Low Carbon Society Study Workshop
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DEVELOPING VIETNAM LOW CARBON SOCIETY

Kyoto University: Nguyen Thai Hoa, Kei Gomi, Yuzuru Matsuoka
National Institute for Environmental Studies: Tomoko Hasegawa, Junichi Fujino, Mikiko Kainuma
Institute of Strategy, Policy and Natural Resources: Nguyen Thi Thuy Duong, Nguyen Tung Lam, Nguyen Lanh, Nguyen Van Tai
Institute of Meteorology, Hydrology and Environment: Huynh Thi Lan Huong, Tran Thuc
Water Resources University: Nguyen Quang Kim
Japan International Cooperation Agency: Hiroshi Tsujihara

Background

Why we need a LCS?

In conventional growth pathway, developed countries have been emitting a large amount of green house gases in the process of economic growth.

To avoid it, a developing country like Vietnam should leap-frog this process and creates low-carbon society (LCS) directly.

One of the strategic objectives of “National Target to Respond to Climate Change” is “take an opportunity to develop towards a low-carbon economy” and “ National Climate Change Strategy” is “consider low carbon economy as principles in achieving sustainable development; GHG emission reduction to become mandatory index in social and economic development”

In order to contribute discussion on LCS, we created a national sustainable LCS scenario in Vietnam in 2030.

To create a LCS society:

- We use ExSS tool and AIM/AFOLU Bottom up model to estimate GHG emissions and mitigations in energy sector and AFOLU sectors
- Target GHGs: only CO_2 is considered in energy sector, CO_2, CH_4 and N_2O are considered in AFOLU sectors

- Part I: Socio-economic scenario in 2030
- Part II: GHG emissions/mitigations in energy sectors
- Part III: GHG emissions/mitigations in AFOLU sectors
- Part IV: Integration and Actions towards LCS

Part I: Socio-economic scenario in 2030

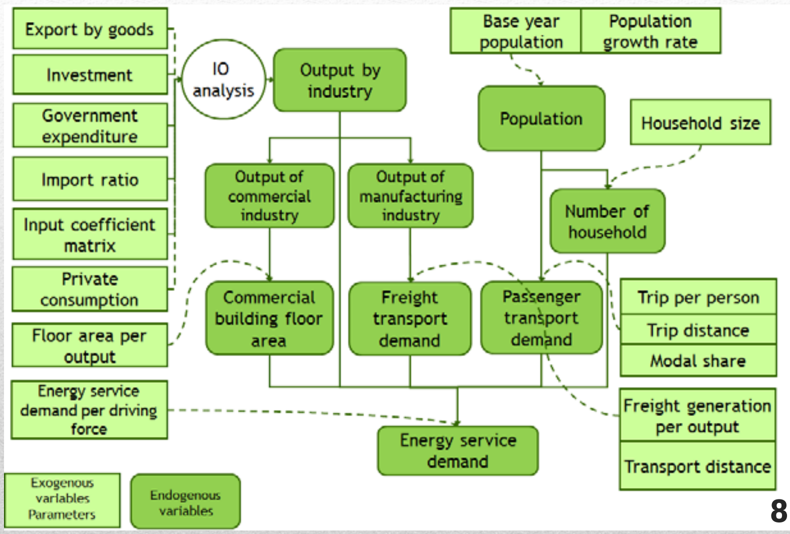
Procedure

1. Data collection & estimation in the base year (2005)
2. Construct future socio-economic scenario in 2030 using ExSS

Extended Snapshot Tool (ExSS)

- ✓ ExSS is a quantitative projection tool for LCS scenarios developed by Kyoto University and National Institute for Environmental Studies, Japan.
- ✓ It describes future socio-economic scenario (demography, economy, transport, land use, buildings, etc), energy demand, and GHG emissions and mitigation potential.
- ✓ GHG mitigation potential is based on energy technology database (both demand & supply sides), building performance, transport structure change, land use change, agriculture practice, behavior change and renewable energy potential.
- ✓ It can be used to identity detailed mitigation potential of each options in each sector.

Socio-economic part of ExSS



Data collection (socio-economic)

Data	Source
Population	Population Division - United Nations Population low variant, 2030 for Vietnam, General Statistic Office of Vietnam (2008)
Household	Vietnam Population and Housing Census (2009).
IO table	Input-output table 2005 (Trinh Bui, 2009)
Transport	JICA/MoT(2009): The comprehensive study on the sustainable development of transport system in Vietnam (VISTRANSS 2) General Statistic Office of Vietnam (2009) Schipper L., A. T. Le, O. Hans., 2008. Measuring the invisible. Quantifying emissions reductions from transport solutions. Hanoi case study. EMBARQ – The WRI Center for Sustainable Transport and World Resources Institute. Walter, H. and R. Michael (1995). Motorization and non-motorized transport in Asia. Transport system evolution in China, Japan and Indonesia. Land Use Policy, Vol 13, No.1, pp. 69-84, 1996.

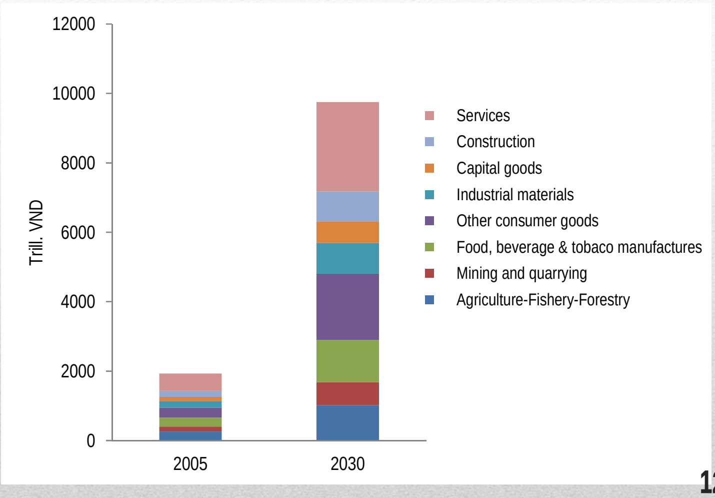
2030 BaU Assumptions

Indicator	Quantification (2030BaU scenario)	Tendency to
Population	104 million people	Growth rate at 0.9 % per annum
Demographic composition	[Male] 0-14: 8%, 15-64: 35.9%, 65 and over: 5.8% [Female] 0-14: 7.7%, 15-64: 35.2%, 65 and over: 7.4%	Number of male births are higher than female births
Average number of persons per household	3.5 (4.2 in 2005)	Slight decrease in average size of household
GDP	6.5%	Average annual growth rate during the period 2005 - 2030
Industrial structure	[Agriculture, Fishery, Forestry]: 17% (22% in 2005) [Industry, Construction]: 43% (41% in 2005) [Service]: 40% (37% in 2005)	Primary industry sectoral share has a decrease trend, whilst secondary and tertiary industry have an increasing trend.
Demand structure	Contribution of export in GDP: 29% (29% in 2005)	Export maintains there share in GDP
Modal shift in transport	Passenger transport:	Increasing of public transport, keep

Estimated socio-economic indicators

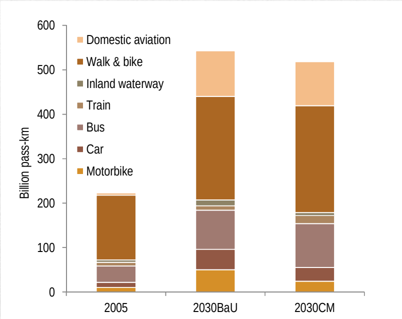
	2005	2030 BaU	2030 CM	2030BaU/2005	2030CM/2005
Population (million people)	83.1	104.0	104.0	1.3	1.3
No. of households (million)	20.0	29.7	29.7	1.5	1.5
GDP (trillion VND)	818.5	3,963	3,963	4.8	4.8
Gross output (trillion VND)	1,934	9,750	9,750	5.0	5.0
Primary industry (trillion VND)	404	1,684	1,684	4.2	3.9
Secondary industry (trillion VND)	1,033	5,497	5,497	5.3	5.2
Tertiary industry (trillion VND)	497	2,569	2,569	5.2	5.2
Passenger transport demand (million people-km)	223,981	542,687	518,028	2.4	2.3
Freight transport demand (million ton-km)	38,856	235,212	235,124	6.1	6.1

Projected industrial output

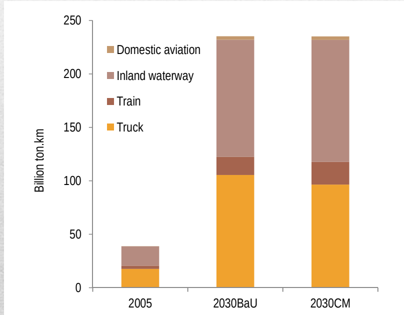


Projected transport demand

- ✓ There is an increasing share of motorbike and domestic aviation in passenger transport in 2030
- ✓ Freight transport volume increases proportionally with growth of secondary industries



Passenger transport



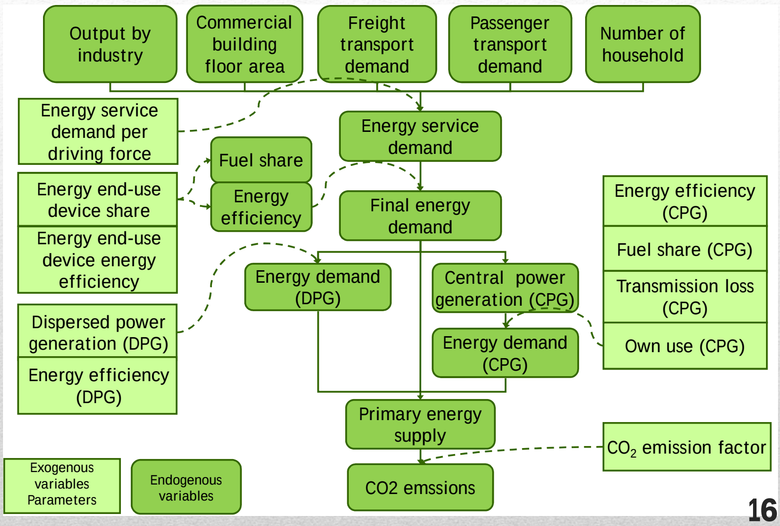
Freight transport

Part II: CO_2 emissions/mitigations in Energy sector

Procedure

1. Data collection of energy demand and supply in the base year (2005)
2. Project 2030BaU (Business as usual) energy demand and CO_2 emissions
3. Develop 2030CM (Countermeasures) scenario with mitigation options

Energy part of ExSS



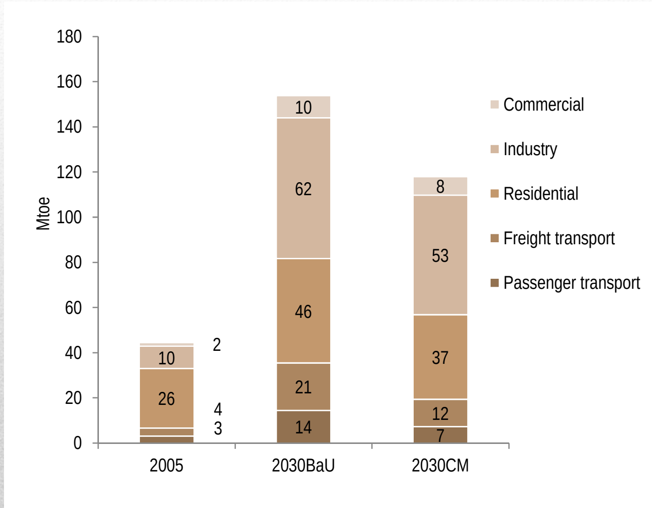
Data collection (energy)

Data	Source	Remarks
Energy demand	System for the Analysis of Global Energy Markets (SAGE), 2003. Model Documentation Report. Office of Integrated Analysis and Forecasting Energy Information Administration U.S Department of Energy Washington, DC. International Energy Agency (IEA), 2007. Energy balances of non-OECD countries 2004-2005. 2007 Edition. IEA statistics.	Final energy demand by fuel by sector is obtained from National Energy Balance 2005 (IEA). Other literatures were referred in order to estimate details of energy demand by industries and by services.
Power supply	International Energy Agency (IEA), 2007. Energy balances of non-OECD countries 2004-2005. 2007 Edition. IEA statistics.	Total power supply and fuel consumption were derived from EBT.

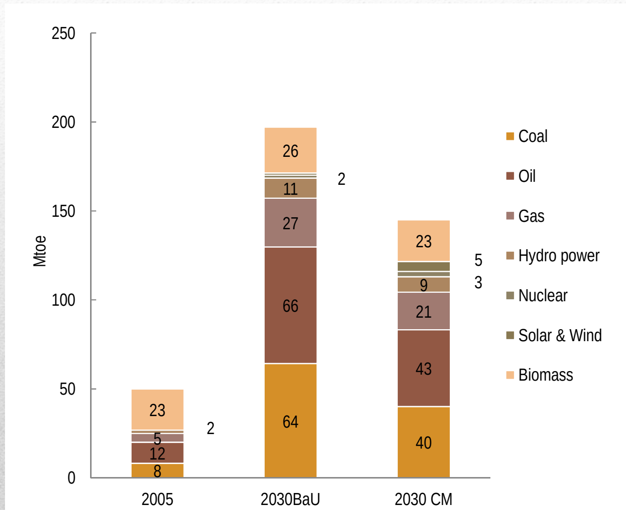
2030 BaU Assumptions

Field	Variables	Assumptions
Final energy demand	Total	From 2005 to 2030, total final energy demand grows by 5.1%/year from 2005 to 2030.
	By sectors	Industrial sector grow in higher rate than total demand.
	By fuels	Electricity and petroleum products grow in higher rate than total demand.
Power supply	Share of fuels	According to APEC Energy Demand and Supply Outlook (4th edition) and Vietnam Power Development Plan (PDP VI)
	Efficiency	Nhan T. N., M. H. Duong, 2009. The potential for Mitigation of CO_2 Emission in Vietnam's Power Sector. DEPOCEN Working paper Series No. 2009/22.

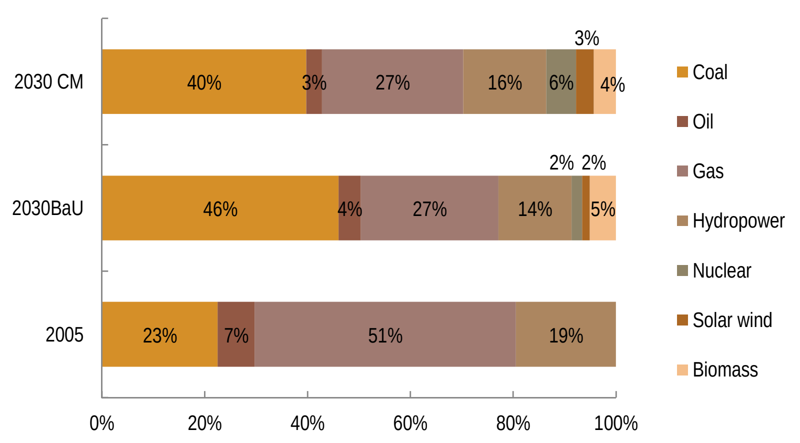
Projected final energy demand by sectors



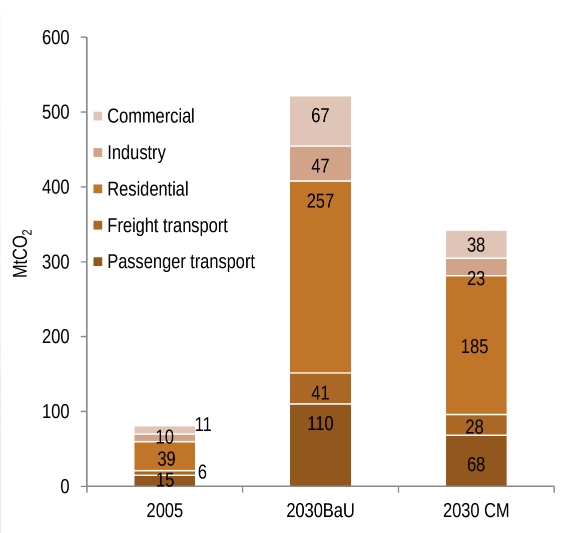
Projected primary energy demand by fuels



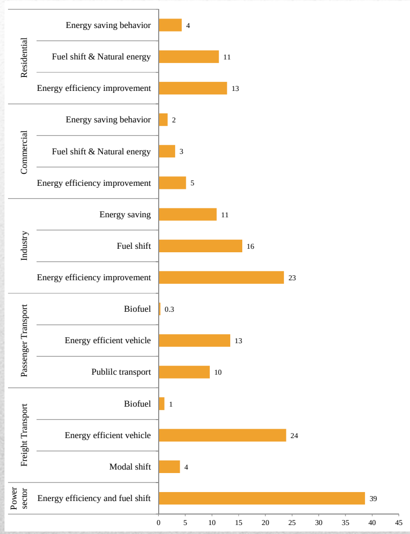
Projected energy mix of power supply

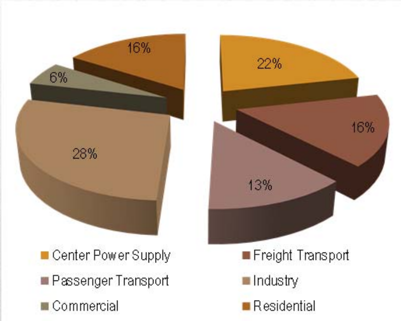


Projected CO_2 emissions



Contribution of low carbon countermeasures





Part III: GHG emissions/mitigations in AFOLU sectors

Framework

- Country: Vietnam
- Year:
  - Agriculture; 2000, 2005, 2010, 2015, 2020, 2030
  - LULUCF; 2000-2030 (1 year step)
- Target GHGs: CO_2, CH_4, N_2O
- GHG emission sources:
  - livestock enteric fermentation, livestock manure, managed soils, paddy rice and land-use change, excluding fire and disturbance of land.
- Scenarios
  - BaU: No countermeasure applied
  - CM: Countermeasure applied under several carbon taxes

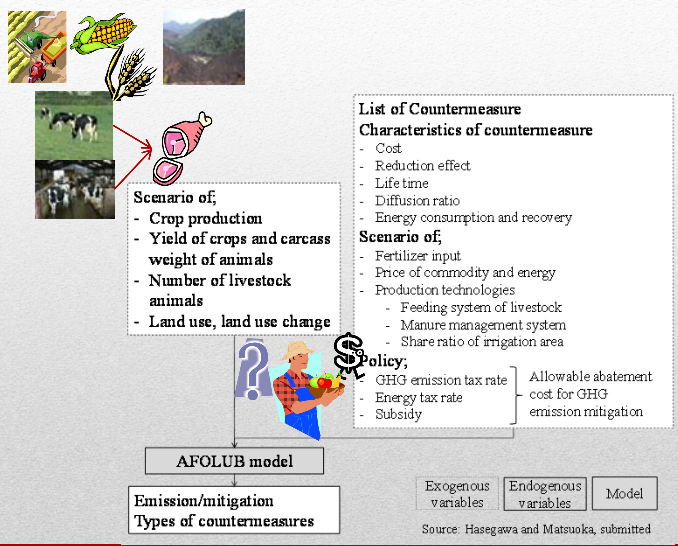
AFOLUB model

Activity data → AFOLUB model → Emission/mitigation

- AG/Bottom-up
- LULUCF/Bottom-up

- AFOLUB model
  - Bottom-up type model to determine combination and amounts of individual mitigation countermeasures
  - Estimate GHG emissions and mitigations in AFOLU sectors
  - Analyze effect of policies such as carbon tax, energy tax, subsidy etc.
  - Time horizon: mid-term (typically until 2030)
- AGriculture Bottom-up module (AG/Bottom-up)
  - Illustrate behavior of agricultural producers and selection of mitigation countermeasures
  - Maximize producer's profit
- The LULUCF/Bottom-up
  - Illustrate land use and land use change cohort
  - Maximize total accumulated mitigation in the future

Input and output of AFOLUB model



Source: Hasegawa and Matsuoka, submitted

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Data sources

- Present & future Activity data
  - Crops & Livestocks in 2005-2009:
    - Vietnam Second National Communication to the UNFCCC (SNC)
    - Statistical Yearbook (2002, 2007 and 2009)
    - Ministry of Agriculture and Rural Development, 2006
    - FAOSTAT, 2012, download
  - Landuse in 2000, 2005:
    - SNC
    - ResourceSTAT, FAOSTAT, 2011, download
    - Statistical Yearbook 2001(2002)
- Countermeasure data
  - Collected from domestic & international literatures
  - Countermeasures in LULUCF is referred to SCN

Countermeasures in Agricultural sector

Emission sources	Code	Countermeasures	Code	Cost [USD/activity/yr]*	Mitigation [tCO_2eq/activity/yr]*	Reference
Enteric fermentation	3A1	Replacement of roughage with concentrates	RRC	-23	0.45	Bates(1998a), Shibata et al.(2010), Graus et al.(2004)
		High genetic merit	HGM	0	0.32	Bates(1998a)
Manure management	3A2	Dome digester, cooking fuel and light	CFL	44	0.62	USEPA(2006)
		Daily spread of manure	DSM	2.2	0.33	Bates(1998a)
Rice cultivations	3C7	Midseason drainage	MD	0	0.89	USEPA(2006)
		Fall incorporation of rice straw	FIR	0	0.68	USEPA(2006)
		Replace Urea with Ammonium	RAS	20	0.24	USEPA(2006), Graus et al. (2004)
Managed soils	3C4~3C6	High efficiency fertilizer application	HEF	2.2	0.65	USEPA(2006), Hendriks et al. (1998), Amann et al. (2005)
		Slow-release fertilizer application	SRF	2150	0.76	USEPA(2006), Akiyama et al.(2010)
		Tillage and residue management	TRM	5	0.08	IPCC(2007), Smith et al.(2007)

* Activity is area of cropland for crop cultivation and animal numbers for livestocks.

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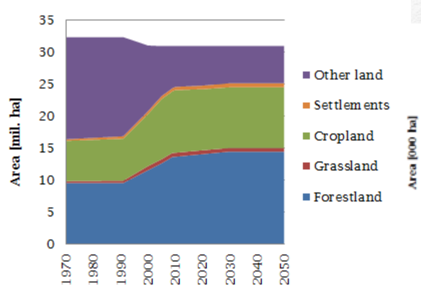
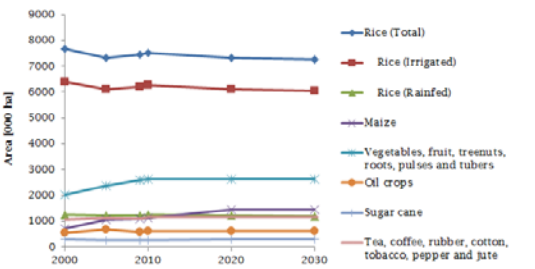
Assumptions

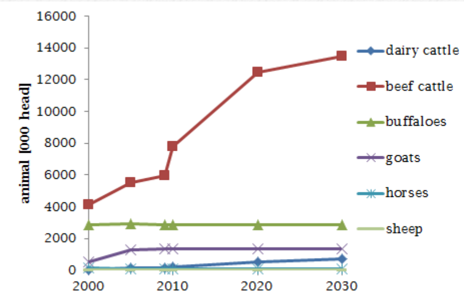


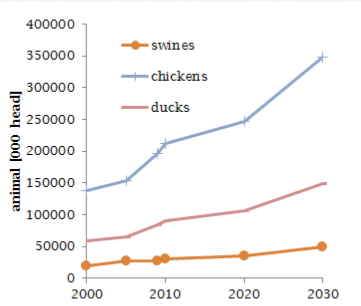


Scenarios of land use and land use change

Scenarios of harvested area of crop production

Assumptions





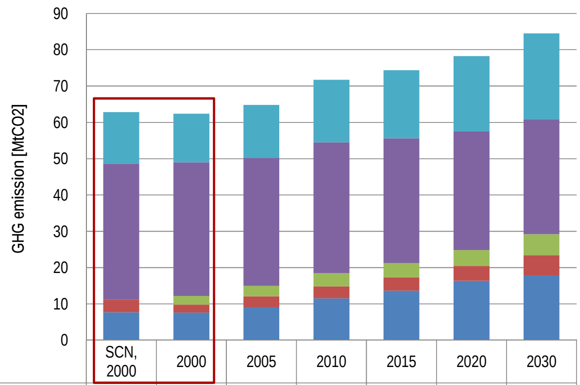
Scenarios of livestock animal (1)

Scenarios of livestock animal (2)

Comparison of total GHG emissions in BaU in AFOLU sectors

	SCN, 2000	2000	2005	2010	2015	2020	2030
Emission and removals from soils	28	20	18	19	17	15	14
Emission from agriculture	63	62	65	72	74	78	85
Forest and grassland conversion	41	42	35	31	29	27	23
Changes in forest and other woody biomass stocks	-50	-50	-48	-47	-46	-45	-43
TOTAL	82	74	70	75	74	76	79

Comparison of breakdown of GHG emissions in Agriculture in BaU case



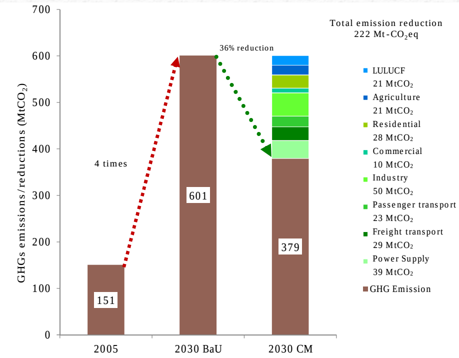
	SCN, 2000	2000	2005	2010	2015	2020	2030
Managed soils (N2O)	14	13	15	17	19	21	24
Rice field (CH4)	37	37	35	36	34	33	32
Manure (N2O)	0	2	3	4	4	4	6
Manure (CH4)	3	2	3	3	4	4	6
Enteric fermentation (CH4)	8	8	9	12	14	16	18

Mitigation in 2030 in different allowable abatement cost in AFOLU sectors

Mitigation in 2030 [$MtCO_2$]		Allowable abatement cost [USD/tCO_2]			
		0	10	100	10000
Agriculture	Enteric fermentation: High genetic merit	0.1	0.1	1.6	1.8
	Enteric fermentation: Replacement of roughage with concentrates	3.2	3.2	2.6	2.5
	Manure management: Daily spread of manure	0.0	0.0	0.0	4.9
	Manure management: Dome digester, cooking fuel and light	2.8	2.8	2.8	0.1
	Rice cultivations: Replace urea with ammonium sulphate	0.0	1.8	1.8	1.8
	Rice cultivations: Midseason drainage	4.7	6.7	6.7	6.7
	Rice cultivations: Fall incorporation of rice straw	0.0	3.4	3.4	3.4
	Managed soils: High efficiency fertilizer application	0.0	2.9	2.7	2.4
	Managed soils: Slow-release fertilizer	0.0	0.0	0.8	2.8
	Total	10.8	20.8	22.7	26.6
LULUCF	Protection and sustainable management of existing production forest areas	0.0	3.1	3.1	3.1

Part IV: Integration and Actions towards LCS

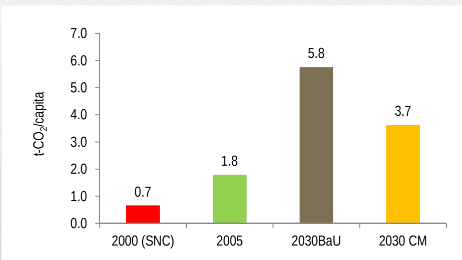
GHG emissions/mitigations in Vietnam in 2030



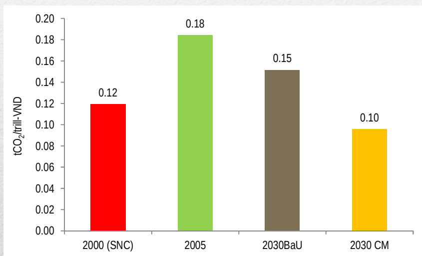
Sector	GHG emissions ($MtCO_2$eq) 2030BaU	GHG emissions ($MtCO_2$eq) 2030CM	GHG emissions reduction ($MtCO_2$eq)
AFOLU sectors	79	37	42
Agriculture	85	64	21
LULUCF	-6	-27	21
Energy sectors	522	342	180
Residential sector	110	68	42
Commercial sector	41	28	13
Insudtry	257	185	71
Transport	114	61	53
Total	601	379	222

Projected per capita GHG emissions and emission intensity

Per capita GHG emissions

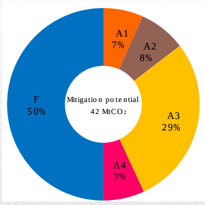


Emission intensity

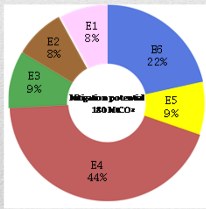


Actions towards low carbon society in Vietnam

Actions towards LCS in Vietnam in 2030	GHG emissions mitigations ($MtCO_2$)
AFOLU sectors	42
Action A1 Livestock Manure Management	3
Action A2 Livestock Enteric Fermentation	3
Action A3 Rice Cultivation Management	12
Action A4 Soil Management	3
Action F Forest and Land Use Management	21
Energy sectors	180
Action E1 Green Building	14
Action E2 Convenient Transport	15
Action E3 Energy Saving Behavior	17
Action E4 Energy Efficiency Improvement	79
Action E5 Fuel Shift in Industry	16
Action E6 Smart Power Plants	39

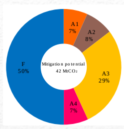


Mitigation potential of AFOLU sector

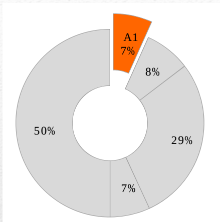


Mitigation potential in Energy sector

Action A1. Livestock Manure Management



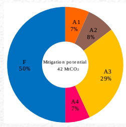
The action "Livestock Manure Management" is expected to reduce 2.8 $MtCO_2$ at Allowable Abatement Cost (AAC) of 10 USD/tCO_2, accounts for 7% of total GHG emissions in AFOLU sectors



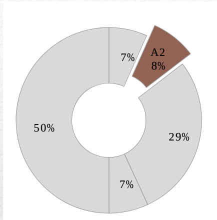
Breakdown of emission mitigation in action A1 in different AAC

Mitigation in 2030 [$MtCO_2$]	Allowable abatement cost [USD/tCO_2]			
	0	10	100	100000
Daily spread of manure	0.0	0.0	0.0	4.9
Dome digester, cooking fuel and light	2.8	2.8	2.8	0.1
Total	**2.8**	**2.8**	**2.8**	**5.0**

Action A2. Livestock Enteric Fermentation



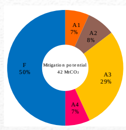
The action "Livestock Enteric Fermentation" is calculated to reduce 3.3 $MtCO_2$ at AAC of 10 USD/tCO_2 in 2030. This action comprises of 2 main countermeasures; namely, high genetic merit and replacement of roughage with concentrates, account for 8% of total GHG emissions in AFOLU sectors



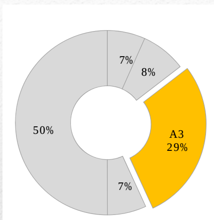
Breakdown of emission mitigation in action A2 in different AAC

Mitigation in 2030 [$MtCO_2$]	Allowable abatement cost [USD/tCO_2]			
	0	10	100	100000
High genetic merit	0.1	0.1	1.6	1.8
Replacement of roughage with concentrates	3.2	3.2	2.6	2.5
Total	**3.3**	**3.3**	**4.2**	**4.3**

Action A3. Rice Cultivation Management



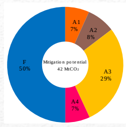
The action "Rice Cultivation Management" is contributed to the largest potential mitigation in agricultural sector (11.9 $MtCO_2$ at AAC of 10 USD/tCO_2), account for 29% of total GHG emission reduction in AFOLU sectors



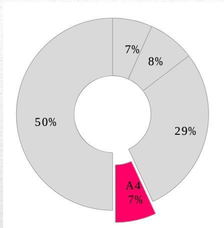
Breakdown of emission mitigation in action A3 in different AAC

Mitigation in 2030 [$MtCO_2$]	Allowable abatement cost [USD/tCO_2]			
	0	10	100	100000
Replace urea with ammonium sulphate	0.0	1.8	1.8	1.8
Midseason drainage	4.7	6.7	6.7	6.7
Fall incorporation of rice straw	0.0	3.4	3.4	3.4
Total	**4.7**	**11.9**	**11.9**	**11.9**

Action A4. Soil Management



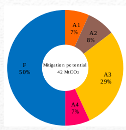
The action "Soil Management" is contributed to reduce 2.9 $MtCO_2$, account for 7% of total GHG emission in AFOLU sectors. This action comprises of 2 main countermeasures; namely, high efficiency fertilizer application and slow-release fertilizer.



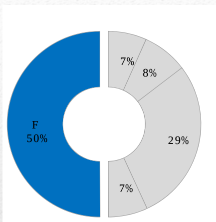
Breakdown of emission mitigation in action A4 in different AAC

Mitigation in 2030 [$MtCO_2$]	Allowable abatement cost [USD/tCO_2]			
	0	10	100	100000
High efficiency fertilizer application	0.0	2.9	2.7	2.4
Slow-release fertilizer	0.0	0.0	0.8	2.8
Total	**0.0**	**2.9**	**3.5**	**5.1**

Action F. Forest and Land Use Management



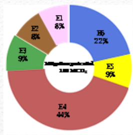
The action "Forest and Land Use Management" is a biggest reduction contributor, account for 50% of GHG emissions reduction in AFOLU sectors, which numbers to about 20.9 $MtCO_2$ main countermeasures such as "protection and sustainable management of existing production forest areas", "conservation of existing protection forests" and "planting fast-growing trees for lumber".



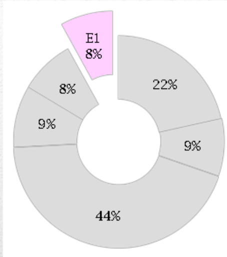
Breakdown of emission mitigation in action F in different AAC

Mitigation in 2030 [$MtCO_2$]	Allowable abatement cost [USD/tCO_2]			
	0	10	100	100000
Protection and sustainable management of existing production forest areas	0.0	3.1	3.1	3.1
Conservation of existing protection forests	0.0	16.5	16.5	16.5
Planting fast-growing trees for lumber	0.0	1.3	1.3	1.3
Total	**0.0**	**20.9**	**20.9**	**20.9**

Action E1. Green Building



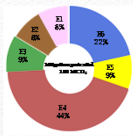
The "Green Building" action focuses on countermeasures of fuel shifting and natural energy utilization of two sectors (residential and commercial). This action is expected to reduce 14.4 $MtCO_2$, account for 8% of total CO_2 emission reduction in energy sector



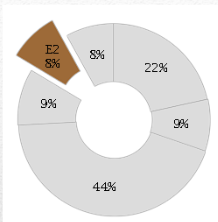
Breakdown of emission mitigation in action E1

	CO_2 emission reduction [ktCO_2]		Contribution in the Action [%]	Contribution in total reduction in energy sector [%]
Residential		11302	78%	6%
Heating	369			
Hot water	2040			
Cooking	8893			
Commercial		3099	22%	2%
Heating	456			
Hot water	2306			
Cooking	338			
Total		14401	100%	8%

Action E2. Convenient Transport



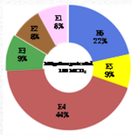
The action on "Convenient Transport" primarily comprises of a shift from private vehicles to public transportation (such as from motorbike and car to bus and train) by traffic management system and increased penetration of fuel switch (fuel switch from gasoline and diesel to electricity and bio-diesel).



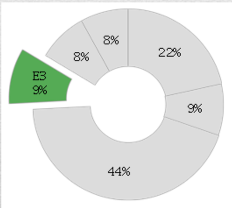
Breakdown of emission mitigation in action E2

	CO_2 emission reduction [ktCO_2]		Contribution in the Action [%]	Contribution in total reduction in energy sector [%]
Passenger transport		9932	66%	6%
Bio diesel vehicle	335			
Public transport	9596			
Freight transport		5117	34%	3%
Bio diesel vehicle	1107			
Modal shift	4011			
Total		15049	100%	8%

Action E3. Energy Saving Behavior



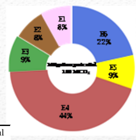
The action "Energy Saving Behavior" is projected to reduce 16.9 $MtCO_2$ or 9% of total CO_2 emission reduction in energy sector. Energy saving activities focus on energy services such as cooling, heating, hot water, cooking in commercial and residential sectors, direct heating, steam and motor in industrial sector.



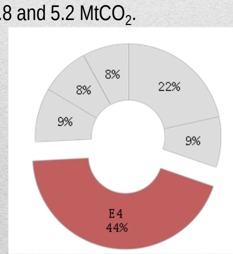
Breakdown of emission mitigation in action E3

	CO_2 emission reduction [$ktCO_2$]	Contribution in the Action [%]	Contribution in total reduction in energy sector [%]
Residential	**4349**	26%	2%
Cooling	94		
Heating	109		
Hot water	525		
Cooking	2961		
Lighting	245		
Refrigerator	179		
Other electric equipment	236		
Commercial	**1697**	10%	1%
Cooling	51		
Heating	594		
Hot water	581		
Cooking	108		
Lighting	163		
Refrigerator	93		
Other electric equipment	106		
Industry	**10871**		6%
Furnace	3182		
Boiler	3872		
Motor	2250		
Other	1567		
Total	**16917**	36%	9%

Action E4. Energy Efficiency Improvement



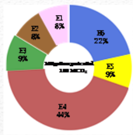
The "Energy Efficiency Improvement" action is able to reduce CO_2 emissions in all sectors in 2030 by 78.8 $MtCO_2$ or 44% of total CO_2 emission reduction in energy sector. The highest amount of CO_2 emission reduction accounts for transport sector by 37.3 $MtCO_2$. It is followed by industry, residential and commercial sectors with respectively amount of CO_2 reductions are 23.5, 12.8 and 5.2 $MtCO_2$.



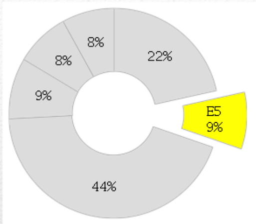
Breakdown of emission mitigation in action 4

	CO_2 emission reduction [$ktCO_2$]	Contribution in the Action [%]	Contribution in total reduction in energy sector [%]
Residential	**12838**	16%	7%
Cooling	1460		
Heating	127		
Hot water	857		
Cooking	5937		
Lighting	2275		
Refrigerator	940		
Other electric equipment	1241		
Commercial	**5159**	7%	3%
Cooling	795		
Heating	969		
Hot water	822		
Cooking	303		
Lighting	1092		
Refrigerator	624		
Other electric equipment	555		
Industry	**23484**	30%	13%
Furnace	14861		
Boiler	4757		
Motor	974		
Other	2892		
Passenger transport	**13431**	17%	7%
Motorbike	4033		
Car	3355		
Bus	3772		
Train	31		
Ship	18		
Aviation	2221		
Freight transport	**23901**	30%	13%
Truck	23698		
Train	10		
Ship	179		
Aviation	13		
Total	**78812**	100%	44%

Action E5. Fuel Shift in Industry



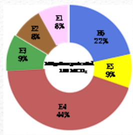
The action “Fuel Shift in Industry” is projected to reduce CO_2 emission in 2030 by 15.7 $MtCO_2$ or 9% of total CO_2 emission in energy sector.
Fuel uses in industry sector will be able to shift from high carbon intensity to lower carbon intensive. For instance, fuel switch from coal and oil to natural gas.



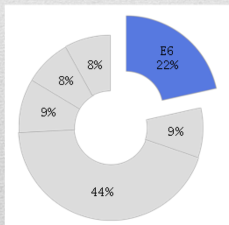
Breakdown of emission mitigation in action E5

Sector	CO_2 emission reduction [$ktCO_2$]	Contribution in the Action [%]	Contribution in total reduction in energy sector [%]
Agriculture-Fishery-Forestry	1335	9%	1%
Mining and quarrying	2253	14%	1%
Food, beverage & tobaco manufactures	2067	13%	1%
Other consumer goods	3251	21%	2%
Industrial materials	3037	19%	2%
Capital goods	1060	7%	1%
Construction	2667	17%	1%
Total	**15670**	100%	9%

Action E5. Fuel Shift in Industry



The action “Smart Power Plants” is calculated to reduce CO_2 emission in 2030 by 26.6 $MtCO_2$ or 16% of total CO_2 emission reduction in energy sector. This action comprises of 4 main countermeasures; namely, utilizing economically efficient domestic energy resources, promoting the use of renewable energies, reducing transmission and distribution loss, and developing nuclear power plant.



Power supply indicators in Vietnam

	Coal	Oil	Gas	Hydropower	Nuclear	Solar wind	Biomass	Total
2005								
Fuel (ktoe)	2132	679	4812	1845	0	0	0	9467
Efficiency (%)	36	31	37	100				
Generation (ktoe)	769	213	1770	1845	0	0	0	4597
Own-use (ktoe)	21	6	49	51	0	0	0	126
Transmission loss (ktoe)	84	23	194	203	0	0	0	505
Distribution (ktoe)	663	184	1527	1592	0	0	0	3966
2030BaU								
Fuel (ktoe)	36611	3468	21244	11330	1619	1214	4046	79532
Efficiency (%)	42	35	40	100	100	100	30	
Generation (ktoe)	15377	1214	8498	11330	1619	1214	1214	40465
Own-use (ktoe)	421	33	233	310	44	33	33	1109
Transmission loss (ktoe)	1196	94	661	882	126	94	94	3148
Distribution (ktoe)	13759	1086	7604	10138	1448	1086	1086	36207
2030CM								
Fuel (ktoe)	22643	2438	15439	8028	3088	1853	772	54260
Efficiency (%)	45	38	42	100	100	100	40	
Generation (ktoe)	10189	926	6484	8028	3088	1853	309	30877
Own-use (ktoe)	279	25	178	220	85	51	8	846
Transmission loss (ktoe)	694	63	441	547	210	126	21	2102
Distribution (ktoe)	9217	838	5865	7261	2793	1676	279	27929

Conclusions

- Vietnam LCS scenarios in 2030 were projected using ExSS and AIM/AFOLU models,
- Target GHGs are: CO_2 from energy use, CO2, CH4 and N20 in AFOLU sectors
- In 2030BaU scenario, GHG emissions were four folds from 2005 from 151 MtCO2 to 601 MtCO2
- In 2030CM scenario, GHG emission was reduced 36% from 2030BaU. Emission intensity was reduced 20%
- In AFOLU sectors, GHG emissions is contributed to decrease by 57% by 2030CM compared to 2030BaU level. Midseason drainage and conservation of existing protection forests are expected the largest mitigation countermeasures in the sectors.
- In energy sector, about 38% of GHG emissions can be reduced in 2030CM compared to 2030BaU level. Fuel shift and energy efficiency are projected the largest countermeasures in the sector.