Indonesia Second National Communication

GHGs emissions from Transportation sector (part of Energy sector)

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Outline

1. Background: Energy Situation and Climate Change in Indonesia
2. National GHG and Role of GHG from Energy
3. Fossil Fuels in Indonesia's Energy Supply Mix
4. Energy Utilization from Transportation
5. GHG emission from Transportation in the SNC
6. Mitigation Strategy and Policy in Transportation

1. Background

- Energy consumption grows ± 5.7% per annum in the last decades with population growth 1.05%. Energy elasticity still > 1.
- The objective of energy development is energy supply security
- The selection of energy type and technology is based on least cost consideration & resources availability → *climate change mitigation will be a by-product of the development*.
- Fossil fuels dominate national energy mix at around 90%, fuel oil accounted 51%. GHG emission increases by 5% per annum. Energy of transportation still relies on fossil fuels.
- Huge potential to reduce emission by deplyoment of renewable energy and more efficient technology.
- 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.

2. National GHG and Role of GHG from Energy

- Status of Indonesia's GHG emission (including AFOLU) :
  - 2000 is 1.38 GTon CO2eq, and
  - 2005 1.99 GTon CO2-eq.
- Main sources: LUCF-*peat fire* (56-60%), energy (20%), waste (8-11%), agriculture (5%), industrial process (2-3%).
- GHG Projection:
  - emissions: 2.61 GT CO2eq (2020) and 3.1 GT COeq (2025)
  - removal: 0.75 GTons CO2eq (2020) and 0.83 GT CO2eq (2025)
  - net GHG 1.86 GTCO2eq (2020) and 2.25 GTCO2eq (2025)
- Energy utilization generates 0.418 GTCO2eq (2010): power (34.4%), industry (30.7%), **transport (24.5%)**, household (5.6%), commercial (1%), and ACM (3.7%).

Notes:

Energy utilization in industry is to generate electricity (captive) and steam/heat;
ACM = agriculture, construction, and mining

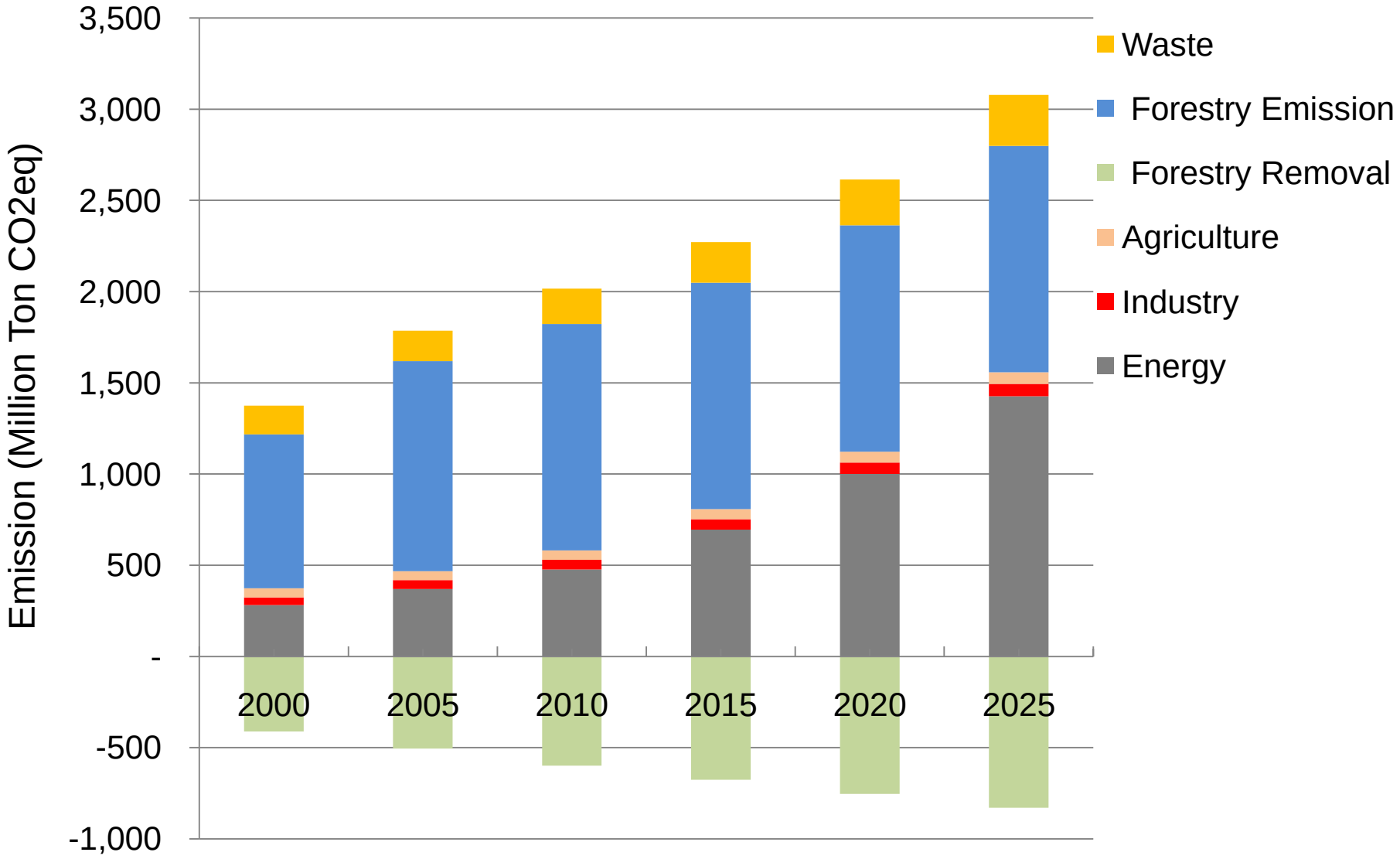
National GHG Emissions Inventory (NGHGI)

1000-Tons CO2eq

Sector	2000	2001	2002	2003	2004	2005	Annual Growth
Energy	280,938	306,774	327,911	333,950	372,123	369,800	5.7 %
Industry	42,814	49,810	43,716	46,118	47,971	48,733	2.6 %
Agriculture	75,420	77,501	77,030	79,829	77,863	80,179	1.1 %
Waste	157,328	160,818	162,800	164,074	165,799	166,831	1.2 %
LUCF	649,254	560,546	1,287,495	345,489	617,423	674,828	Fluctuated
Peat Fire	172,000	194,000	678,000	246,000	440,000	451,000	Fluctuated
Total with LUCF	1,377,753	1,349,449	2,576,952	1,215,460	1,721,179	1,991,371	Fluctuated
Total w/o LUCF	556,499	594,903	611,457	623,971	663,756	665,544	3.2 %

Source: Indonesia Second National Communication, 2009

GHG Emission and Removal Projection



Source: Indonesia Second National Communication, 2009

3. Role of Fossil Fuels in Indonesia Energy Supply Mix

- GOI has relalized the importance of reducing imported oil dependence → main focus of energy sector is “supply security“
- To full fill energy demand, Indonesia still relies on fossil energy. *New-renewable* is still low (4.5% or 44.55 mmboe in 2008).
- Presidential Decree no.5/2006, in blue print of national energy management, has targeted that in 2025 share of energy mix:
  - n*ew-renewable* energi will increase to 17%
  - oil will decrease from 52 % to 20%
  - natural gas will increase 28 % to 30%
  - coal will increase from 15 % to 33%.
- New–renewable energy target is bio-fuel 5%, geothermal 5% nuclear and other energy is 5%, and liquified coal is 2%.

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
Coal Bed Methane	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

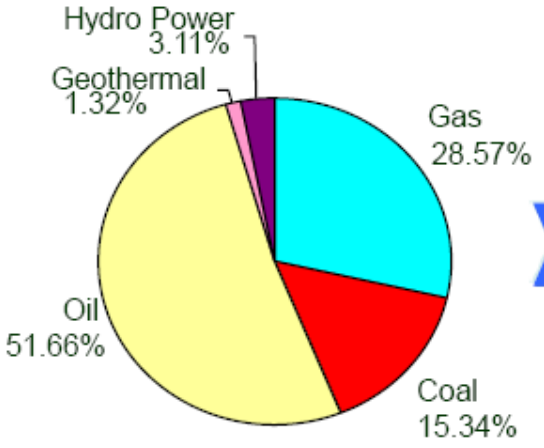
Source: Data and Information Center, MEMR, 2009

Figure 1

TARGET OF ENERGY MIX

(Presidential Regulation No. 5 of 2006)

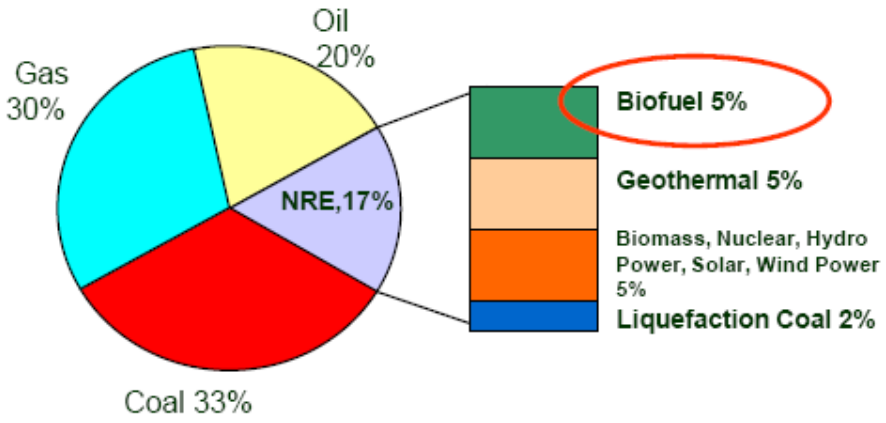
Primary Energy Mix 2006



Energy Elasticity = 1,8

NON FOSSIL ENERGY < 5%

Energy Mix 2025

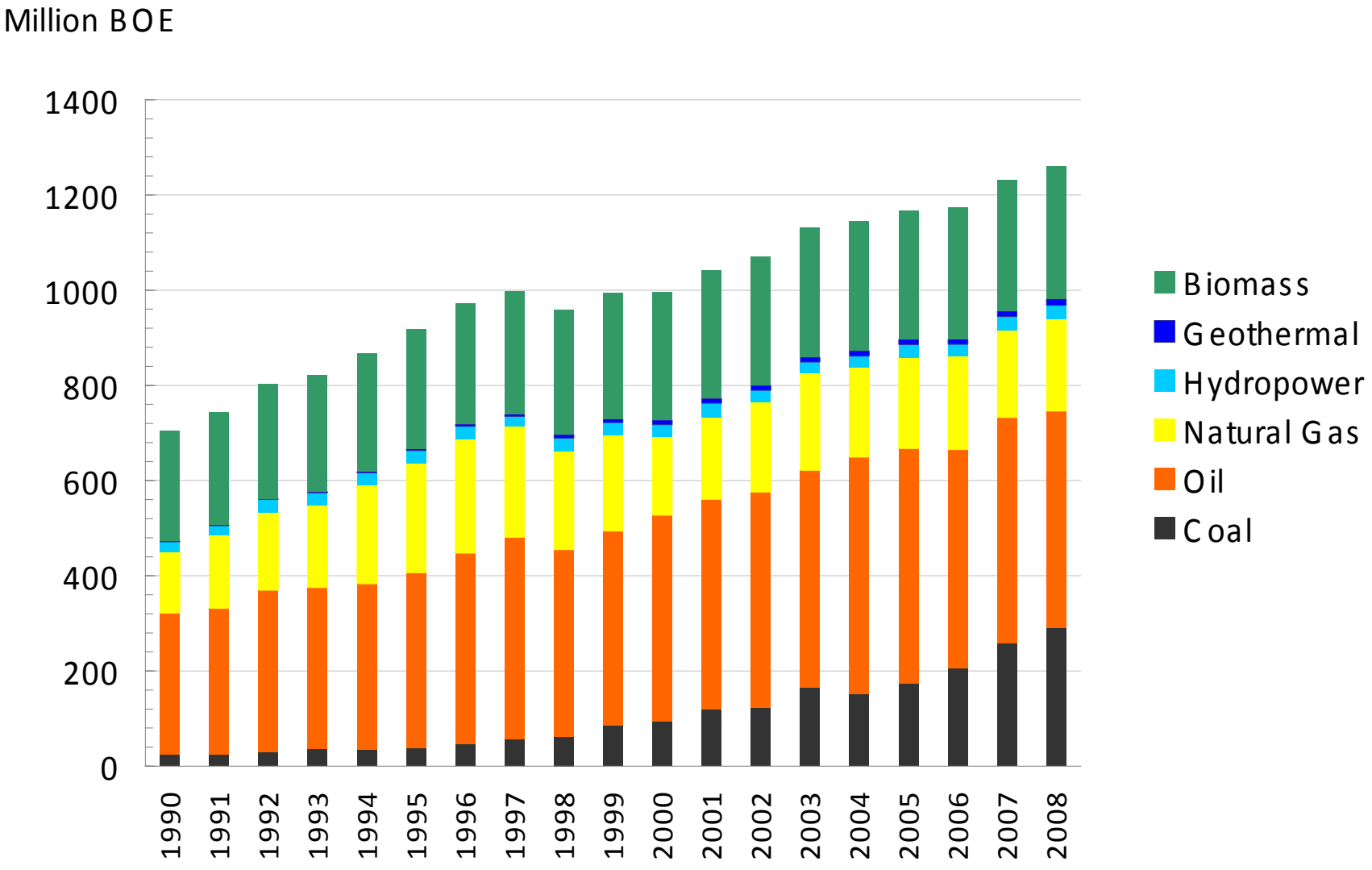


Energy Elasticity < 1

NON FOSSIL ENERGY
New & Renewable Energy : 17 %

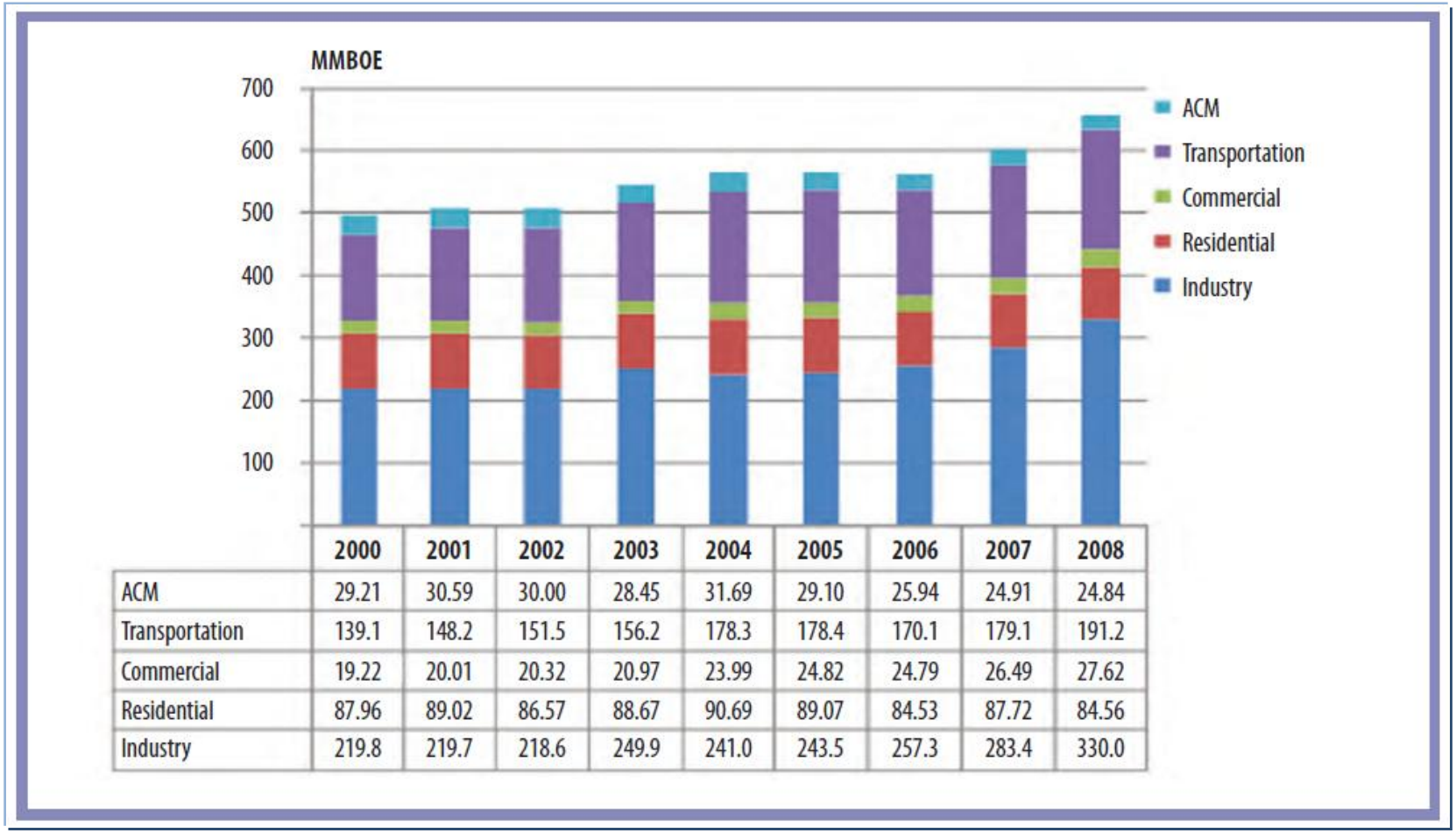
Move away from oil

Primary energy supply



Note: Growth : 3.3% per year; Biomass is used in rural household

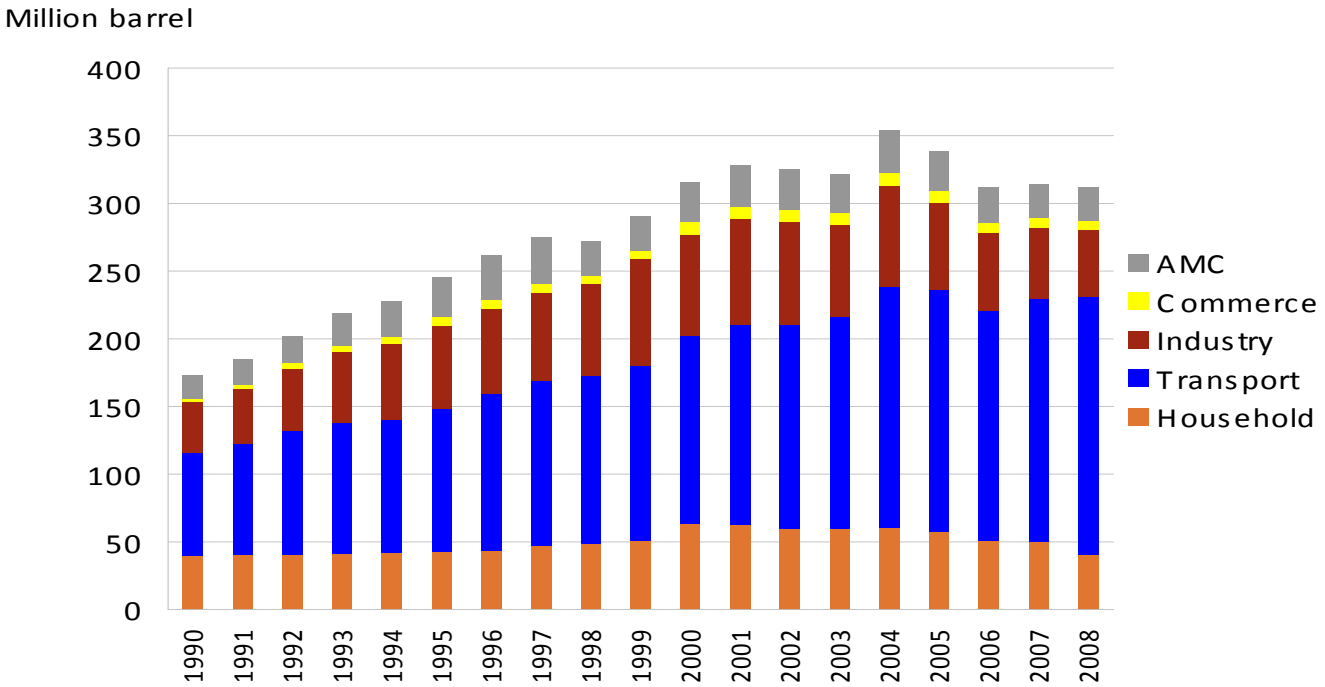
4. Energy Utilization in Transportation



	2000	2001	2002	2003	2004	2005	2006	2007	2008
ACM	29.21	30.59	30.00	28.45	31.69	29.10	25.94	24.91	24.84
Transportation	139.1	148.2	151.5	156.2	178.3	178.4	170.1	179.1	191.2
Commercial	19.22	20.01	20.32	20.97	23.99	24.82	24.79	26.49	27.62
Residential	87.96	89.02	86.57	88.67	90.69	89.07	84.53	87.72	84.56
Industry	219.8	219.7	218.6	249.9	241.0	243.5	257.3	283.4	330.0

Final energy consumption in Indonesia, 2000 – 2007 (MEMR, 2009)

Domestic energy consumption by sector is dominated by industry followed by transportation and residential.



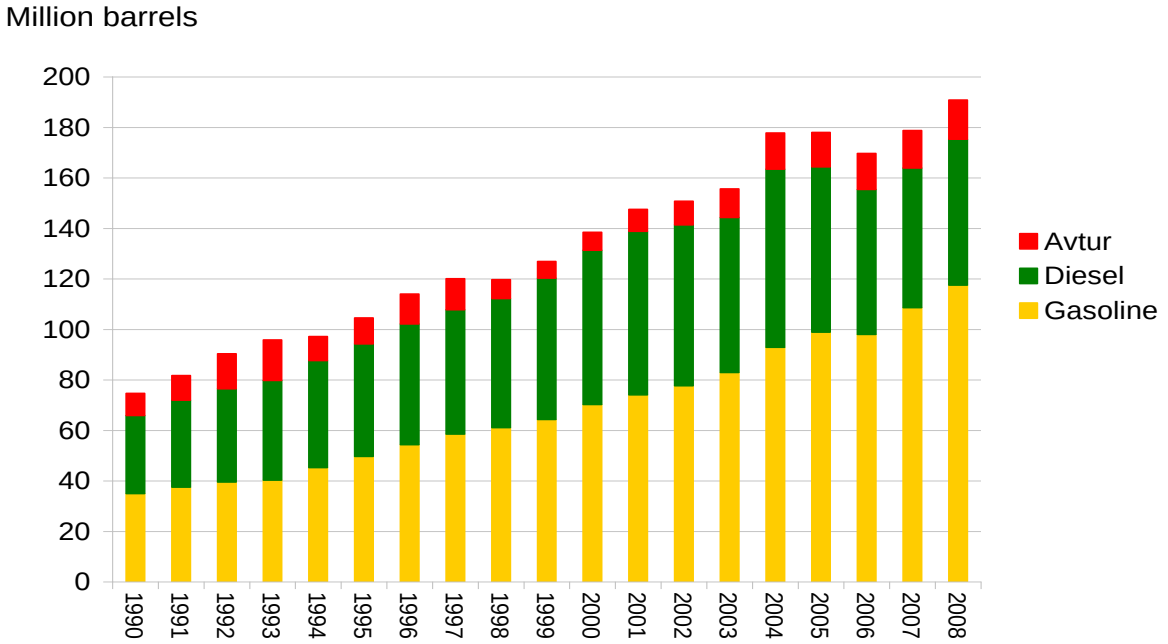
Oil Fuels Consumption

Notes:

- *Mostly used in transport*
- *Household demand will decrease significantly, substituted by LPG*

Transportation fuels

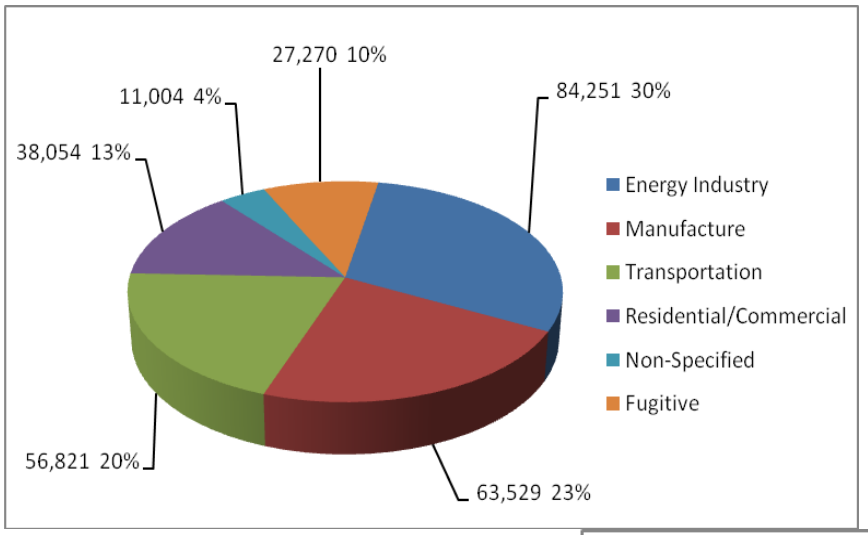
Note: Other transport fuels (gas, electricity and other liquid fuels) are much smaller



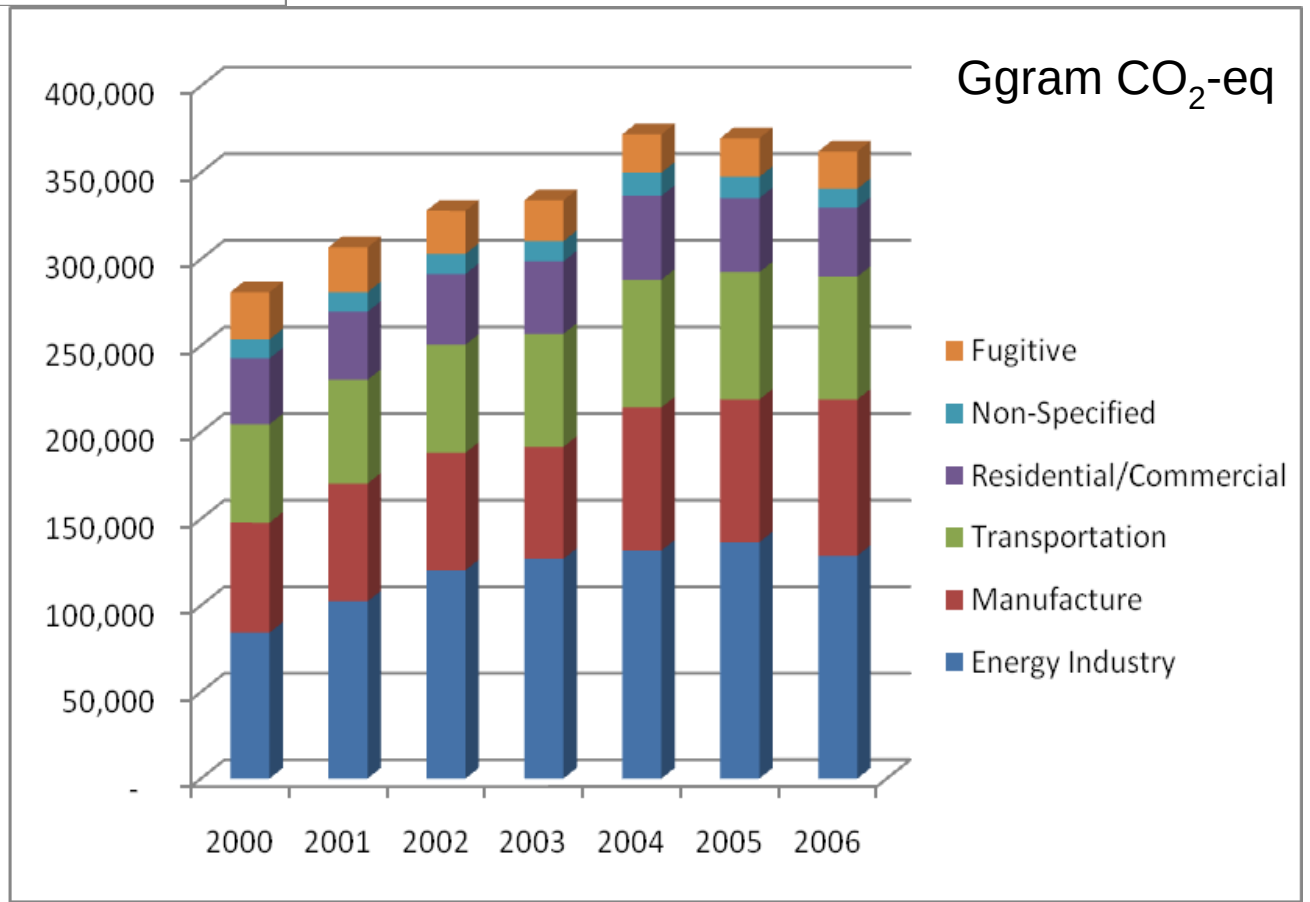
5. GHG emission from Transportation in the SNC

Summary of national GHG emissions in 2000

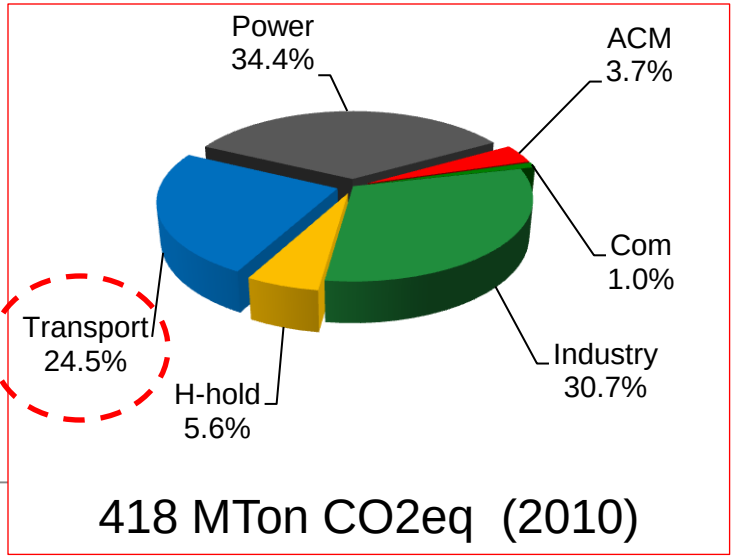
No	Source and sink Categories	CO_2 removal (Gg)	CO_2 emission (Gg)	CH_4 (Gg)	N_2O (Gg)	CO (Gg)	NO_X (Gg)	NMVOC (Gg)	SO_X (Gg)
Total National Emission and Removals		**-296,794.38**	**1,352,471.68**	**11,256.59**	**91.42**	**2,335.71**	**85.66**	**NE**	**NE**
1. Energy (without Biomass)			**247,522.25**	**1,436.89**	**10.45**	**NE**	**NE**	**NE**	**NE**
A	**Fuel Combustion Activity**		**240,876.89**	**455.51**	**10.40**	**NE**	**NE**	**NE**	**NE**
1	Energy production (electricity, heat, oil & gas refining)		84,011.42	1.89	0.64	NE	NE	NE	NE
2	Manufacturing Industries and Construction		63,032.48	7.39	1.10	NE	NE	NE	NE
3	Transportation		55,689.23	14.32	2.68	NE	NE	NE	NE
4	Commercial/Intstitutional		3,320.84	2.14	0.03	NE	NE	NE	NE
5	Residential		23,878.82	428.26	5.86	NE	NE	NE	NE
6	Non Specified		10,944.09	1.50	0.09	NE	NE	NE	NE
B.	**Fugitive Emissions**		**6,645.36**	**981.38**	**0.05**	**NE**	**NE**	**NE**	**NE**
1	Solid Fuels			17.22		NE	NE	NE	NE
2	Oil and Natural Gas		6,645.36	964.17	0.05	NE	NE	NE	NE

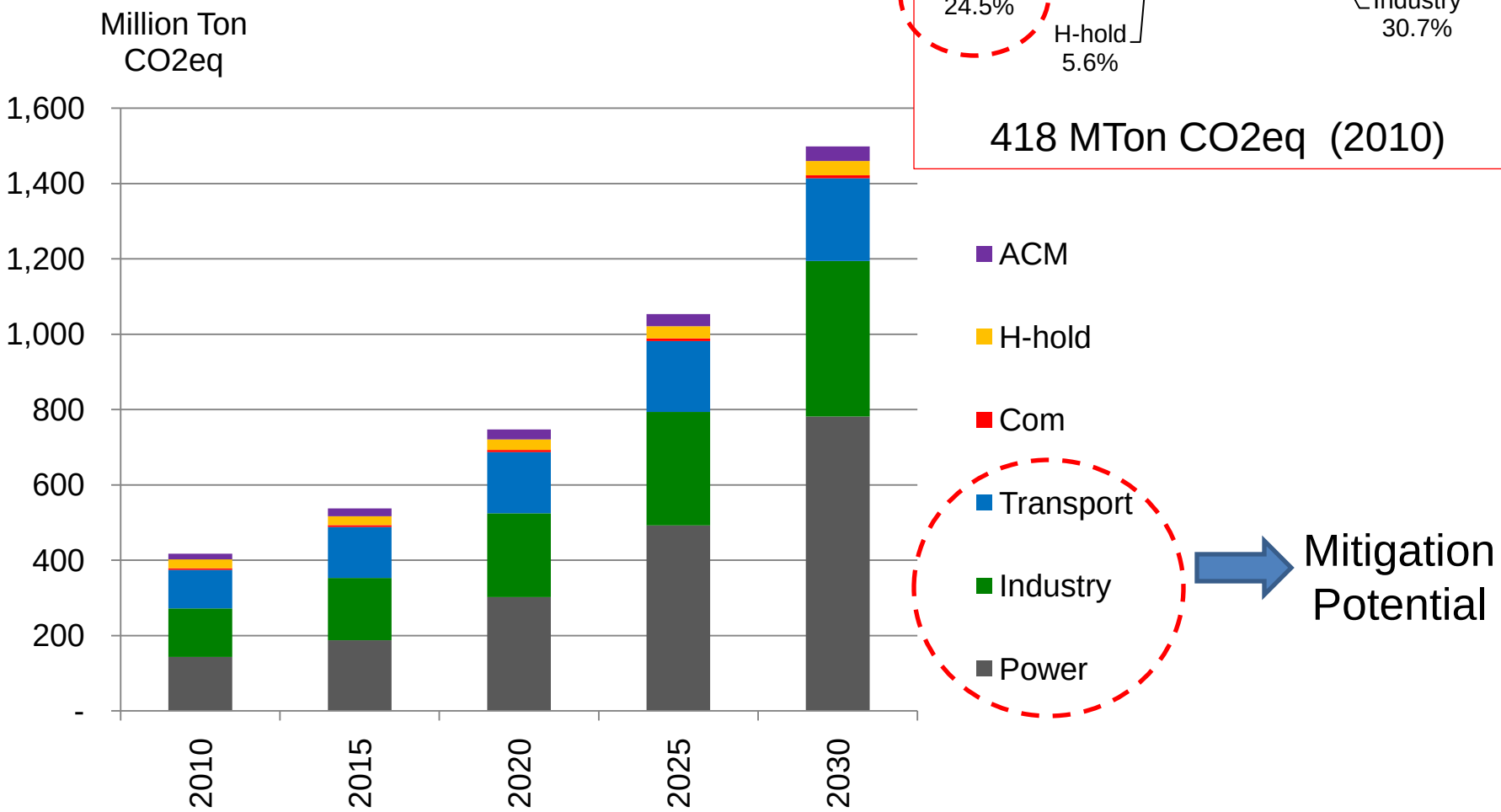


GHG emission of key sources of energy sector in 2000



Main sources of GHG from energy in Indonesia and Its Projection

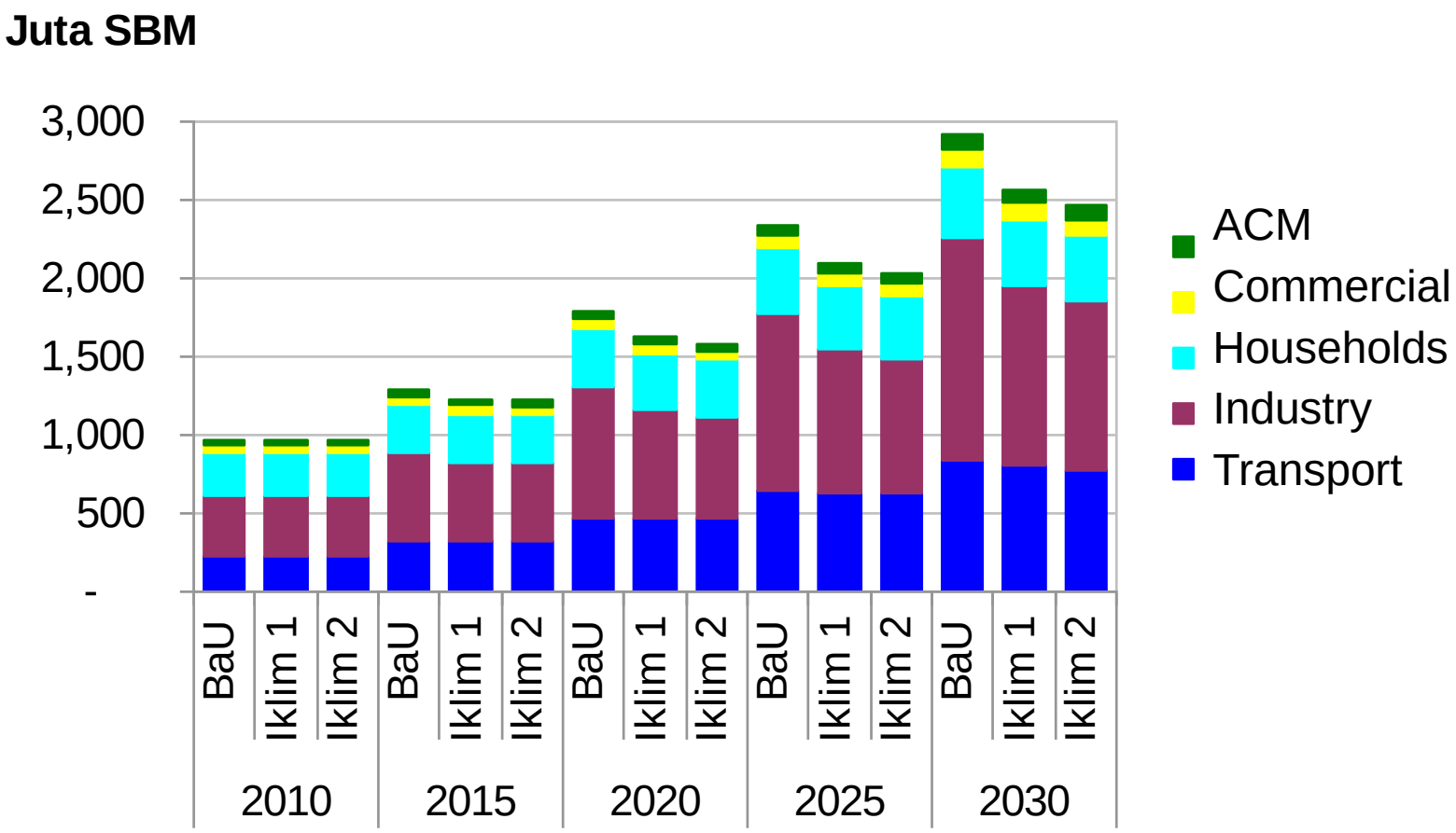




6. Mitigation Strategy and Policy in Transportation

Final Energy Demand Projection (by Sector)

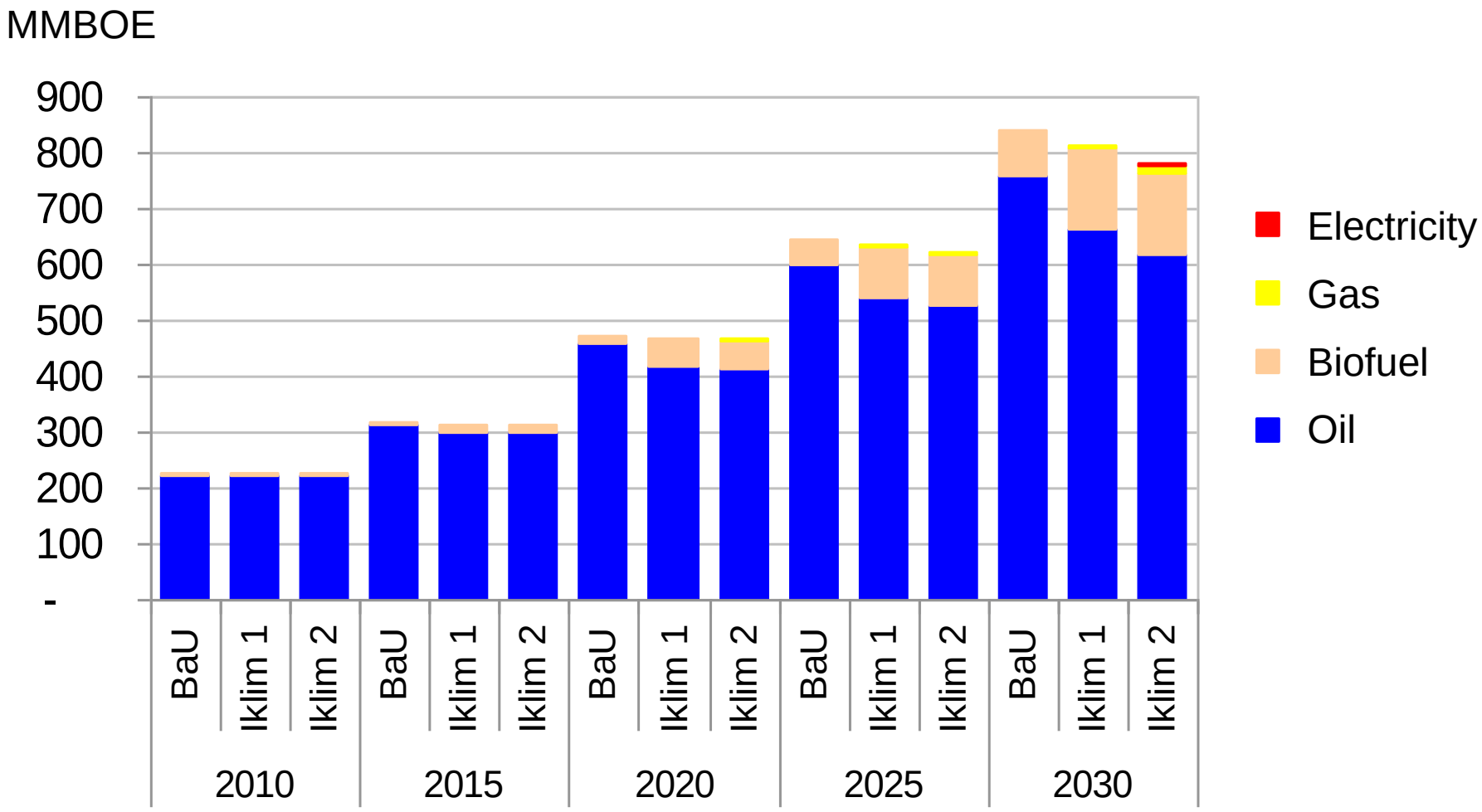
[BaU, Iklim 1 (energy efficiency), Iklim 2 (*clean/low GHG emitting Technology*)]



BAU Growth

Transport	Industri	R.Tangga	Komersial	PKP	Total
6.8%	6.7%	2.4%	5.1%	4.0%	5.7%

Final Energy Demand of Transportation



Key Policies and Programs Affecting the Mitigation of GHG Emissions

National Policy on Climate Change Mitigation

- Indonesian Regulation to the Climate Change Mitigation
  a. Act No. 32 Year 2009: Act of Environmental Management & Protection
     - Art. 57 ➔ Atmospheric Function Preservation, consist of climate change mitigation & adaptation
     - Art. 63 ➔ Government has task of GHGs Inventory
  b. Act No. 6 Year 1994: Act of UNFCCC Ratification
  c. Act No. 17 Year 2004: Act of Kyoto Protocol Ratification
- National Action Plan on Addressing Climate Change (RANPI)

Climate Change Mitigation Policy in Energy Sector

- There are energy policies that affect GHG mitigation positively:
  a. gradual subsidy removal (become more energy efficient)
  b. promotion the use and development of renewable energy,
  c. encouragement of public adoption of clean and efficient energy
- In National Energy Plan, new-renewable energy will be promoted but targetted increase of its share in energy supply mix is based on supply security & resource availability considerations and it is not within GHGs reduction and climate change mitigation framework.

Related Energy Regulation Affected to Climate Change Mitigation

1. **Law No. 30/2007 on Energy**
   - *Provision and utilization of new & renewable energy should be increased by the government and local government in accordance to their authorities.*
   - *Provision and utilization of new renewable energy can get incentives from government/ local government for certain period until it reaches economical development stage*

2. **Minister of Finance Regulation No. 21/PMK.011/2010 and 24/PMK.011/2010 on Renewable Energy Incentives**
   - *Tax facility for renewable energy in the form of Income Tax, VAT, Import Duty and Tax Holiday, Tax Exemption etc.*

REFF-Burn : Reducing Emissions from Fossil Fuel Burning

1. Pre-Fossil Combustion, prevent large amount of fossil energy consumption
   - *Efficient Energy Technology (demand side)*
   - *Renewable Energy Technology*
   - *Fossil Pre-Treatment*
2. *During Fossil Combustion, prevent GHGs emitting*
   - *Efficient Technology (supply side)*
   - *Low Carbon Electricity Generation*
   - *Clean Fuel Technology*
3. *Post Fossil Combustion, tackling GHGs emitted*
   - *Carbon Capture and Storage (CCS)*
   - *Algae*
   - *Utilization of CO_2*

Available Technology to Reduce GHGs from the Utiization of Energy in Transportation Sector

Technologies and policies are two important components of the GHGs reduction in transport sector.

- fuel efficiency improvement on existing vehicles/technologies (vehicle size matching, operator behavior, emission control (catalitic converter, routine maintenance, etc),
- alternative fuels (NGV, CNG/LPG, biofuel, H2, fuel cell, used frying-oil),
- shift to low emission travel modes and reduce travel: alternative transport mode (switched transport demand/ communication, MRT, BRT)
- Introduce new vehicle concepts having lower/no emissions

Thank you

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