ACTIVITIES IN INDONESIA

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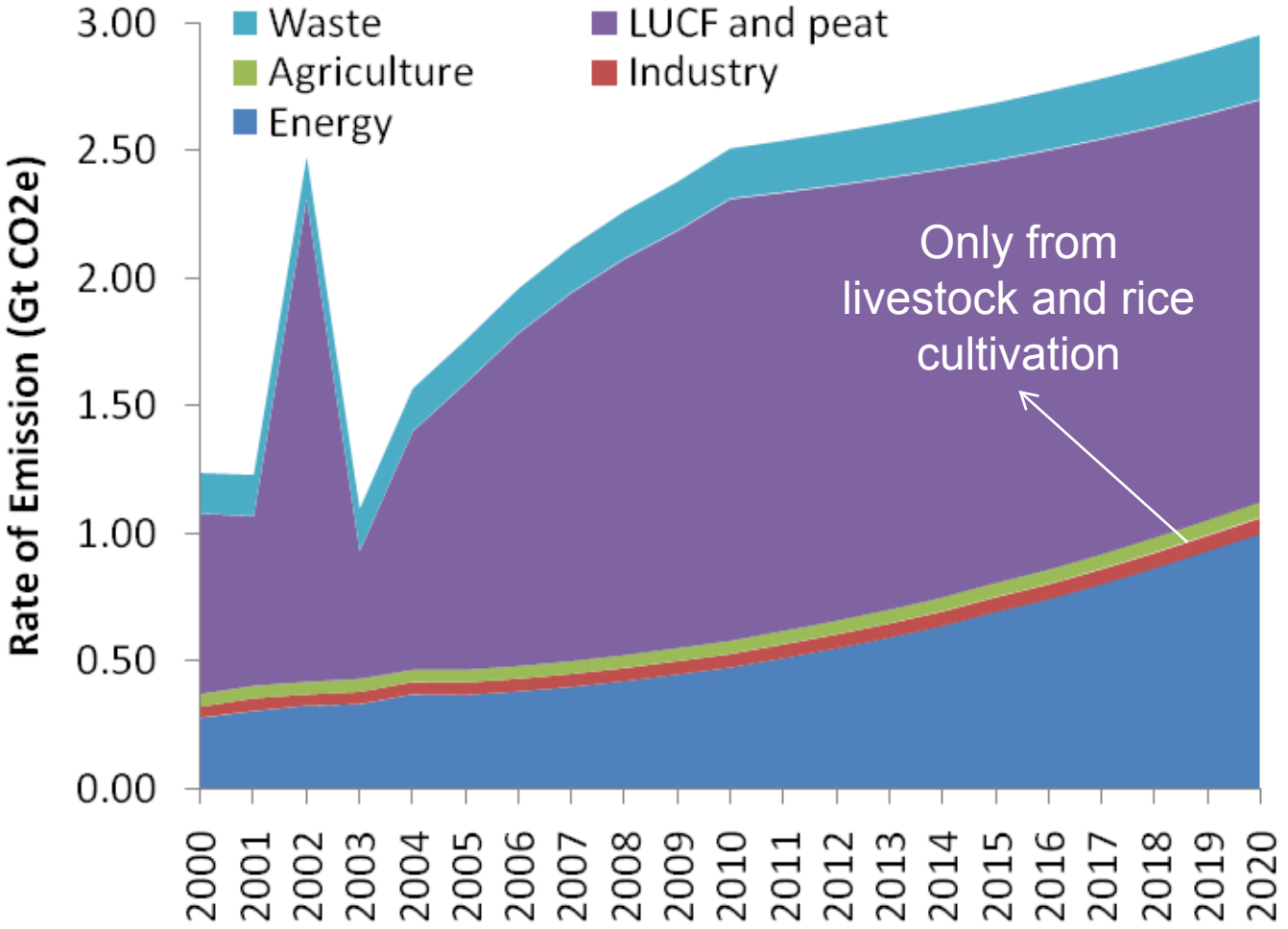
Indonesia's GHG Emissions (2000-2005)

Ton CO2-eq

Sector	2000	2001	2002	2003	2004	2005	Growth ,% per yr
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[1]	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: SNC (2010)

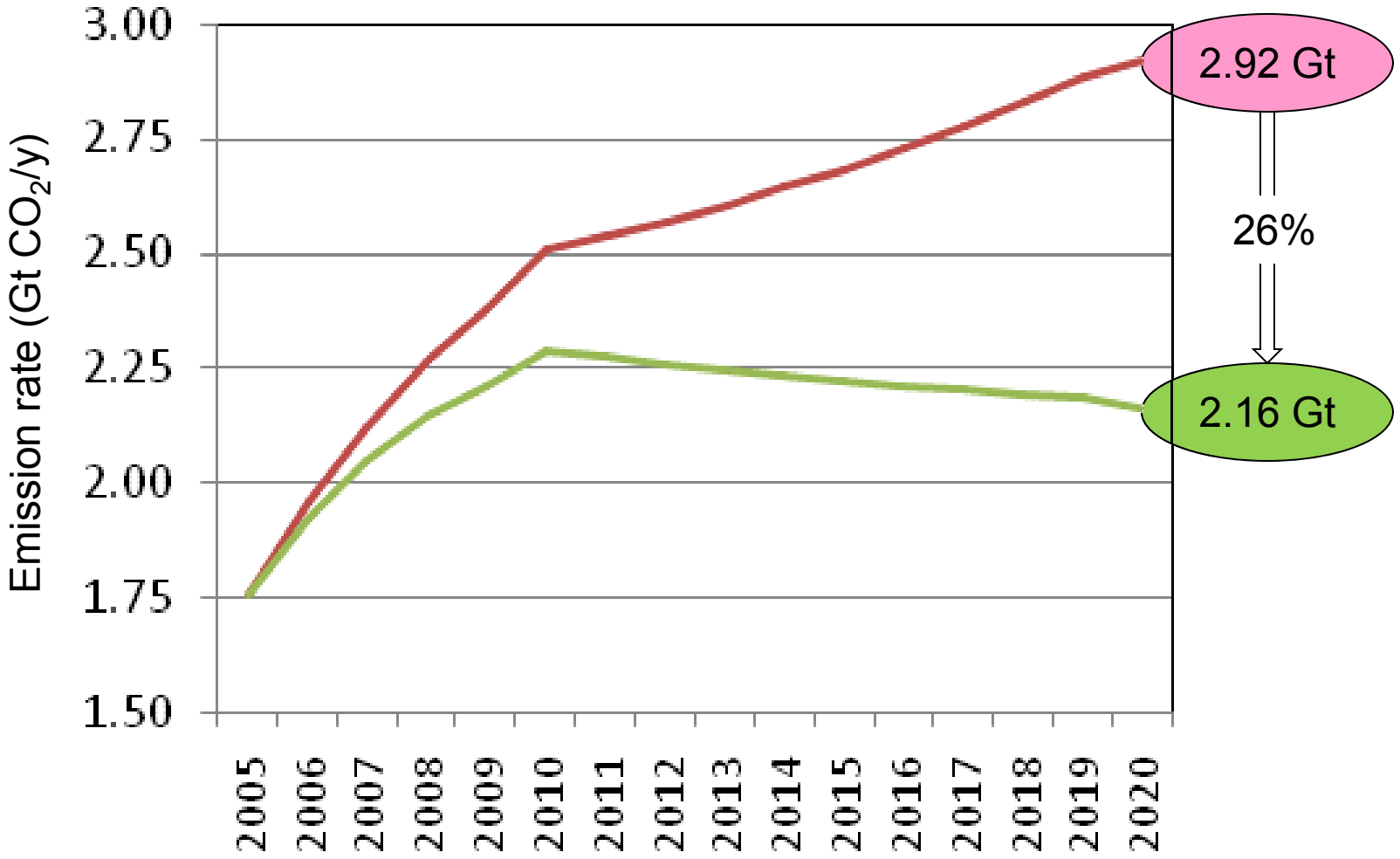
INTRODUCTION: Historical Emission & BAU Projection



Source: SNC (2010)

Indonesian emission under BAU by 2020 will increase to 1.95 Gt CO2e. Land0base emission is still dominant, however, contribution of energy sector is expected to increase compare to current condition

BAU Projection has been adopted by GoI in defining the 26% and 41% ERT. By 2020, with unilateral actions the rate of emission is targeted to be 26% of the BAU emission rate and the effort will start from 2011 to meet the ERT

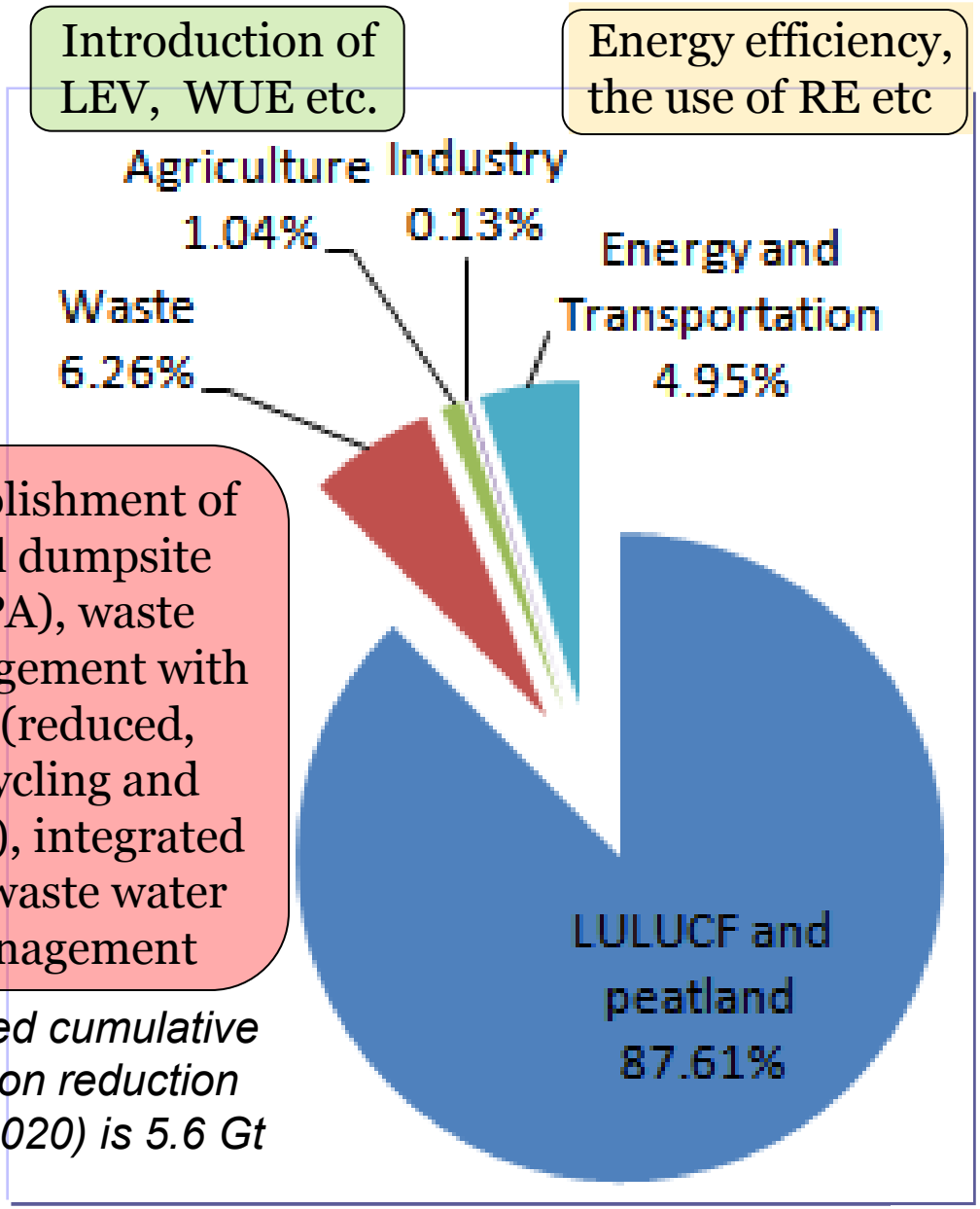


Source: Sectoral Roadmap (Bappenas, 2010)

Sectors contribution to the 26% ERT

Introduction of LEV, WUE etc.

Energy efficiency, the use of RE etc



Use of biofuel, engine with improved energy efficiency, improve public transportation and road, *demand side management, energy* efficiency, development of renewable energy

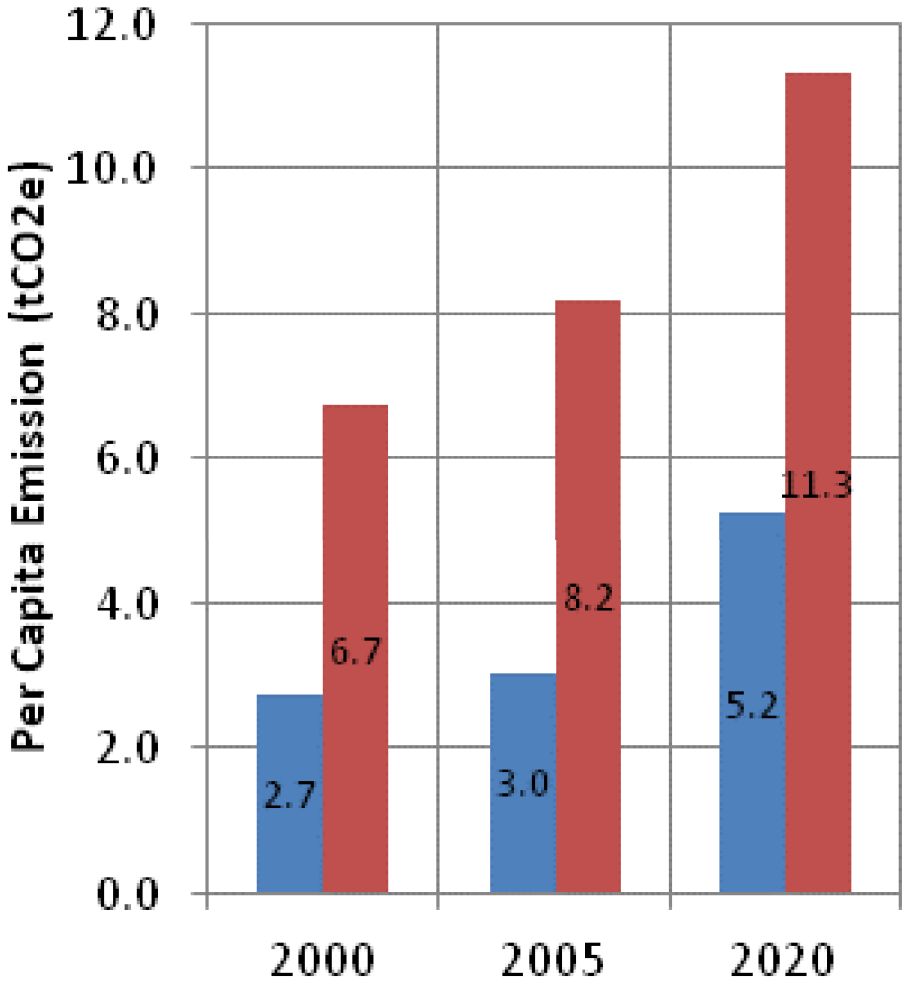
Establishment of final dumpsite (TPA), waste management with 3R (reduced, recycling and reuse), integrated city waste water management

Peat/forest fire management, improving water management on peat, land and forest rehabilitations, combating illegal logging, reducing deforestation and community empowerment

Expected cumulative emission reduction (2005-2020) is 5.6 Gt

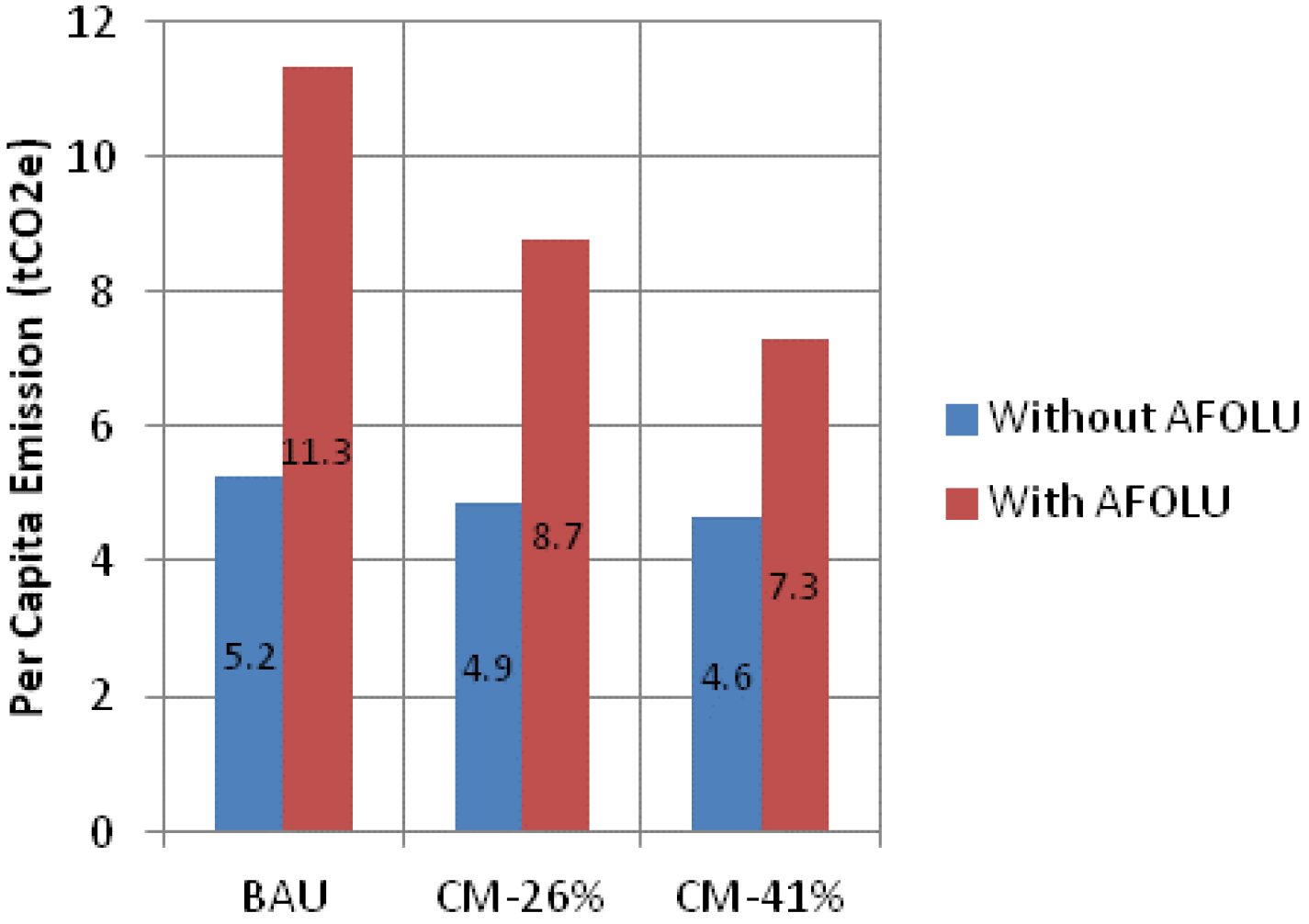
Forestry: 53.8%
~ 1.56 Gt CO_{2e}

Per Capita Emission under BAU



Based on End Use Model under BAU by 2050, per capita emission from energy 13.3 tCO2 and with CM will go down to 6.9 tCO2

Per Capita Emission in 2020 under BAU and Mitigation Scenarios



Mitigation Studies in Indonesia

- There are a number of GHG mitigation studies in Indonesia
  - IPB: Focus on AFOLU, both technical aspects and Macro economic (Biofuel) – National and Local Level
  - ITB: Energy - National
  - DNPI: Energy and AFOLU – National and Local
  - UNPAD/UI: Macro economic aspect of mitigations– National
- All studies were independence, and no studies that integrated all sectors both emission and economic aspects of it into one model

Studies on AFOLU & Energy

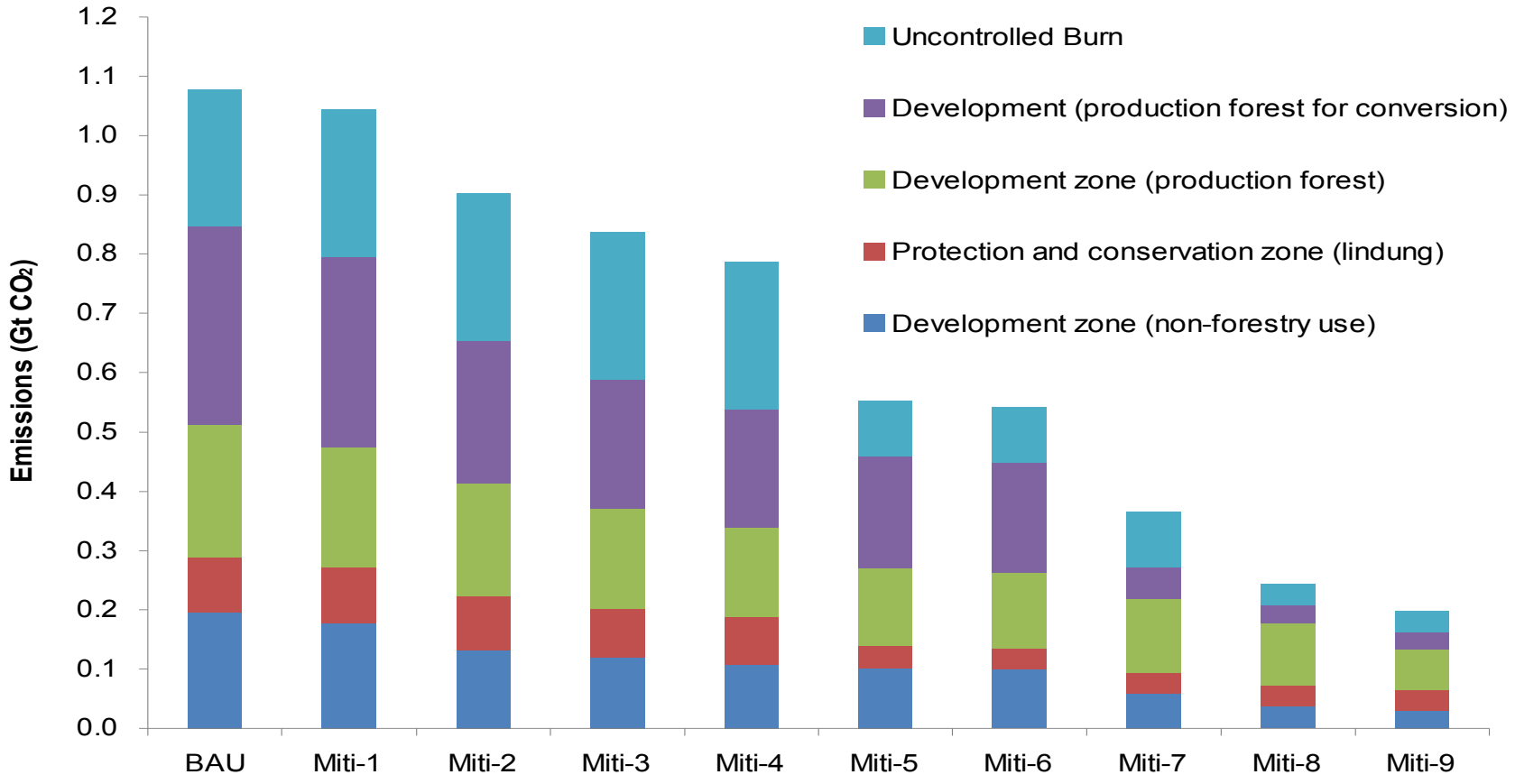
- National and Local Strategies on GHG Mitigation for Peatland (BAPPENAS, 2010 with IPB)
- Land-Based LCD Strategies (DNPI)
- Reducing agricultural expansion into forests in Indonesia: Central Kalimantan Case IPB, 2012)
- NIES model developed by Hasegawa to assess mitigation potential for AFOLU under different Abatement Cost scenarios
- ITB and NIESS is still continuing developing the energy model

1. Scenarios for Reducing Emission from Peat Land (a Multi Disciplinary Study Coordinated by BAPPENAS)

- ***BAU**: All allocated peat land (APL+HPK) will be used irrespective of depth*
- ***Abatement Policy 1: Legal compliance and best management practices in existing land under production***
  - ***Miti-1***: Future legal compliance (only peat with depth of less than 3 m can be used/converted)
  - ***Miti-2***: As Miti 1 + no burning
  - ***Miti-3***: As Miti 2 + improve water management
  - ***Miti-4***: As Miti 3 + ameliorant application

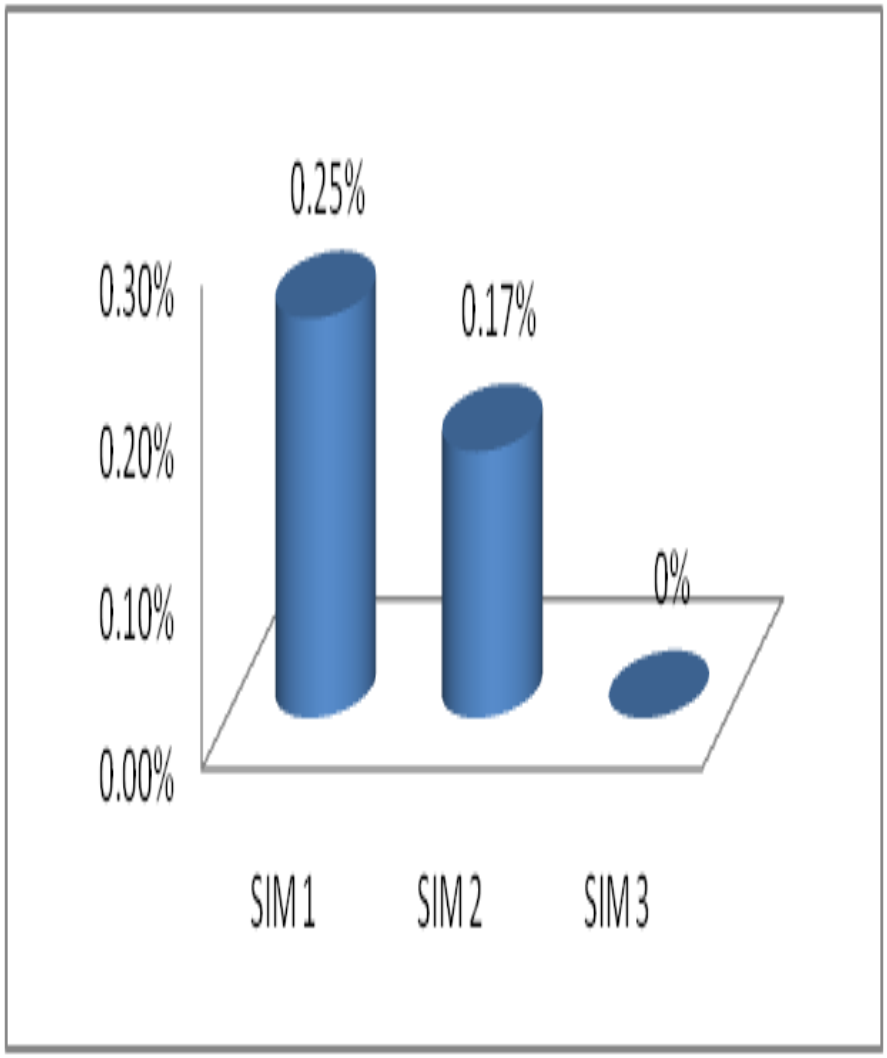
- ***Abatement Policy 2: Peat land rehabilitation and prevention of uncontrolled fires***
  - ***Miti-5***: As Miti-4 + Restore secondary forests and rehabilitate all grasslands
  - ***Miti-6***: As Miti-5 + reduce uncontrolled fire
- ***Abatement Policy 3: Revision of land allocation, forest conservation and land swaps***
  - ***Miti-7***: As Miti 6 + conserved primary forest in APL+HPK
  - ***Miti-8***: As Miti 7 + No more permits issued for peat conversion
  - ***Miti-9***: As Miti 8 + move all unused existing licenses to mineral soils

Rate of emission under BAU and 9 mitigation scenarios



BAPPENAS, 2011

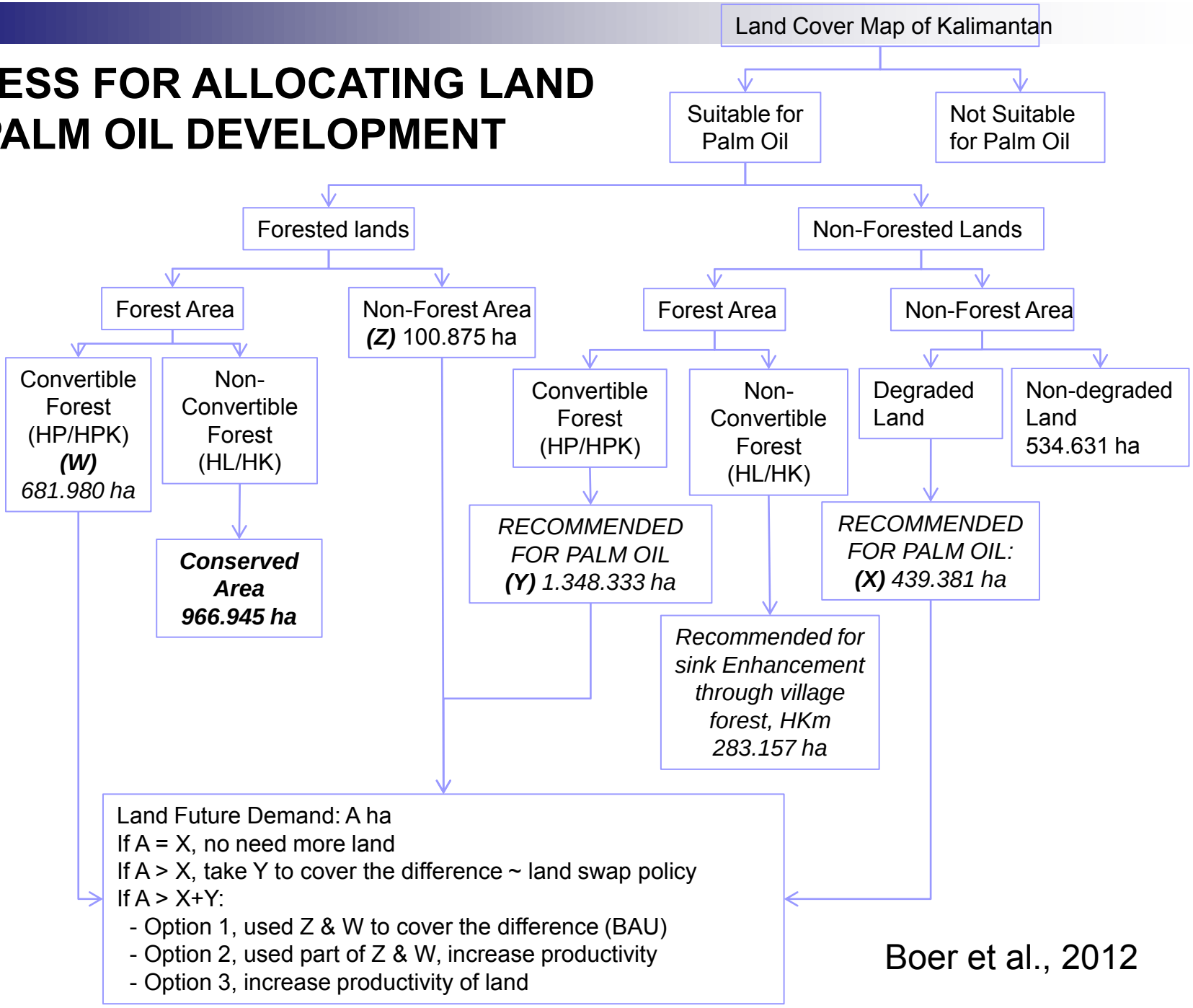
Impact of Implementation of the Mitigation Strategies on Local GDP: Bengkalis Case



- SIM 1 (BAU): It was estimated that it can push the GDP growth of Bengkalis by 0.25%.
- Mitigation 1: Limit the expansion of palm oil and rubber to peat land with depth of more than 3 m. The growth of GDP will decrease to 0.17% with economic cost of 78.5 billion IDR
- Mitigation 2: All peat land is conserved. No growth in GDP and economic cost 117.8 billion IDR

Anggraeni, 2010

PROCESS FOR ALLOCATING LAND FOR PALM OIL DEVELOPMENT



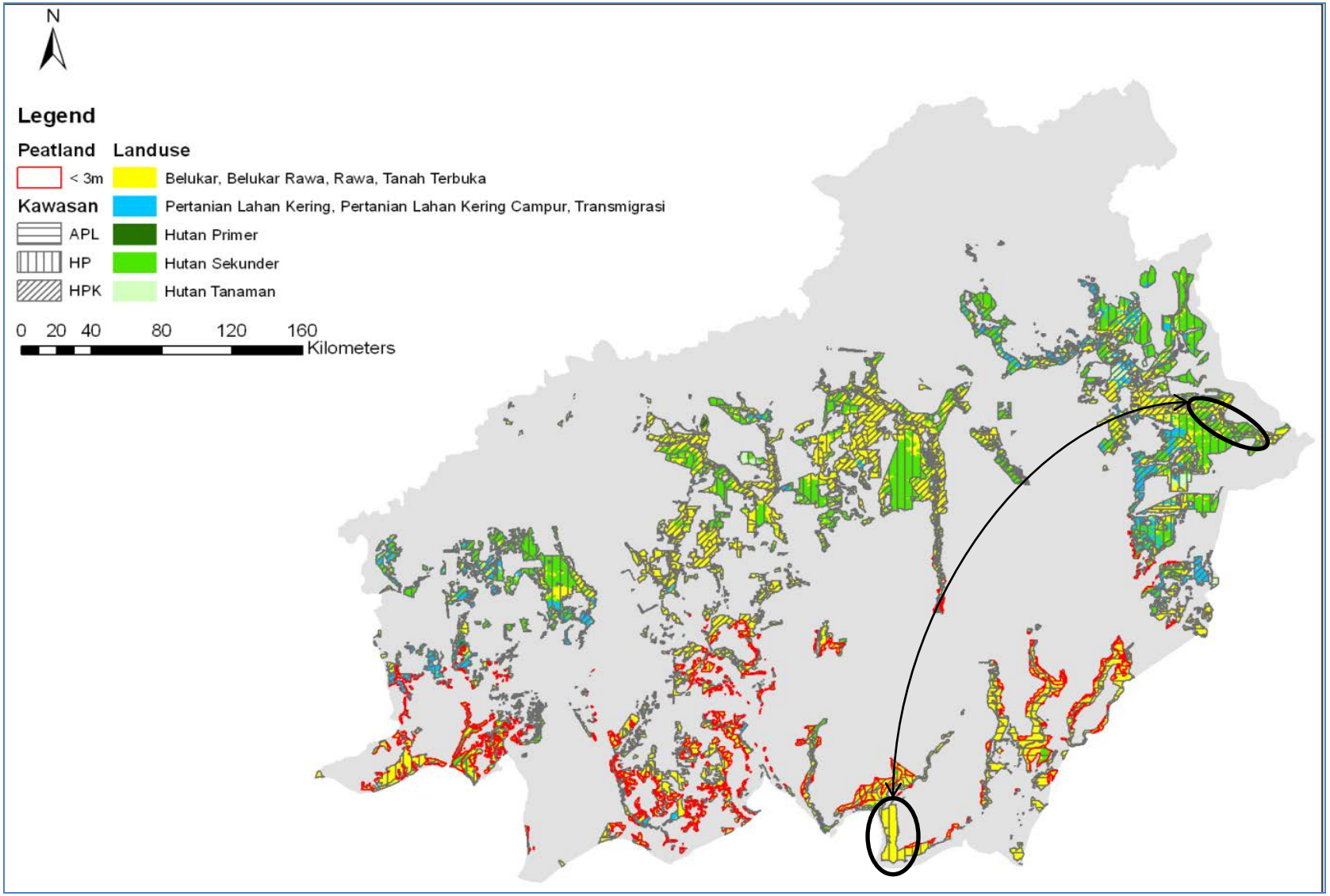
Boer et al., 2012

Preliminary Results: Scenario for Land Swap and Improved Yield

		Total suitable land	Baseline (70% of Total)	Land Swap Policy	Improved yield (IY)
APL	Forested Land	88,568	61,998	-	61,998
	Non-forested land	467,476	327,233	327,233	327,233
HPK	Forested Land	251,499	176,049	-	101,527
	Non-forested land	688,659	482,061	482,061	482,061
HP	Non-forested land	374,582	-	238,047	
TOTAL		1,870,784	1,047,341	1,047,341	972,819

Boer et al., 2012

Preliminary Results: Land swap



Preliminary Result: Benefit from Land Swap policy

Indicators	Sum
Total area of land swap (Ha)	238,047
Costs for land swap (IDR/ha)	284,377
Estimated costs for land swap (IDR)	67,694,943,727
Additional CO_2 sequestered due to moving from forested land to non-forested land (million ton)	94
CO_2 emission reduction from deforestation (million ton)	109
Total CO_2 saved (million ton)	203
Estimated price of carbon (IDR/ton CO_2)	45,000 (or 5 USD)
Estimated earnings of carbon from land swap (IDR)	9,135,000,000,000
Df 15%, 25 year	0.123
Estimated earnings of carbon from land swap (IDR) at df 15%, year-25	1,123,605,000,000

Boer et al., 2012

NIES: Framework of AFOLU model by Hasegawa

AFOLU model consists of;

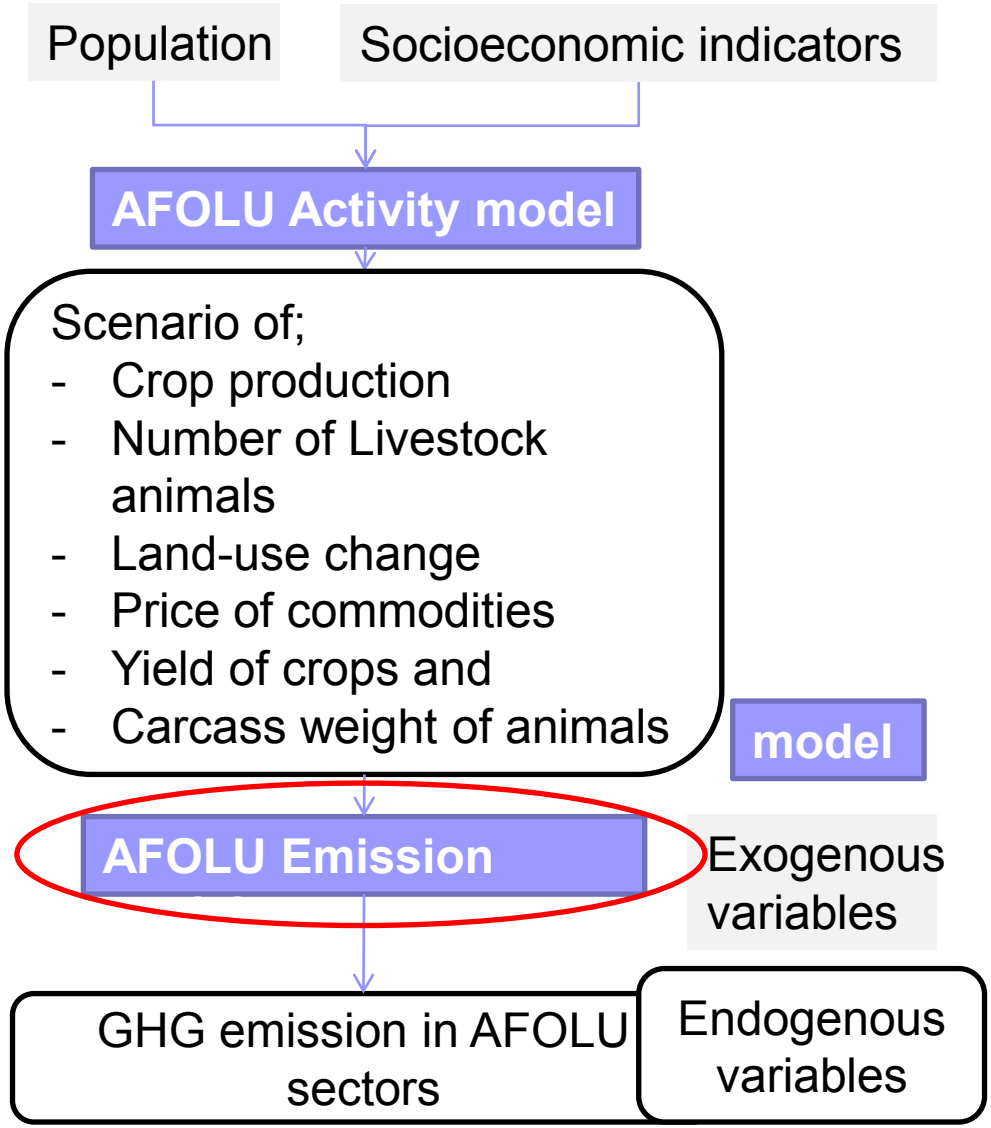
- **AFOLU Activity model**;

Top-down model to estimate amounts of human activity in AFOLU sectors based on population and socioeconomic indicators

- **AFOLU Emission model**;

Bottom-up model to estimate GHG mitigations, types/ amounts of countermeasures and mitigation cost in AFOLU

As 1st step of development of AFOLU Emission model, this ppt presents Example of model application and comparison of results to existing studies.

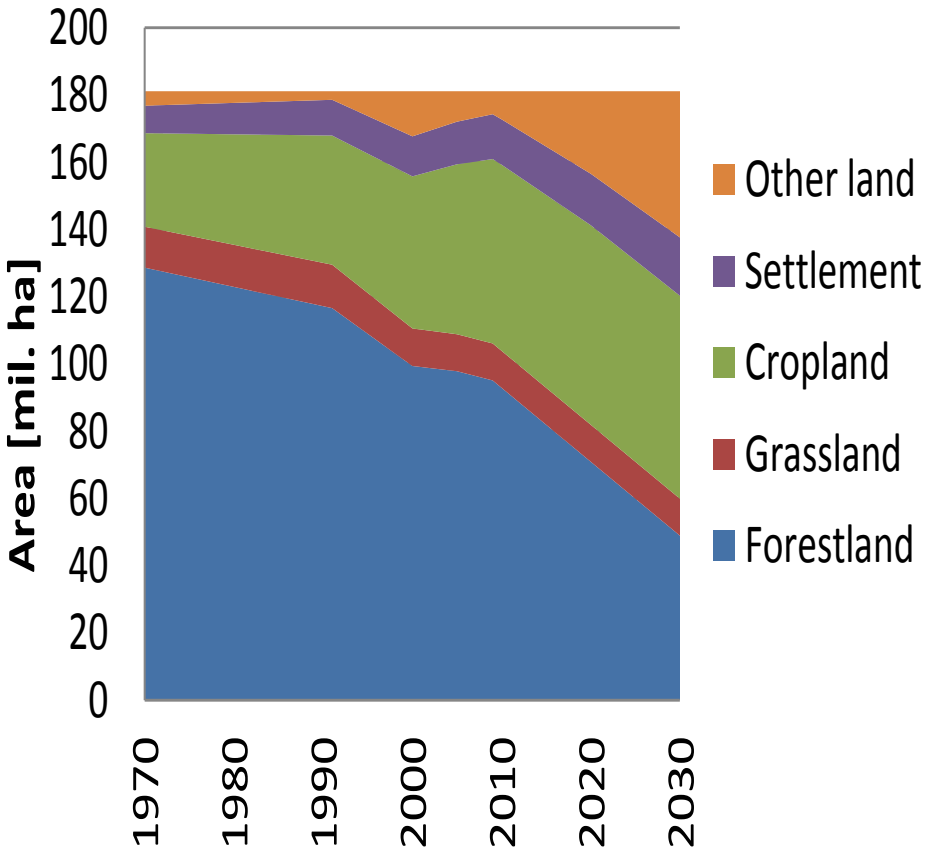


Scenario: land use and land use change

- ***Forestland*** are based on Wicke et al.(2011) for 1970 and FAOSTAT(2011) for 1990, 2000, 2005 and 2009.
- ***Cropland*** is total harvested area of crops
- A ratio of ***settlement***s to total country area: 7% (NC2)
- Other lands are from FAOSTAT(2011)

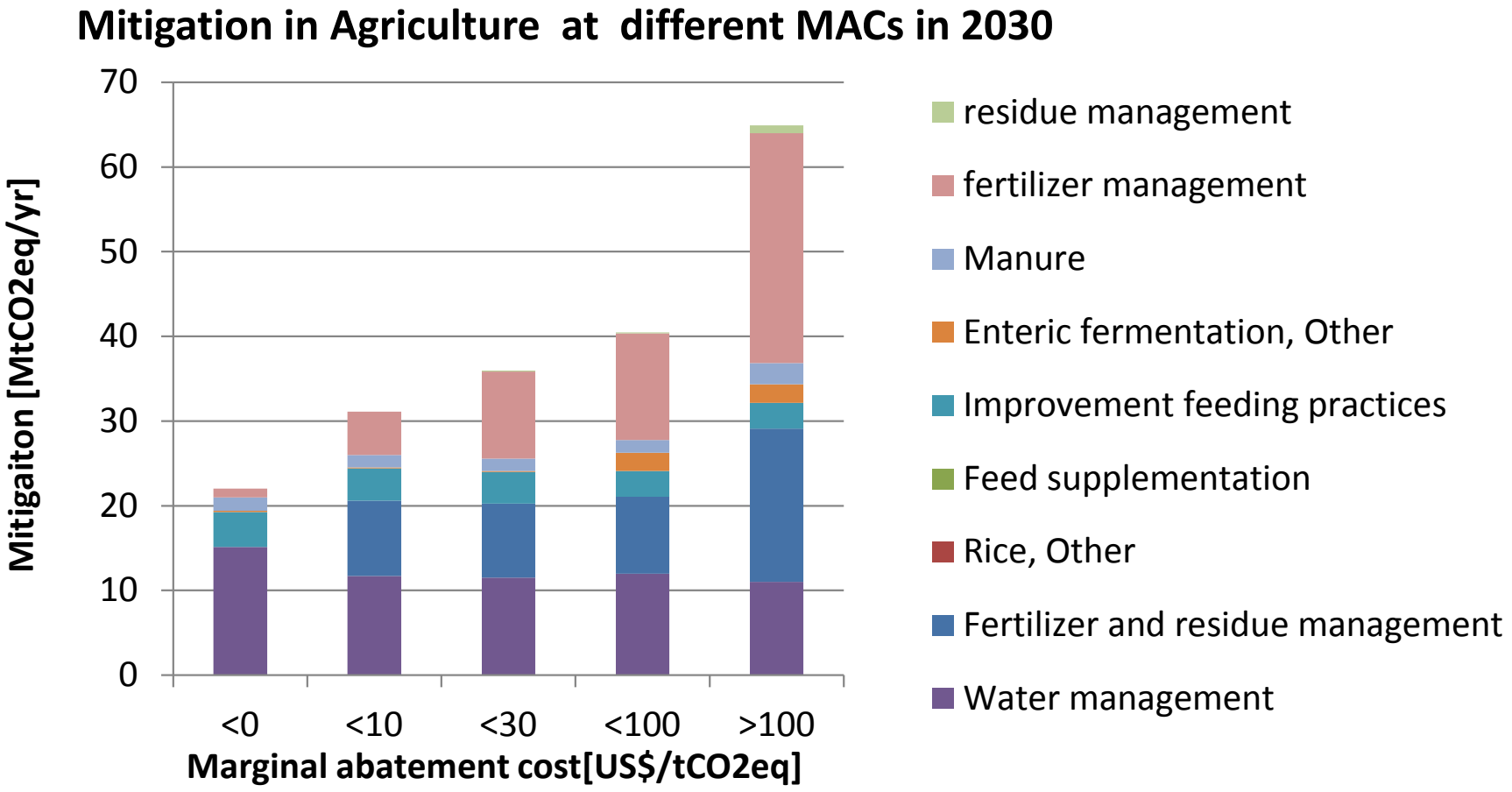
For future;

- ***Forest*** decreases at a deforestation rate 1.1 mil. ha/yr (NC2)
- ***Settlements*** is extrapolated at a growth ratio of population (UN)



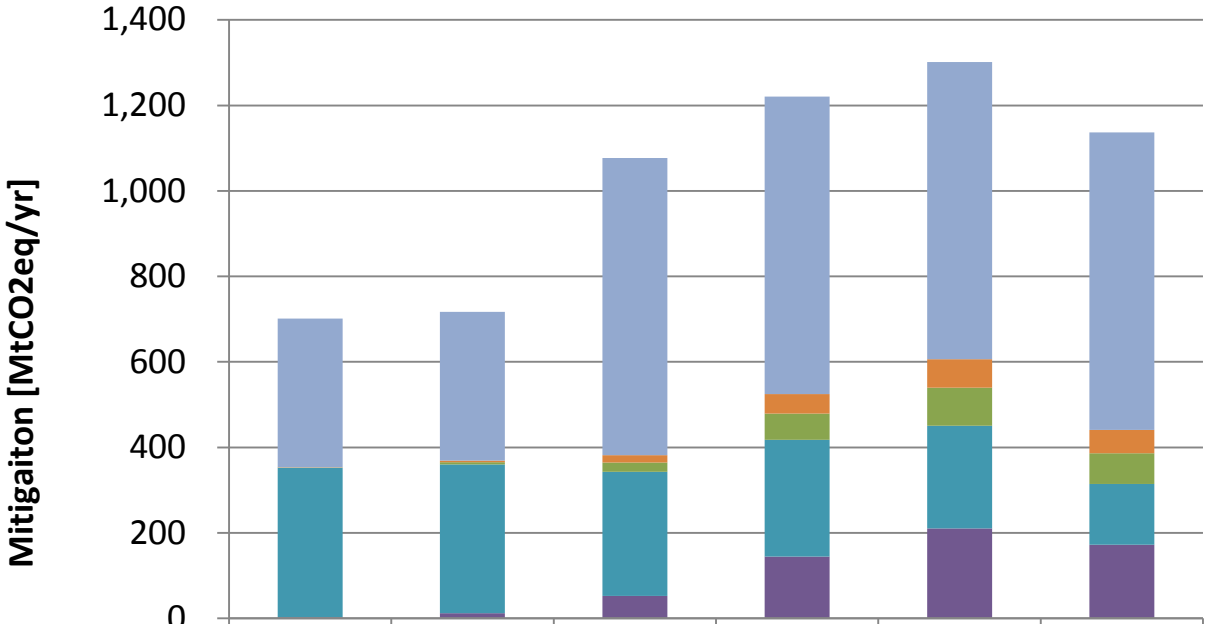
Hasegawa (NIESS, draft)

Preliminary Results: Mitigation potentials in agriculture at different MACs in 2030



Hasegawa (NIESS, draft)

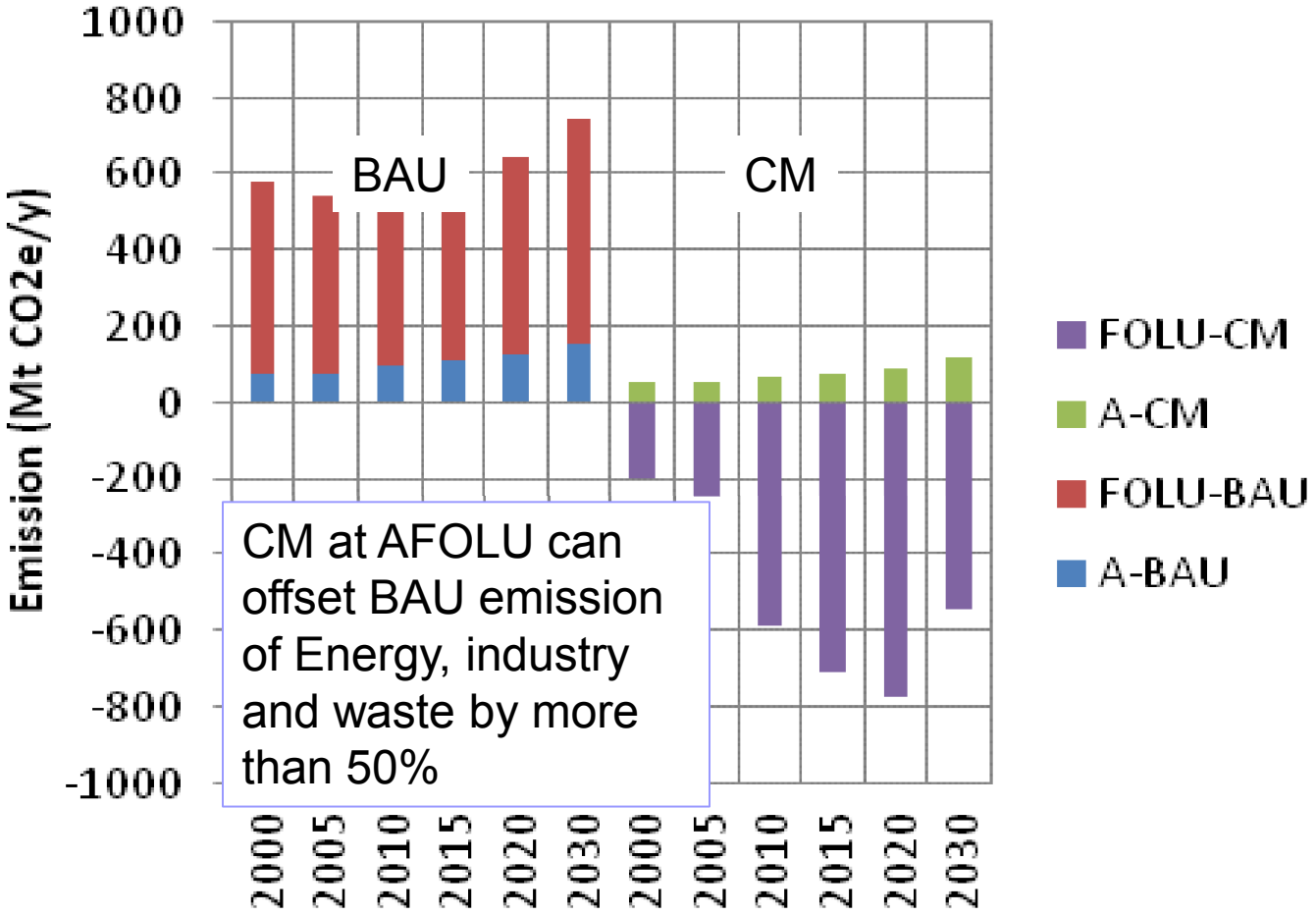
Preliminary Results: Mitigation potential at abatement cost of <30USD/tCO2eq in LULUCF



	2000	2005	2010	2015	2020	2030
Avoid deforestation	348	348	695	695	695	695
Reforestation	1	4	17	46	67	54
Afforestation	1	5	22	61	89	72
Intensive silviculture	349	347	290	273	240	142
Sustainable forest management	3	13	53	145	211	172
LULUCF total	701	717	1077	1220	1302	1136

Hasegawa (NIESS, draft)

Preliminary Results: Mitigation potential at abatement cost of <30USD/tCO2eq for AFOLU



Hasegawa (NIES, draft)

Preliminary Results: Evaluating impact of Mitigation on energy sector emission and macro economic parameters (Dynamic CGE from NIES)

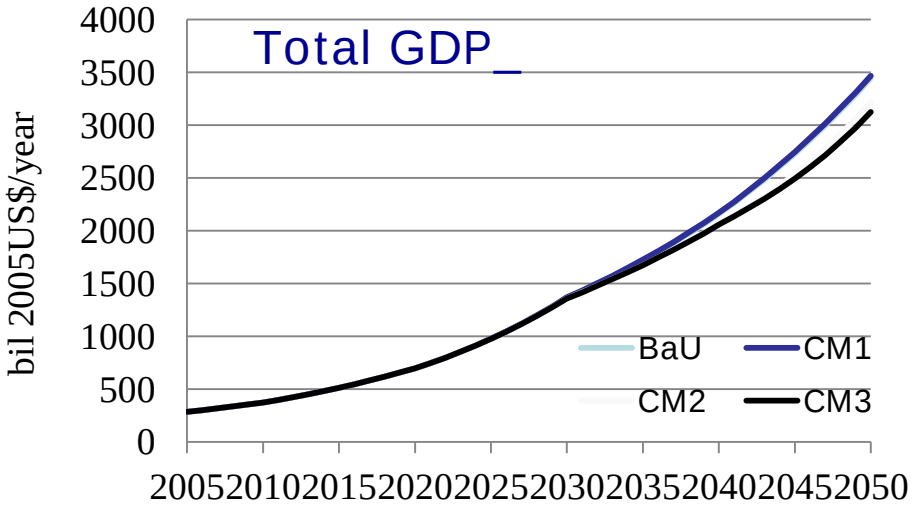
Counter Measures	BaU	CM1	CM2	CM3
Carbon Tax	off	on	on	on
CCS	off	off	off	on
Additional EEI	off	on	on	On
Non-CO2 emission reduction	off	on	on	On
Land Use	off	off	off	Off
AEEI	low			
CCS year and instalation speed	off	off	off	2020/low

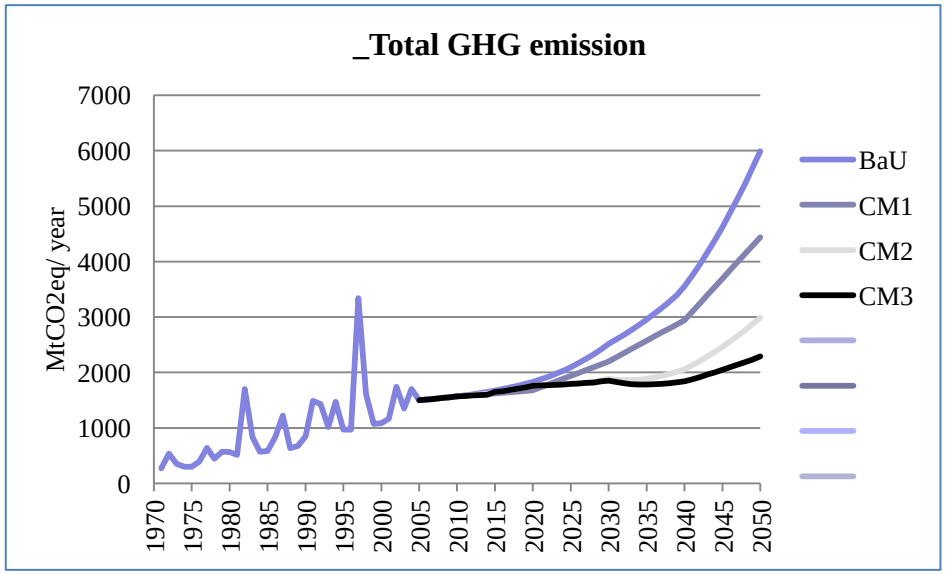
	BAU	CM1	CM2	CM3
Emission reduction	-	Reduction emision 26% in 2025 and 50% in 2050		
Emission trading	-	-	v	v
CCS	-	-	-	v
Power Dev't	-	Geothermal and hydro increased 50 %		

Socio Economic Performance

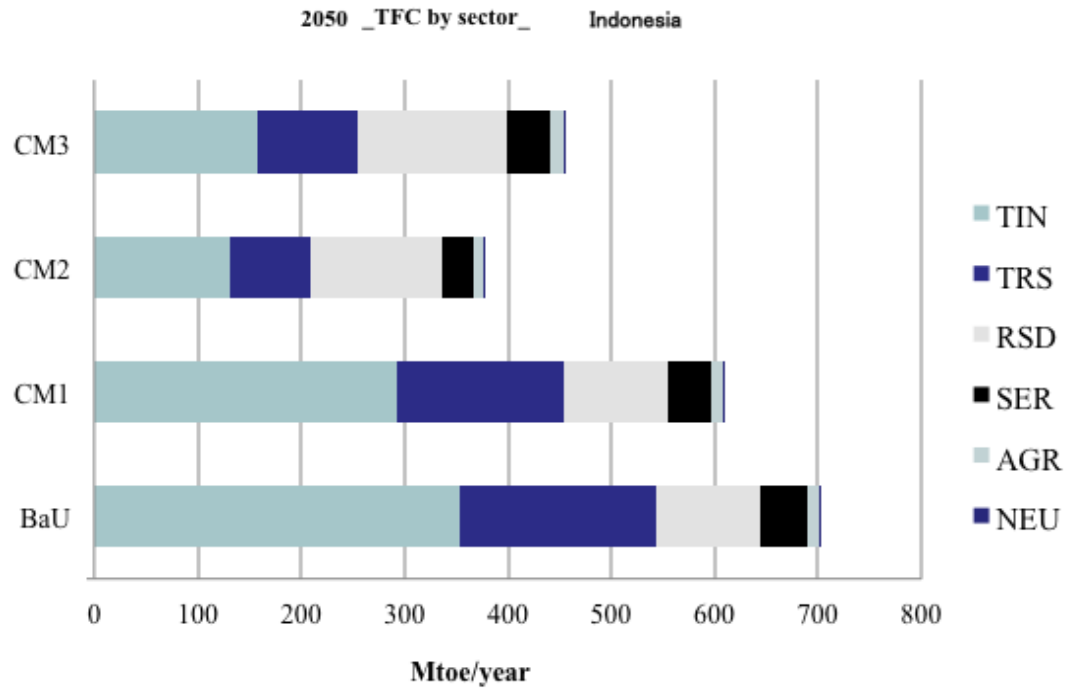
BAU-2005 compared with 2050:
- Population increase 1.46 times
- GDP increase 11.8 times

The effect of CO2 mitigation efforts to GDP
- CM 1 : - 1,62 %
- CM 2 : -8,13 %
- CM 3 : -8,08 %





GHG emission reduction from BaU:
CM1 :-25,8 %
CM2 : -50,1 %
CM3 : -61,8 %

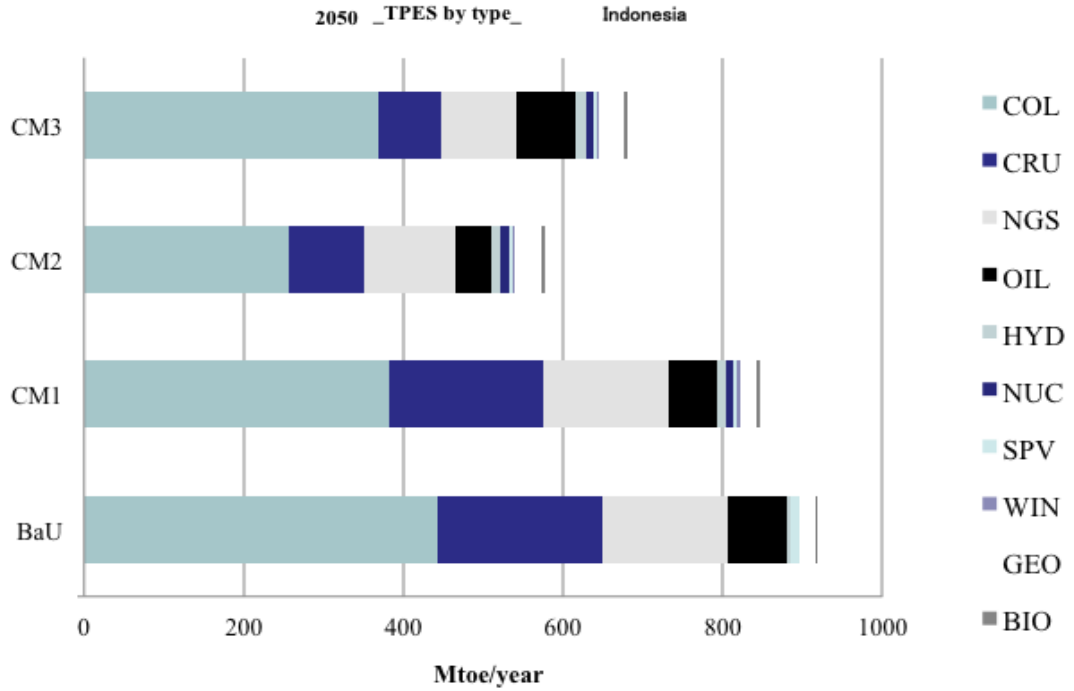


Profile of Final Energy Consumption by Sector in 2050

Major consumer: Industrial>Transportation

Profile of Primary Energy Supply by Types of Energy in 2050

- Still rely on fossil, particularly coal > oil >natural gas
- ***Contribution of Biofuel increased in CM but not significant. Biomass energy excluded in this analysis***



Next Step

- Improving AFOLU model with adding more CM at Peatland, land swap
- Integrating the AFOLU with the Energy Models – particularly ***impact on regional economic and change in land demand***
- Applying the integrated Models for developing LCD scenarios at National and Local (DKI Jakarta-**energy** and Riau Provinces-**land-based**) → part of TNC (Third National Communication)