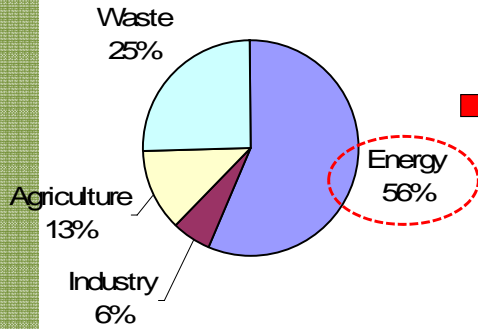
Major World GHG Emitters (Mton CO₂e), 2005



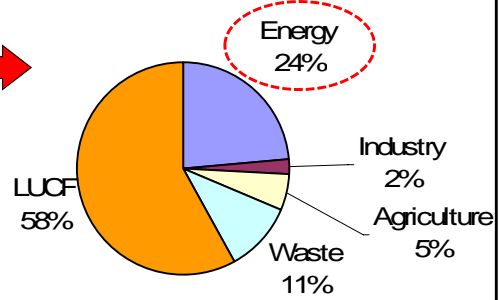
Notes: * including emission from industries; SNC= Indonesia second national communication, 2009; other data from World Bank (2007)

GHG Emissions Potential and Key Sources, 2005

Emission from peat fire is excluded



Mean of peat fire Emission 1997-07 is included



	Ggram CO ₂ -eq
Energy	333,540.98
Industry	34,197.64
Agriculture	75,419.73
Waste	151,579.67
LUCF	649,254.17
Total	1,243,992.19

Total 1.55 ton C/capita
Energy sector 0,49 ton C/capita

[Indonesia SNC, September 2009]

ANALYSIS OF ENERGY SITUATION AND ITS IMPACT ON GHG EMISSIONS



Current Condition of Energy Sector in Indonesia

- Energy consumption grows 5.45 %/year (2000-2005) at population growth 1.05%, energy elasticity 1.2, and GDP growth 4.95% - 5.5%.
- The objective of energy development is energy supply security.
- The selection of energy types and technologies is based on the least cost consideration and resources availability
- Fossil fuels will still dominate (90%) national energy mix, in which oil will account 51%. GHG emissions will still increase by 5%/year.
- Huge potential to reduce GHGs by deployment of renewable energy.
- Indonesia still rely on imported technology products for all sectors. Current energy technologies are generally still inefficient, there are rooms for improvements on technology efficiency.



Energy Resource Potential of Indonesia, 2008

Fossil Energy	Resources	Reserves (Proven + Possible)	Annual Production	R/P, year (*)
Oil	56.6 BBarels	8.2BBarels (**)	357 MBarels	23
Natural Gas	334.5 TCF	170 TCF	2.7 TSCF	63
Coal	104.8 Btons	18.8 Btons	229.2 Mtons	82
<i>Coal Bed Methane</i>	453 TCF	-	-	-

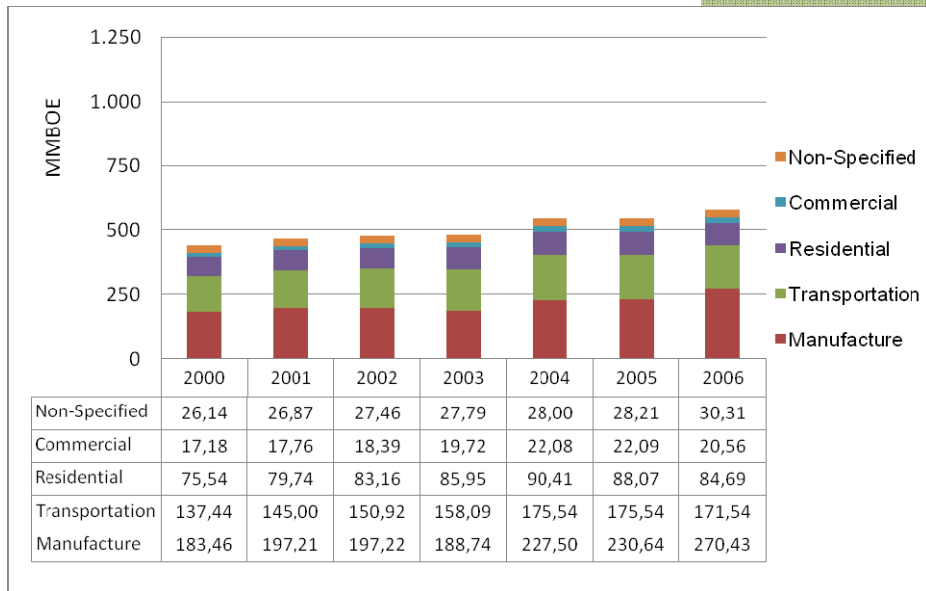
(*) assuming no new discovery; (**) including Cepu Block

New and Renewable Energy	Resources	Installed Capacity
Hydro	75.670 MW	4.200 MW
Geothermal	27.510 MW	1.052 MW
Mini/Micro Hydro	500 MW	86,1 MW
Biomass	49.810 MW	445 MW
Solar Energy	4,80 kWh/m ² /day	12,1 MW
Wind Energy	9.290 MW	1,1 MW
Uranium (***)	3 GW for 11 years*) (e.q. 24,112 ton)	30 MW

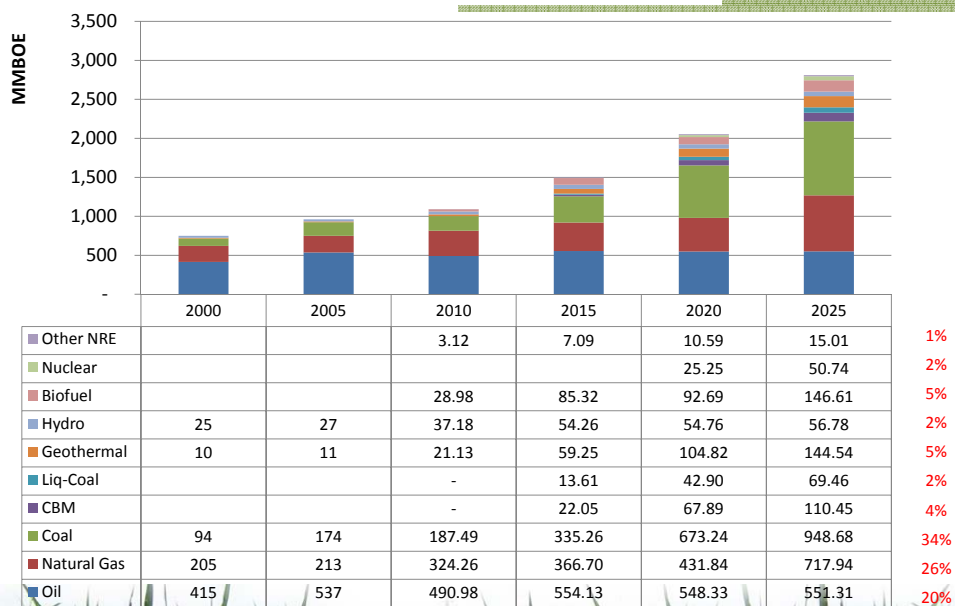
***) Only at Kalan – West Kalimantan Source: Data and Information Center, MEMR, 2009



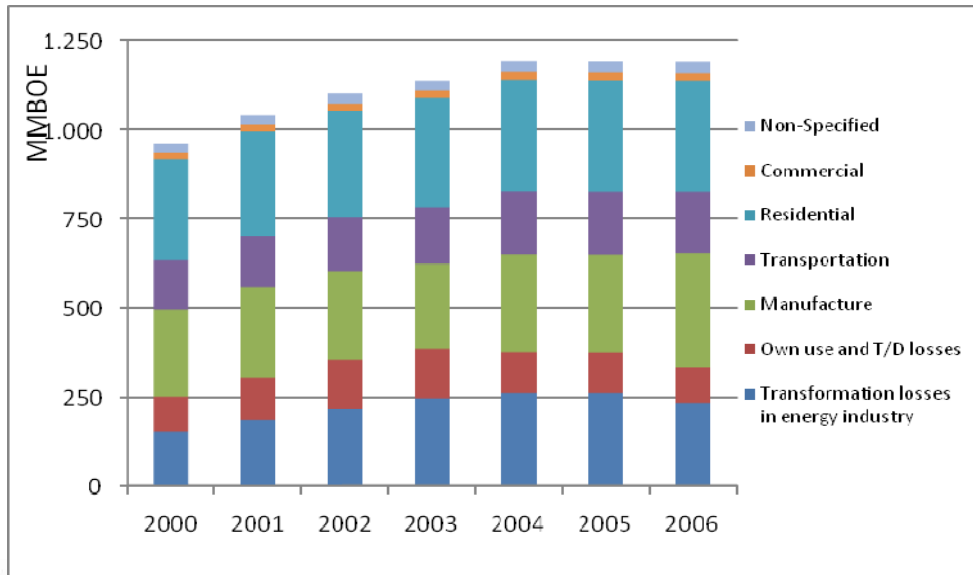
Final energy consumption (excluding biomass), 2000 – 2006



Energy Demand Projection in Indonesia [Refer to national energy mix target based on Presidential Decree 5/2006]



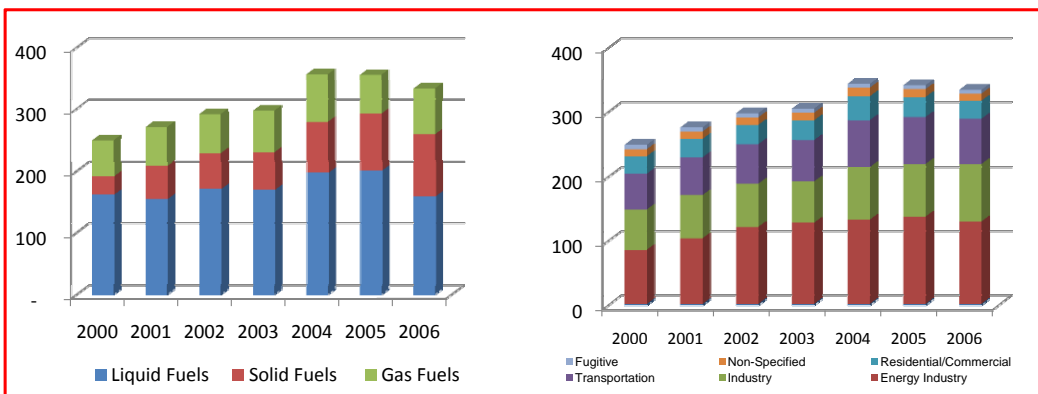
Energy Used in The Key Sources of GHG Emissions



CO2 Emission Inventory, Million Ton

Reference Approach

Sectoral Approach





GHG Reduction Scenario



Questions Arising from the Study

- What are the future GHG trajectories, satisfying developmental needs and realizing low carbon societies?
- What are the core principles for and elements of achieving a low-carbon society for Indonesia towards 2050?
- How developing countries can decouple development with the carbon emissions?
- How the future global climate regime and regional cooperation can help in achieving low-carbon development?

Blueprint PEN 2005

Assumptions used in developing energy projection

▪ GDP Growth:

2005	2010	2015	2020	2025
4.92	5.13	5.13	6.51	6.51

▪ Energy elasticity

Scenario	2005	2010	2015	2020	2025
BAU PEN	1.48	1.48	1.48	1.48	1.48
RIKEN	1.9	1.8	1.38	1.13	0.94
Prepres Opt	-	-	-	-	1.0

▪ Energy growth:

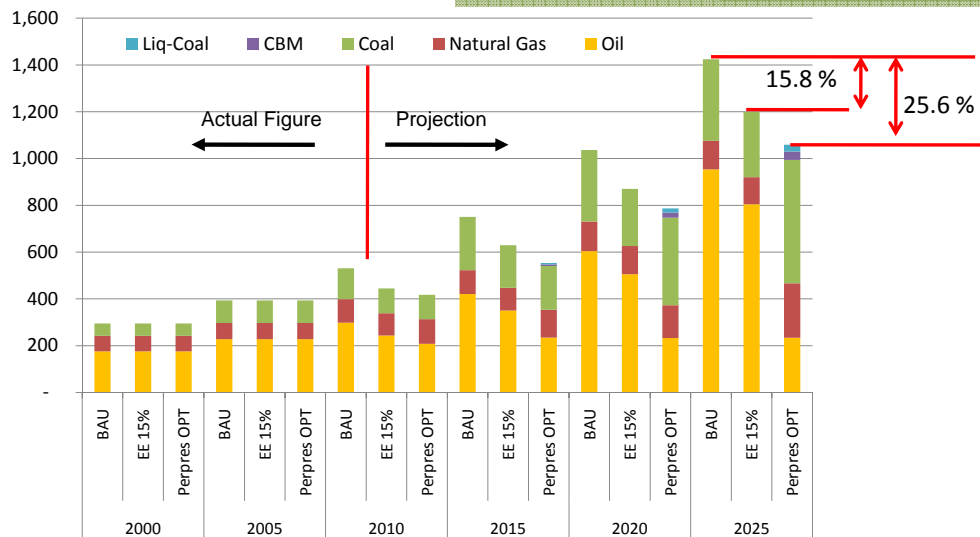
Scenario	2000 – 2025	2005 – 2025
BAU PEN	8%	8.7%
RIKEN	6.3%	6.7%
Prepres Opt	6.1%	6.4%

Notes: Energy Growth

- BAU PEN is too high
- Actual (2000-2006): 5.45%
- BAU SNC with elasticity 1.2: 6.0% (2005- 2010) 6.5% (2010 – 2025)

The Projection of GHGs Emission of Energy Sector

Million Ton CO₂

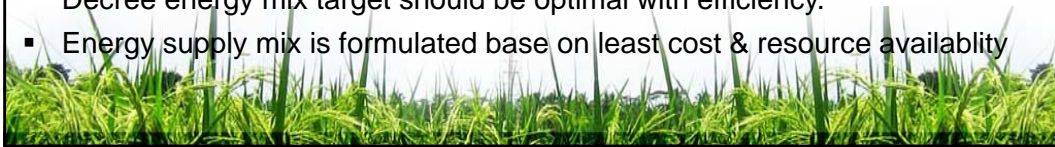


Notes:

- RIKEN (National Energy Conservation Planning)
- Perpres (Presidential Decree on energy supply mix and optimization)

Presidential Decree no.5/2006, Blue Print of National Energy Plan:

- Energy elasticity of Indonesia = 1.2 (other countries 1.0) → more energy is needed for Indonesia to increase a unit of GDP. National policy objective is elasticity is < 1 in 2025 (through energy efficiency)
- Share target of different sources of energy in 2025:
 - a. oil becomes less than 20%
 - b. natural gas becomes 30%
 - c. coal becomes more than 33%
 - d. biofuel becomes more than 5%
 - e. geothermal more than 5%
 - f. other new and renewable, particularly biomass, nuclear, hydro power, solar, and wind becomes more than 5%
 - g. liquefied coal becomes more than 2%.
- It should be noted, shift of new-renewable from 4.5% (2005) to 17% (2025), coal 14% (2005) to 33% (2025) only may not reduce GHGs significantly since coal and other fossil fuels still increases, therefore the in Presidential Decree energy mix target should be optimal with efficiency.
- Energy supply mix is formulated base on least cost & resource availability

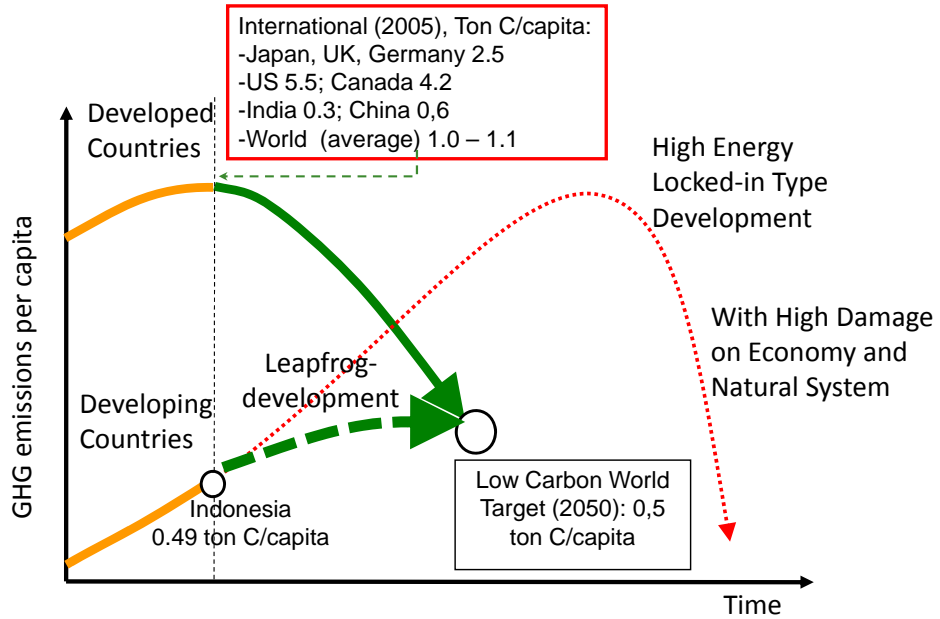


Main principles and elements for achieving LCS

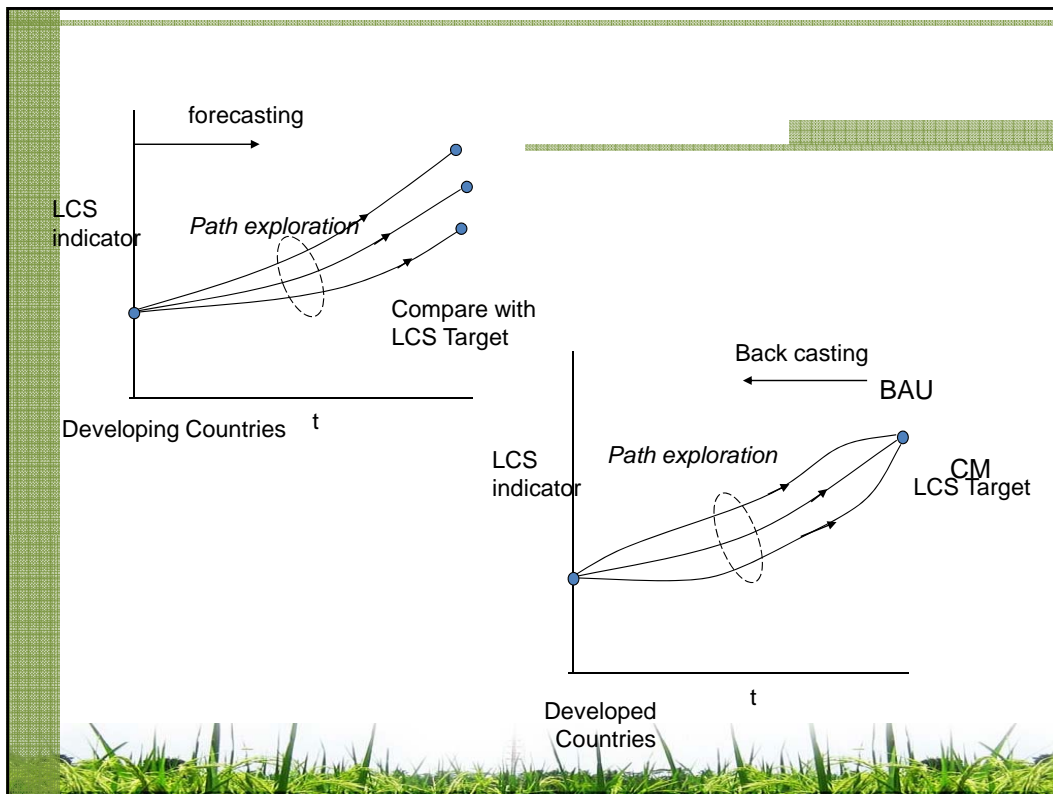
- Global as well as regional cooperation to reduce GHG emissions associated with the integration process through sustainable low-carbon community, which can be achieve by:
 - setting up the GHG emission reduction target for developed countries to minimize and properly manage negative impacts of climate change at the GHG level in the atmosphere that could keep increasing global temperature < 2°C compare pre-industrial, i.e. 2 ton CO₂eq/capita or 0.5 ton C/capita (world's target),
 - finding the optimal mitigation path of GHG emission reduction for developing countries that has no obligation to reduce CO₂ emission (such Indonesia) so that in 2050 the level of GHG emission of the country will meet or at least will close to the world's target
- Since the mitigation of GHG emission needs high sources (in terms of budget and social capability), it is needed to reduce socio-economic gaps of the region and to realize fully developed societies in Asia

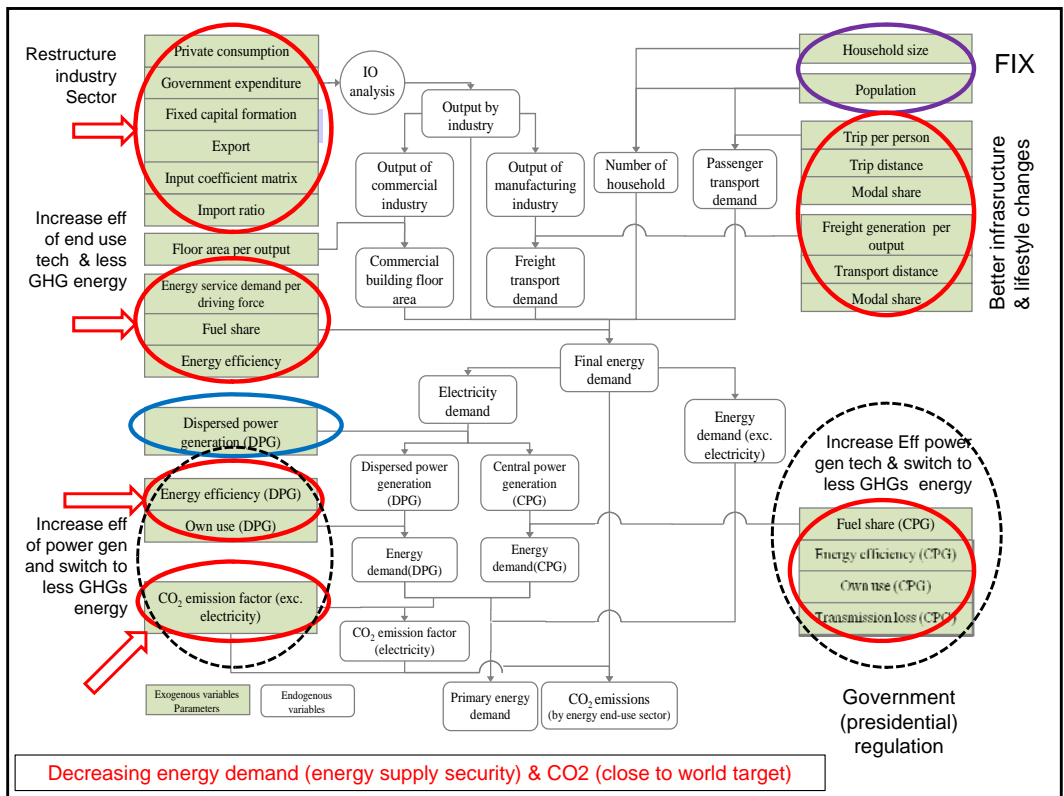
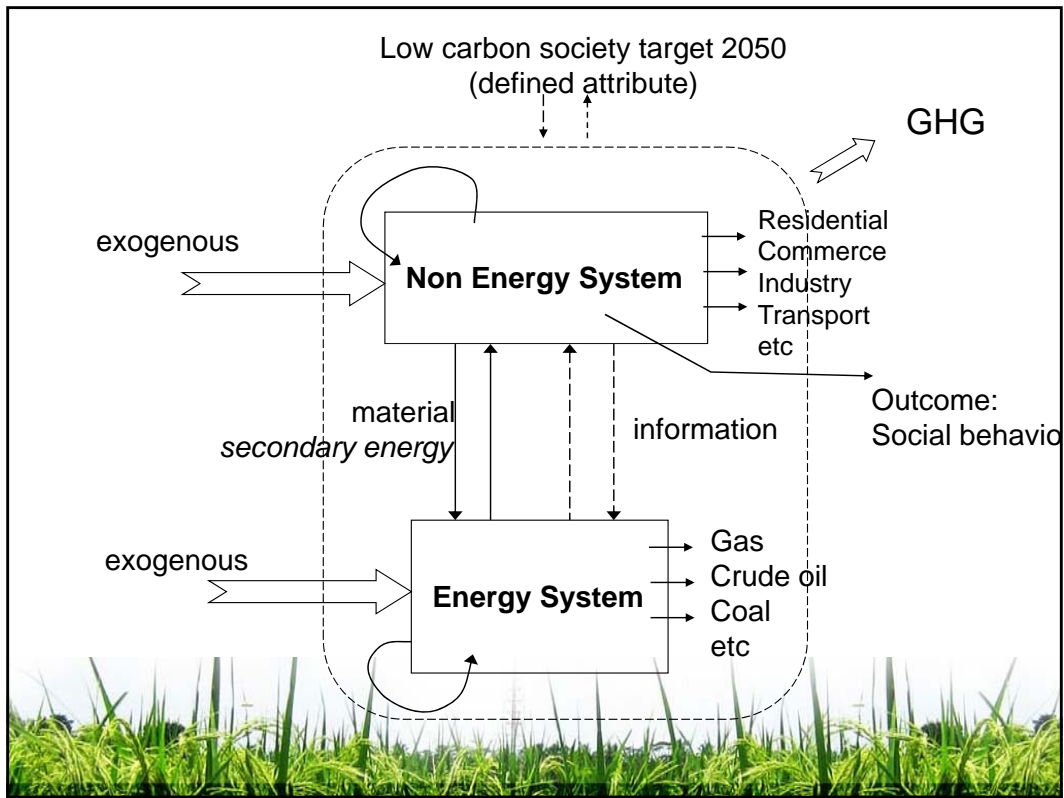


Designing Sustainable Low-Carbon

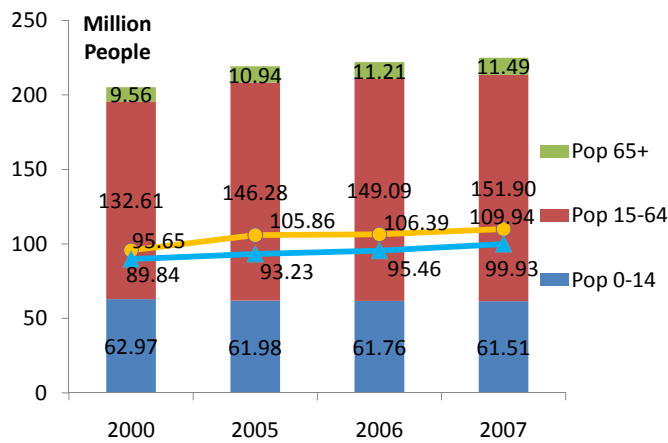


Asian LCS Study (2009)





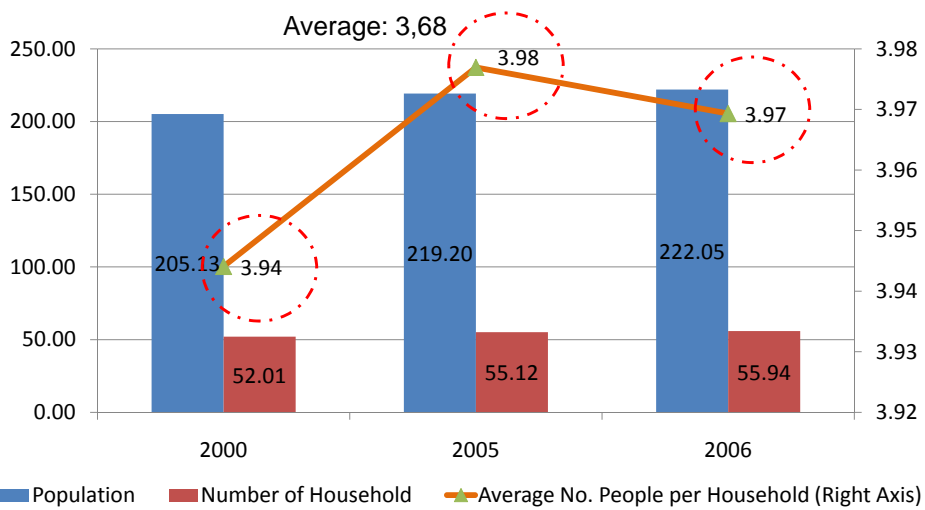
Demography



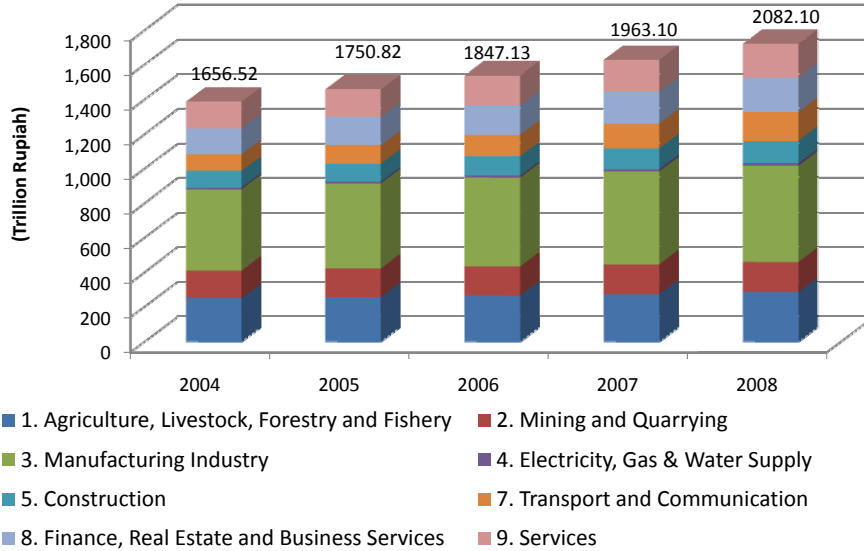
Year	Population
2000	205280
2005	219210
2010	232517
2015	244191
2020	254218
2025	263287
2030	271485
2035	278382
2040	283503
2045	286717
2050	288110

Source: UN report

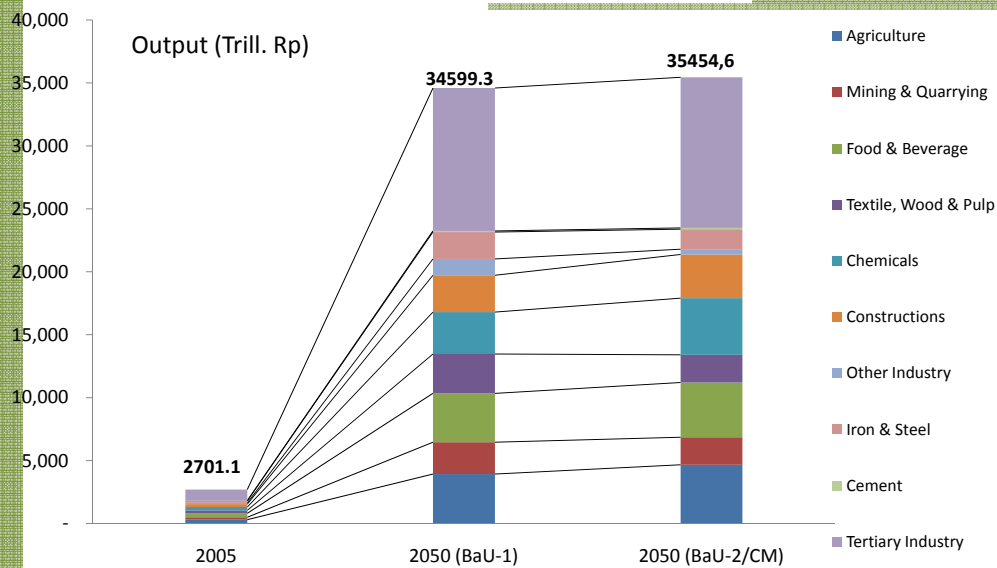
Number of People in a Household



GDP (at 2000 Constant Market Prices) By Sectors



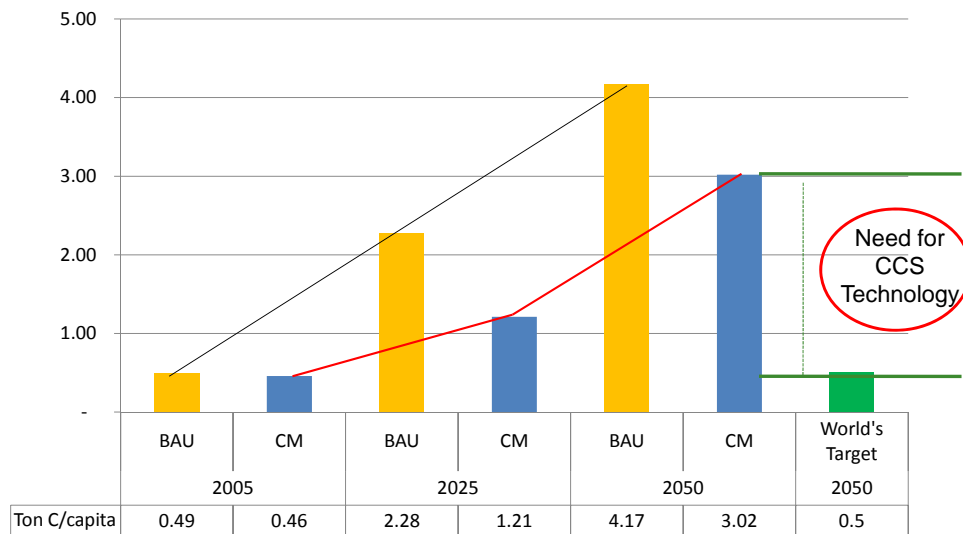
BAU Scenario: Change in economic structure



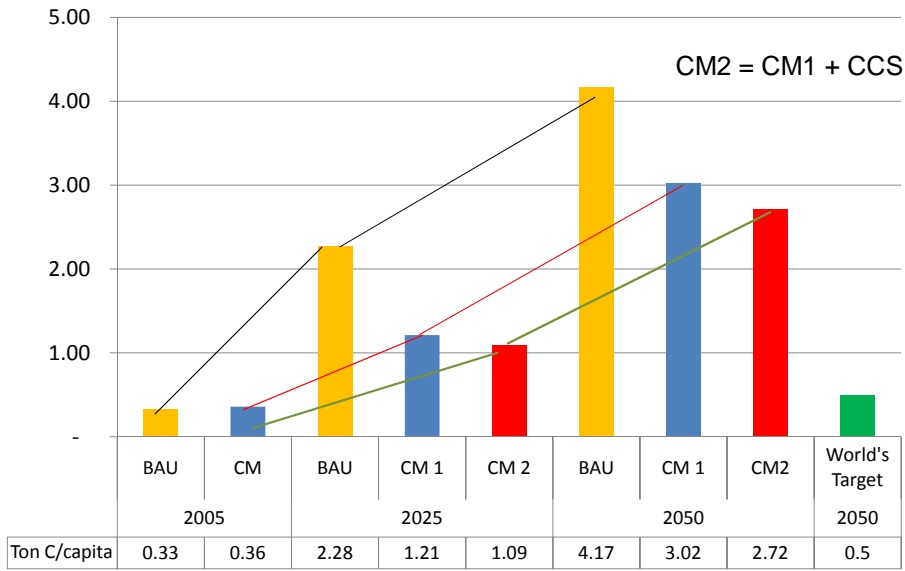
Estimation Results of Counter Measure Scenario

	2005	2050 (BaU)	2050 (CM)	Ration 2050	
				(BaU)/ 2005	2050 (BaU 2)/ 2005
Population	219,212,000	288111000	288111000	1.314	1.314
Number of Household	59,626,000	78366633.61	78291032.61	1.314	1.313
GDP (mil Rp.)	1,366,500,296	18110993671	18110993671	13.254	13.254
GDP per Capita (mil Rp.)	6,233,693	62,861,167	62,861,167	10.084	10.084
Gross Output (mil Rp.)	2,701,099,837	35,454,563,538	35,454,563,538	13.126	13.126
Primary	307,436,021	4671926437	4671926437	15.196	15.196
Secondary	1,507,581,167	18817979889	18817979889	12.482	12.482
Tertiary	886,082,650	11964657212	11964657212	13.503	13.503
Floor Space for Commercial (mil m ²)	886,082,650	11964657212	11964657212	13.503	13.503
Passenger_trs (p-km)	894,116,173	1175139613	636938819.8	1.314	0.712
Freight_trs (mil t-km)	8,459	109473.6953	127041.6835	12.942	15.019
Energy Demand (ktoe)	153,902	1200029.186	869728.0147	7.797	5.651
CO2 Emissions (ton C)	102,177	927405.3609	604949.671	9.076	5.921

GHG Emission per Capita



GHG Emission per Capita



CM 1

POWER SECTOR

- In line with GOI target, in CM scenario the share of RE will increase (hyd and sw = solar, wind, geothermal)
- More efficient power generation:
 - Clean coal efficiency (IGCC) 50%
 - Oil (combined cycle) 55%
 - Gas (combined cycle) 55%
 - Government target T & D losses 5% at 2030
 - Own use reduces regarding increasing efficiency of power technologies
- The application of CCS should be considered; in BAU and CM scenario the CCS technology was not included the calculation.

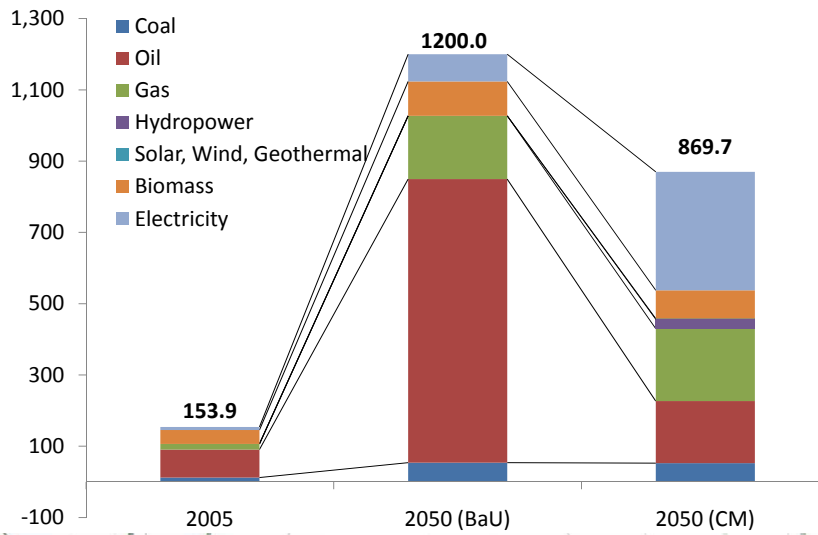
▪ **Transport sector**

- Lifestyle changes will reduce number trips of each persons
- Good urban planning and infrastrucstur will reduce the length of trip, encourage people more walk or using bicycle, more utilize public transportation.

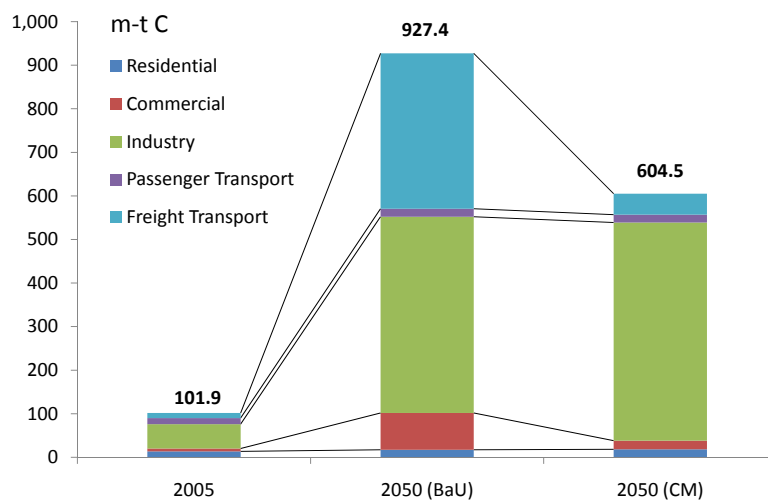
▪ **Industry, residential, and commercial Sector**

- More electric appliances will be used
- Applying new technology with high efficiency and low GHGs
- Fuel switching to less GHG emission energy

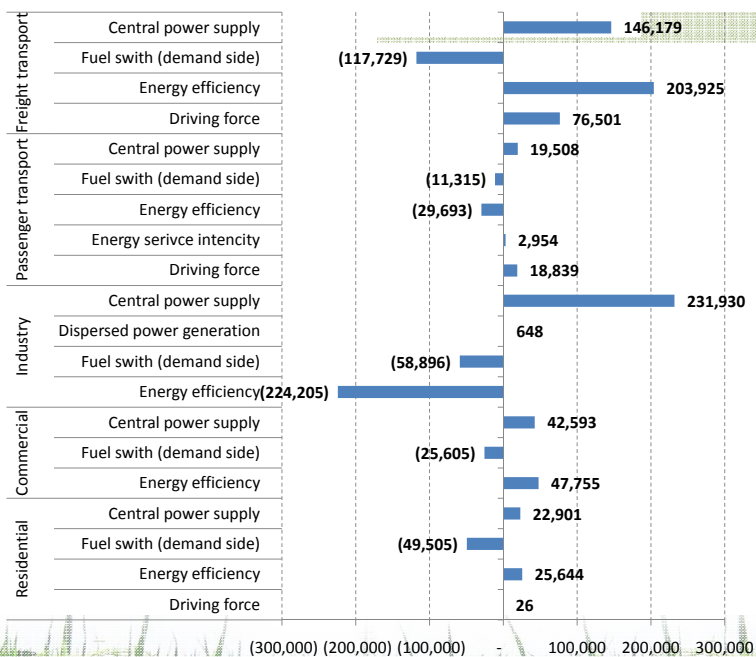
Final Demand by Type of Energy



GHG Emission by Sector



Contribution to CO2 Reduction by Service Compare to BaU



Summary

- People and GDP are main drivers for energy demand as well as GHGs emissions nowadays
- In counter measures scenario:
 - Economic structure changes is considered in BAU projection with agriculture will increase due to more renewable energy and renewable raw material based will be used in next future
 - Fuel switching (still consider coal, oil, and gas) and efficient technology not give much good impact to counter measures in industry, residential, and freight transport how ever in total could decrease almost 35% of total CO2 from BAU (2050)
 - Still need other measures, i.e. CCS to achieve LCS target

Actions

- Set LCS target of Indonesia in the near future that is fitted with real Indonesia's socio-economic condition
- Ways to achieve LCS target (in meeting world' LCS target)
 - Increasing GDP in a good way (low energy used, low emissions)
 - Promoting the utilization of more efficient and less GHG emissions energy types and technology conversions
 - Introduce good urban planning & transport infrastucuture
 - Mainstream climate change measures for Asian-wide development agenda (e.g. integration process through ASEAN +6).

THANK YOU



Parameter set for Power Sector

	col	oil	gas	hyd	sw
Base					
efc	39%	47%	100%	10%	33%
own	0,042	0,042	0,042	0,042	0,042
tls	12,3%	12,3%	12,3%	12,3%	12,3%
Share	30%	15%	8%	5%	1%
BAU					
efc	33,0%	38,6%	46,8%	99,9%	10,0%
own	0,042	0,042	0,042	0,042	0,042
tls	12,3%	12,3%	12,3%	12,3%	12,3%
Share	40,65%	30,58%	15,14%	8,45%	5,18%
CM					
efc	55%	60%	60%	0,9992	0,1000
own	0,0325	0,0348	0,0361	0,0416	0,0416
tls	0,0300	0,0300	0,0300	0,0300	0,0300
share	40,65%	22,35%	17,00%	10,00%	10,00%

Assumption of transportation mode share

	tptr	tpbs	tplv	tpsv	tptw	tpsh	walk	bike	tpar
Base									
Dmst	1,1%	24,6%	0,0%	18,2%	9,7%	5,0%	32,6%	3,8%	5,0%
crsb	0%	15%	0%	15%	0%	35%	0%	0%	35%
BAU									
Dmst	1,1%	24,6%	0,0%	18,2%	9,7%	5,0%	32,6%	3,8%	5,0%
crsb	0%	15%	0%	15%	0%	35%	0%	0%	35%
CM									
dmst	2,5%	18,0%	0,0%	15,0%	6,0%	5,0%	40,0%	8,5%	5,0%
crsb	0%	10%	0%	15%	0%	35%	0%	0%	40%