

Preliminary Research on Low Carbon Society Scenario for Semarang

2 November, 2017

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Semarang in 100RC program

100RC is initiated by the Rockefeller Foundation aim to helping **cities** around the world become more resilient

Semarang is the first city in Indonesia who join in 100RC network with the other 99 cities

100RC program adopts a comprehensive definition of urban resilience in the face of shocks and stresses in various fields

Semarang has a City Resilience Strategy in the context of climate change in 2010, need to be updated with more comprehensive and inclusive approach in the making.

The City Resilience Strategy is in parallel with the Semarang Mid Term Development Plan 2016–2021 who is also in the making

Support from 100 rc program



Providing support to the city of Semarang through a CRO who will lead the preparation of city resilience strategy (CRS / City Resilient Strategy)



Provide assistance and advisory support to the city of Semarang through Mercy Corps Indonesia as strategy partner



Providing access to the platform partners, a resource for the development and implementation of future strategies



Membership in the international 100RC network for knowledge sharing and collaboration.



100 RESILIENT CITIES

Phase 1

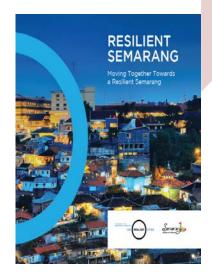
(December 2014-October 2015)

Preliminary Resilience Assessment (PRA) + Discovery Resilience Areas Phase 2 (November 2015- May 2016)

City Resilience Strategy Phase 3

Implementation (on going)





100RC Semarang team

LCS : Part of Initial action toward Semarang City resilience

Collaborative work of Semarang and Japan

Objective

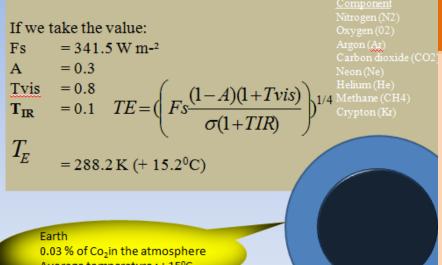
- Support developing and accelerating a climate change action plan in Semarang by quantitative analysis with integrated modeling approach
- Capacity building and knowledge transfer of Low Carbon Society (LCS) scenario development and implementation



Before Joint with

LCS team

Simple modeling of green house effect #9



Average temperature :+ 15°C

Simple modeling of green house effect

02)	If we take Fs = A = Tvis = $T_{IR} =$	341.5 W 0.3 0.8			TE =	$\left(Fs\frac{(1-s)}{(1-s)}\right)$	$\frac{-A}{\sigma(1+2)}$	+Tvi TIR)	
	Scenario	1	2	3	4	5	6	7	8
	Fs	1366							
	А	0.3							
	Tvis	0.8							
	T _{IR}	0.1							
	$T_{E}(\mathbf{K})$	288.2		5	Scenario :	tor 100 or	r 1000 yea	ars?	

My Student and Government Officer with zero understanding of climate

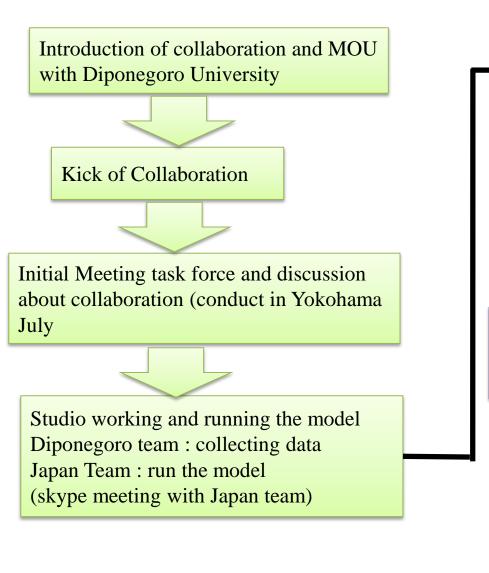
change is very impression when the can calculate by them self and look the result grafic on excel

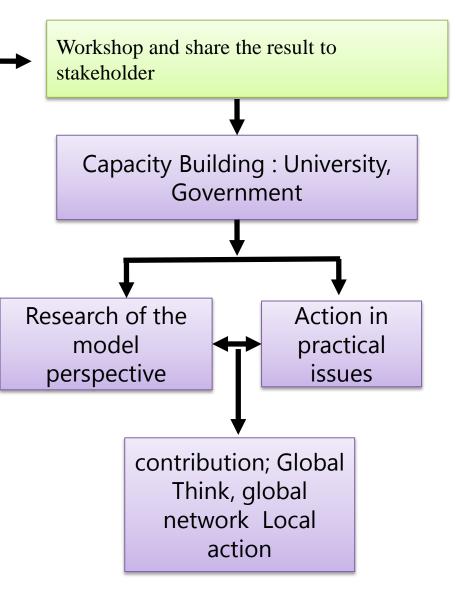
TE

Time or Scenario -Tvis

Joint with LCS team

2. Collaboration with IGES (Japan Team) : Step in Collaboration







Discussion in ISAP-yokohama, July 23, 2017



Kick of Collaboration August 15, 2017



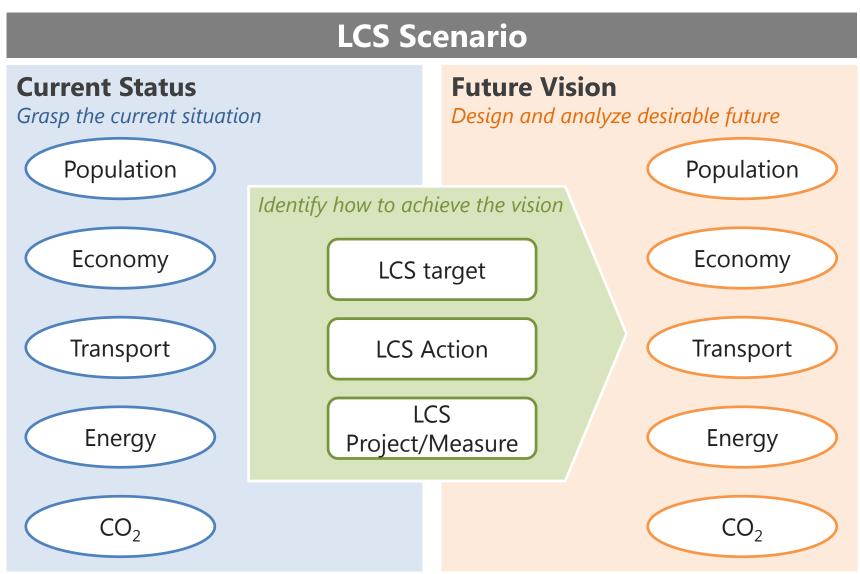
Internal Workshop, 18 August 2017 Diponegoro team



Studio team in Diponegoro University

What is Low Carbon Society Scenario?

A kind of guides to show how to realize an attractive society with low/no GHG emission in future.



Methodology

1. Start of the Story

1.1 Formulation of the region's top initiative 1.2 Resource allocation

2. Framework Setting

2.1 Background research 2.2 Framework setting

3. Data Preparation

3.1 Collection of statistical data and future plan

3.2 Estimation of necessary data in base year

3.3 Assumption of future change of the society

4. Design of LCS Projects and Projection of Future Scenario

4.1 Projection of BaU scenario by quantification tools, ExSS 4.2 Listing of LCS projects

- 4.3 Calculation of emission reduction by project
- 4.4 Projection of LCS policy scenario by quantification tools

4.5 Adjustment of project-based emission reduction

5. Bridging the Output to Real World

5.1 Formulation of Actions and projects for implementation5.2 Reporting the result to policy makers

Authorize task force

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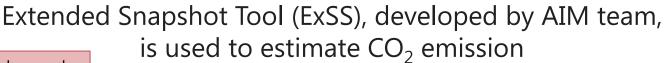
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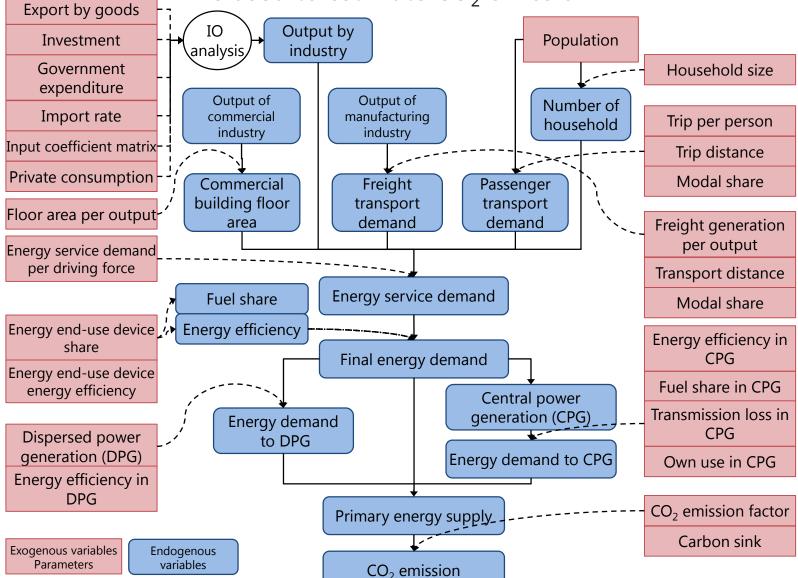
- Human resource, budget plan of research
- Existing policies, plans, and studies, national and regional circumstances etc.

- Related statistics, reports and preliminary surveys
- Demography, macro economy, industrial structure etc.
- Adjusting of methodologies, tools and software
- Existing projects and projects
- Identify parameters and indicators on GHG and non-GHG effects
- Make priority list of actions and projects based on the analysis
- Construct ABS for realizing LCS
 - Summarize the whole outputs to a brochure/report

[•] Timeframe, scope and boundary

Model Structure of Extended Snapshot Tool





Framework of the research

Framework

Base year	2015	Target activities	Fuel combustion
Target year	2030		Industry sectorCommercial sector
Types of GHG	CO ₂		Residential sectorTransport sector
	Тур		BaU scenarioCM scenario

Scenarios

BaU (Business as Usual) Scenario

- Social and economic development based on future plan of the region
- Without implementation of LCS policy in future

LCS Scenario / CM (Countermeasure) Scenario

- Same assumption as BaU scenario about social and economic development
- With implementation of LCS policy

Data Preparation

A variety of data and information of Semarang, Central Jawa and Indonesia were collected to prepare input data for ExSS

	Source
Population and household	 Badan Pusat Statistik, Kota Semarang (2016): Kota Semarang dalam Angka Tahun 2016. Demographia (2010): Demographia World Urban Areas Population Projections (From 6th Edition of World Urban Areas).
Macro economy	 Badan Pusat Statistik, Kota Semarang (Website): [2010 Version] GRDP At Current Market Prices by Industrial Origin Per Sector-Sub Sector in Semarang Municipality, 2008 - 2016. Badan Pusat Statistik, Kota Semarang (Website): [2010 Version] GRDP of Semarang Municipality at Current Market Prices [2010] by Type of Expenditure (Million Rupiahs), 2010 - 2016. Bappeda, Provinsi Jawa Tengah and Badan Pusat Statistik, Provinsi Jawa Tengah (2015): Table Input Output Jawa Tengah 2013. Kota Semarang (2004): Rencana Detail Tata Ruang Kota - Kota Semarang Tahun 2000 - 2010 (Bagian Wilayah Kota I - X). Coordinating Ministry for Economic Affairs, Indonesia (2011): Masterplan for Acceleration and Expansion of Indonesia's
Transport	 Economic Development 2011-2025. Kecamatan Dalam Angka Kota Semarang Tahun 2016 dan. Badan Pusat Statistik, Kota Semarang (Website): Kind of Vehicles in Semarang City, 2005-2014. Sugiono, A (2012): Prakiraan Kebutuhan Energi Untuk Kendaraan Bermotor di Perkotaan: Aspek Permodelan. Jurnal Sains dan Teknologi Indonesia Vol. 14, No. 2, Agustus 2012, Hlm. 104-109. Badan Pusat Statistik, Indonesia (2017): Statistik Indonesia 2017. Indonesia 2050 Pathway Calculator – Panduan Pengguna untuk Sektor Transportasi –.
Energy	 Pemerintah Kota Semarang (2012): Profil emisi GRK Kota Semarang Tahun 2010 - 2020. Pemerintah Kota Semarang (2014): Inventarisasi Emisi Gas Rumah Kaca Kota Semarang Tahun 2009-2014. Ministry of Energy and Mineral Resources, Indonesia (2017): Handbook of Energy & Economic Statistics of Indonesia 2017. International Energy Agency (2017): World Energy Balance 2017. Bandung Institute of Technology & Kyoto University (2013): Technical Report of Low Carbon Society Scenarios Indonesia 2020 and 2050. Ministry of Energy and Mineral Resources, Indonesia (2015): Power Policy and National Development Plan in Indonesia

Socioeconomic indicators

- Population will amount to 2 million in 2030.
 - GRDP per capita will be increased by about 5 times compared to 2015.

	Unit	2015	2030	2030/2015	CAGR
Population	persons	1,595,267	2,060,000	1.29	1.52%
No. of households	households	471,327	686,667	1.46	2.24%
GRDP per capita	mil. Rp	84	405	4.81	9.68%
GRDP	bil. Rp	134,207	834,197	6.22	11.35%
Primary		1,373	3,590	2.61	5.82%
Secondary		73,340	440,906	6.01	11.13%
Tertiary		59,493	389,701	6.55	11.69%
Outputs	bil. Rp	50,252	330,043	6.57	11.71%
Gross fixed capital formation	bil. Rp	99,697	607,179	6.09	11.21%
Export	bil. Rp	37,563	228,772	6.09	11.21%
Import	bil. Rp	114,672	690,811	6.02	11.14%
Commercial floor area	thous m ²	50,252	330,043	6.57	11.71%
Passenger transport demand	mil. pass-km	18,342	28,422	1.55	2.61%
Freight transport demand	mil. ton-km	3,391	20,307	5.99	11.10%

GRDP

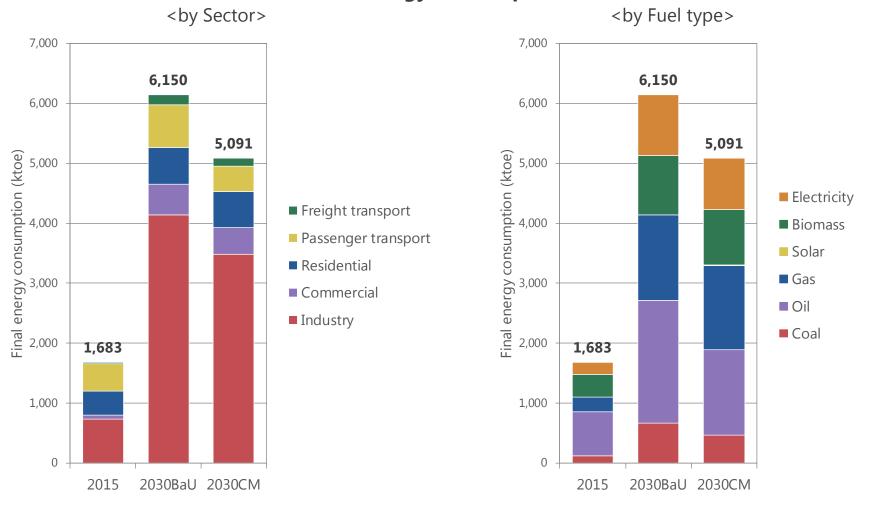
- GRDP in 2030 will become 6 time as large as that in 2015.
- Secondary sector will still be main industry, though remarkable growth of tertiary sector.

GRDP by sector (bil. Rp)

_				
	2015	2030	2030 /2015	GRDP Share
Primary	1,373	3,590	2.61	
Secondary	73,340	440,906	6.01	100% Other services
Mining and quarrying	261	1,414	5.41	90% — 90% –
Foods, beverage & tobacco	17,885	110,507	6.18	Transport and Communications
Paper, paper products & printing	408	2,165	5.30	
				70% — Electricity, gas, water and waste
Chemicals & pharmaceuticals	6,785	35,783	5.27	Construction
Non-metal mineral products	459	1,490	3.24	8 60% + Other manufaturing
Basic metals	2,840	17,264	6.08	ि हु 50% – ■ Metal products, machinery and equipment
Metal products, machinery & equipment	2,804	17,162	6.12	Basic metals
Other manufacturing	5,695	32,959	5.79	₩ 40% + Non-metal mineral products
Construction	36,201	222,162	6.14	30% — Chemicals and pharmaceuticals
Tertiary	59,493	389,701	6.55	Paper, paper products and printing
Electricity, gas, water & waste	250	1,658	6.62	20% Foods, beverage and tobacco
Wholesale & retail trade	18,966	124,395	6.56	10% — Mining and quarrying
				Agriculture, forestry, and fisheries
Transport & Communications	14,669	99,352	6.77	
Financial, real estate & company services	10,452	67,700	6.48	2015 2030
Other services	15,157	96,597	6.37	
Total	134,207	834,197	6.22	1

Energy consumption

- Energy consumption in BaU scenario will increase by 3.7 times as much as 2015.
- In CM scenario, Energy consumption can be reduced by 27%.
- Share of natural gas and electricity is increased in CM scenario.



Final energy consumption

Carbon emission

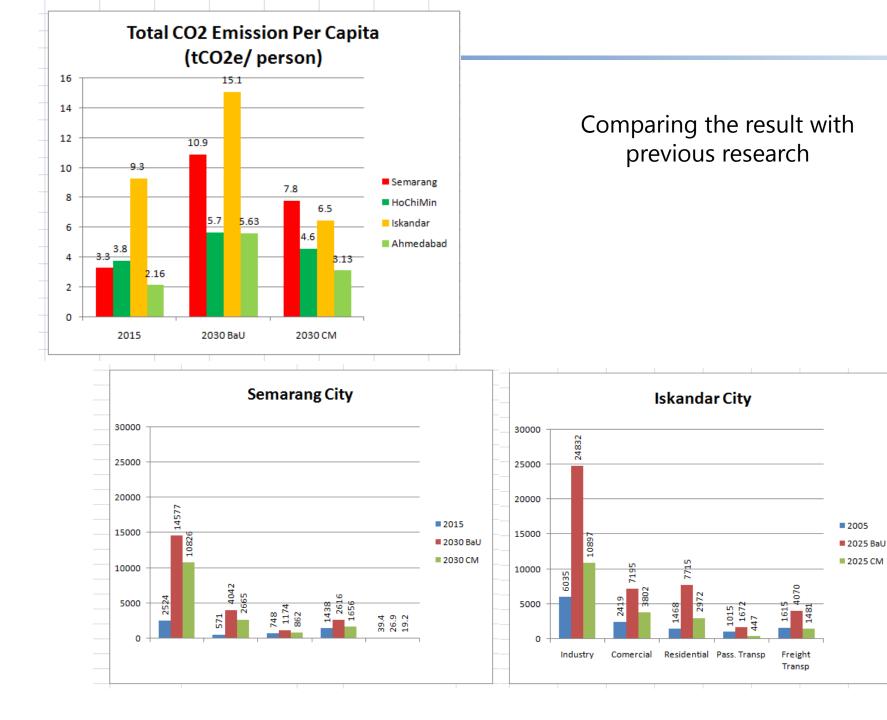
- CO_2 emission in BaU scenario will amount to 4.2 times as much as 2015.
- In CM scenario, CO_2 emission can be reduced by 29%.
- The passenger transport sector and the commercial sector will lead emission reduction.
- Semarang City has a potential to reduce CO_2 emission corresponding to INDC of Indonesia

					25,000]
2015	2030 BaU	2030 CM	BaU /2015	CM /BaU			22,409)	
5,282	22,409	16,009	4.24	0.71	20,000 -				
2,524	14,577	10,826	5.77	0.74	(e)			16,009	
571	4,042	2,665	7.08	0.66	9 15,000 -				Tran
748	1,174	862	1.57	0.73					Resid
1,438	2,616	1,656	1.82	0.63	missi				Com
39.4	26.9	19.2	0.68	0.71	° 0 0	F 202			■ Indu
3.3	10.9	7.8	3.29	0.71	5,000 -	5,282			
	 5,282 2,524 571 748 1,438 39.4 	2015 BaU 5,282 22,409 2,524 14,577 571 4,042 748 1,174 1,438 2,616 39.4 26.9	2015 BaU CM 5,282 22,409 16,009 2,524 14,577 10,826 571 4,042 2,665 748 1,174 862 1,438 2,616 1,656 39.4 26.9 19.2	2015BaUCM/20155,28222,40916,0094.242,52414,57710,8265.775714,0422,6657.087481,1748621.571,4382,6161,6561.8239.426.919.20.68	2015BaUCM/2015/BaU5,28222,40916,0094.240.712,52414,57710,8265.770.745714,0422,6657.080.667481,1748621.570.731,4382,6161,6561.820.6339.426.919.20.680.71	2015 2030 BaU 2030 CM BaU 2015 CM /BaU 5,282 22,409 16,009 4.24 0.71 2,524 14,577 10,826 5.77 0.74 571 4,042 2,665 7.08 0.666 748 1,174 862 1.57 0.73 1,438 2,616 1,656 1.82 0.63 39.4 26.9 19.2 0.68 0.71	2015 2050 2050 BaO CM /2015 /BaU 5,282 22,409 16,009 4.24 0.71 20,000 20,000 2,524 14,577 10,826 5.77 0.74 0.74 0.71 15,000 0.71 571 4,042 2,665 7.08 0.666 15,000 15,000 0.71 748 1,174 862 1.57 0.73 0.73 10,000 0000 15,000 0000 0000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 00000 000000 000000 000000 000000 000000 0000000 0000000 0000000 00000000 000000000 000000000 0000000000 0000000000 0000000000 0000000000 000000000000 0000000000000000000000000 000000000000000000000000000000000000	2015 2030 BaU 2030 CM BaU /2015 CM /BaU 20,000 </td <td>2015 2030 BaU 2030 CM BaU /2015 CM /BaU 22,409 5,282 22,409 16,009 4.24 0.71 20,000 20,000 2,524 14,577 10,826 5.77 0.74 16,009 16,009 571 4,042 2,665 7.08 0.666 15,000 15,000 16,009 748 1,174 862 1.57 0.73 10,000 15,000 10,000 16,009 39.4 26.9 19.2 0.68 0.71 5,282 5,282 5,282</td>	2015 2030 BaU 2030 CM BaU /2015 CM /BaU 22,409 5,282 22,409 16,009 4.24 0.71 20,000 20,000 2,524 14,577 10,826 5.77 0.74 16,009 16,009 571 4,042 2,665 7.08 0.666 15,000 15,000 16,009 748 1,174 862 1.57 0.73 10,000 15,000 10,000 16,009 39.4 26.9 19.2 0.68 0.71 5,282 5,282 5,282

CO₂ emission by sector

2015 2030BaU 2030CM

25,000 _____



CO₂ reduction by action/project

Action		Project	Sector	Emission reduction (ktCO2eq)
1 Green Industry	1-01	Energy saving support scheme such as ESCO (Energy Saving COmpany) project for industries	Industry	964.6
	1-02	Installation high energy efficiency facilities	Industry	346.6
	1-03	Regional energy supply system	Industry	489.7
	1-04	Improvement of kiln and furnace technology	Industry	692.3
	1-05	Promotion of fuel shift of furnaces and boilers from coal to natural gas	Industry	58.8
		Total		2,552.0
2 Smart Building	2-01	Installation of insulated glasses to commercial buildings	Commercial	84.1
	2-02	Installation of insulated glasses to households	Residential	12.2
	2-03	Introduction of incentive to low energy buildings	Commercial	15.9
	2-04	Introduction of insulating material to houses	Residential	7.0
	2-05	Energy efficiency technology applied to buildings	Commercial	35.8
	2-06	Shift to natural gas in buildings	Commercial	17.1
	2-07	Introduction of solar water heater to commercial buildings	Commercial	52.3
	2-08	Introduction of solar water heater to households	Residential	23.9
		Total		248.4
3 Smart Device	3-01	Energy saving support scheme such as ESCO (Energy Saving COmpany) project for commercial buildings	Commercial	150.6
	3-02	High efficiency lighting in commercial buildings	Commercial	66.5
	3-03	High efficiency lighting in households	Residential	22.8
	3-04	High efficiency air conditioners (such as air conditioners with inverter controllers) in commercial buildings	Commercial	137.3
	3-05	High efficiency air conditioners (such as air conditioners with inverter controllers) in households	Residential	33.7
	3-06	Promotion of energy-efficient appliances	Residential	23.1
		Total		434.1

CO₂ reduction by action/project

Action		Project	Sector	Emission reduction (ktCO ₂ eq)
4 Sustainable Trans	port 4-01	Promotion of eco-driving with digital tachographs	Transport	7.2
	4-02	Wide-range traffic control	Transport	28.8
	4-03	Expansion of frequencies and routes of bus transportation	Transport	96.2
	4-04	Development of public transportation like railway and MRT	Transport	98.6
	4-05	Shift to CNG bus	Transport	6.1
	4-06	Introduction of electric motorbikes	Transport	61.5
	4-07	Promotion of energy-efficient vehicles (cars for passenger)	Transport	452.3
	4-08	Promotion of energy-efficient vehicles (motorbikes)	Transport	86.7
	4-09	Promotion of energy-efficient vehicles (trucks)	Transport	112.8
		Total		950.1
5 Green Energy	5-01	Introduction of photovoltaic power generation to commercial buildings	Commercial	24.3
	5-02	Introduction of photovoltaic power generation to households	Residential	9.7
	5-03	Introduction of small-scale hydropower generation (at water distribution stations)	Commercial	1.7
		Total		35.7
mprovement of CO2	emission f	actor of electricity		2,179.1
Total				6,399.5

Summarize output to the brochure

- Output of this preliminary research is summarized into the brochure. (Now printing)
- We will launch it in COP23.



become one of the strategic issues for all over the world, including Indonesia. At the G-20 meeting in Pittsburgh and COP15 in Copenhagen, Indonesia is committed to taking part in reducing greenhouse gases (GHG) by 26% with domestic resources and 41% with international assistance in 2020. The commitments are then followed up by the formulation of Presidential Regulation No. 61/2011 and No. 71/2011 on national action plans for GHG reduction. This regulation provides the basis for ministries, institutions and local governments to implement programs/activities aimed at reducing GHG emissions from key development sectors. The Presidential Regulation has mandated local governments to develop Local Action Plans for Greenhouse Gas Emission Reduction. Moreover, Indonesia has set unconditional reduction target of 29% and conditional reduction target up to 41 % of the business as usual scenario by 2030 in Intended Nationally Determined Contribution (INDC).

Following up the Presidential Regulation 61/2011 and 71/2011, Semarang City as one of the cities in Indonesia has a liability in the GHG reduction activities. This research on the low carbon society (LCS) scenario for Semarang City are carried out aiming to contribution to promoting climate change actions and policies in the city. This study is one of the outcomes of the collaboration between Diponegoro University, Semarang Municipality and the Asia-Pacific Integrated Model (AIM) team in Japan.

The research are begun with collecting data and information related to socioeconomic parameters and energy consumption. A lot of domestic and international sources are used to estimate both current and future status of Semarang City. The entire data is processed with the help of Extended Snapshot (ExSS) tool. ExSS is ap-

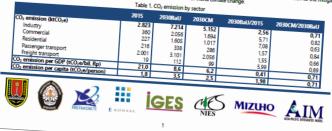
plied for the projection of carbon dioxide (CO2) emission and design of LCS scenario. This preliminary research is focused on energy-

Semarang City's CO₂ emission is estimated to be 2.823 ktCO₂e in 2015 based on collected data. The passenger transport sector is a sector emitting the largest CO2 in Semarang City. This sector accounts for more than half of the total emission

Two kinds of scenarios, namely Business as Usual (BaU) scenario

and Countermeasure (CM) scenario, are prepared to analyze reduction potential of CO2 emission in future. In BaU scenario, it is assumed that there is no policy or technology intervention to reduce carbon emission, while attempt by Semarang City Government to reduce carbon emission is assumed in CM scenario. In the CM scenario, Semarang City Government will promote five LCS actions and implement various LCS projects belonged to the actions. One of the action named "Sustainable Transport", which promotes energy efficient vehicle and modal shift, will contribute to the reduction of 1223 ktCO2e. These actions and projects help Semarang City to reduce total CO₂ emission in 2030 by 29% compared to BaU scenario. CO2 emission per GDP, which is 21,0 tCO2e/bil. Rp in 2015, will be decreased to 8,6 tCO2e/bil. Rp in BaU scenario and to 6,2 tCO2e/bil Rp in CM scenario by 2030. Besides, CO₂ emission per capita is 1,8 tCO₂e/person in 2015 and will be increased by twice from 2015 to 2030 in BaU scenario. On the other hand, it will be reduced to 2,5 tCO,e/person from BaU scenario in CM scenario.

In conclusion, Semarang City has a potential to reduce CO2 emission corresponding to INDC of Indonesia. The city can be developed more effectively and efficiently with contribution to the mitigation of world climate change



Under BaU scenario, final energy consumption will have in-Under sail scenario, mai energy consumption we neve in-creased by 222 times in 2020 compared to 2015. The amount of creased by 4.42 times in 4180 compared to 4015. The amount of energy consumed, which was 8664 ktoe in 2015, will have increased ble 4 describes that the passenger e highest energy consumer with the most rapid growth of energy conpassenger transport sector, but in energy consumption of the commernes as much as that in 2015.

ENERGY DEMAND AND SUPPLY

ption in CM scenario will be 24% p owing to implementation of LCS vill be reduced significantly in the duction rate compared with BaU

III still dominate share of energy Jun to switch from oil to electricity n CM scenario. The commercial



iolar Electricity

energy demand

mated CO₂ emission. In BaU

creased 2.56 times from 2015

h the other hand, CO₂ emis-

tCO2e, which is equivalent to

III be the largest CO₂ emitter

increase in CO₂ emission in

sector, where CO₂ emission

90

99,8

00

352,8

55,6

99.

nd fuel (ktCO2e)

Gas

9.0

9.0

90

0.0

111,7

645.9

90

9.0

00

3,5

source such as sotar, wind, geothermail and biomass energy will have increased to 17% in CM scenario as the national power development nareaux unit in a nitron stemanto as une narros an pones verseupinen. Den is implemented (Figure 4): CO; emission factor will be improved from 10.07 tCO₂/toe in 2015 to 7.74 tCO₂/toe in 2030 CM scenario. Table 4. Final energy consumption by sector (ktoe) 2015 2030BaU 2030CM BaU/2015 CM/BaU terri 23.0 idential

163.0 139,5 57.8 7.08 enger transp 90.8 91.3 reight transport 678 1 1,57 1.050.8 682.9 6.3 1,55 337 866,4 1.920,3 1.452,9 2015 203000 20% 40% Energy mix in power generation · Coal

= Oil = Gas = Hydro = Solar, Wind, Geothermal = Biomass Figure 4. Energy mix in power generation

sector will have become the largest consumer of electricity by 2030

will have increased by 7,08 times compared to 2015, followed by the

minimume nurseau oy 7,00 times compared to 2013, raisoned by the registr transport sector (5.99 times) and the industry sector (5.7)

In CM scenario, the commercial sector and the passenger In Los semano, the cummercial sector and the presentation transport sector will lead emission reduction. The commercial sector transport sector will lead enursion reduction. The commercial sector will have achieved 37% reduction of CO, emission compared with with nave achieved 37% reduction or CO₂ emission compared with BaU scenario, while CO₂ emission will be reduced by 34% in the pas-

Indonesia Vol. 14, No. 2, regum

Pemerintah Kota Se

224,8 226,8 7,214 7.000 63,6 215,6 0.0 2.001,3 6.000 18,7 377,2 2.822,8 513,4 2.056,4 8 5.000 5.152 1.590,8 1.605,5 Freight transport 4.000 338,4 0.0 3.101,2 Passenger transport 3.000 112.1 ĉ 2.823 Residential 45,9 2.204,1 7.213,6 Commercial 2.000 1.694.2 Industry 1.003,5 1.016,5 1.000 285,6 75,6 2.055,9 0 1.487,6 5.151,6 2015 2030BaU 2030CM Figure 5, CO₂ emission

Regarding energy mix in power generation, share of renewable source such as solar, wind, geochermal and biomass energy will have

0.8

0,86

1,01

0.65

0.76

ONS/PROJECTS

Action 3: Smart Device

Action 3 is a group of LCS projects promoting energy efficient devices and equipment used in houses and offices. Total GHG emission reduction by projects of the action is 158,6 ktCO₂e. Projects for the commercial sector has large potential to reduce CO₂ emission reduction. Energy saving support scheme is a project that reduce energy consumption and 54.9 ktCO₂e of CO₂ emission

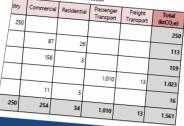
Action 4: Sustainable Transport

LCS projects for transport are included in Action 4. CO, emission reduction equivalent to 1.023,1 ktCO,e by this sector is largest among all actions, because the passenger transport sector emit more CO2 than other sectors. Modal shift to public transportation as well as promotion of fuel efficient vehicles are listed in this action, promoting high efficient motor bike is a project which have the largest moting high emicient motor bike is a project which have the largest potential to reduce CO₂ emission (262,4 ktCO₂e), followed by intro-

Action 5: Green Energy

Action 5 is a category for projects regarding electric power generation from renewable energy. 16 ktCO₂e of emission are reduced eration from renewable energy, to KNLOVE or emission are reduced by assumption that photovoltaic power generation systems and small-scale hydropower generation facilities are introduced in Sema-

ission reduction by action and sector



eferences of this research Source m Angka Tahun 2016 pennangi waano pengati aman ao no. Ireas Population Projections (From 6th Edition of World Urban Areas). D10 Version] GRDP At Current Market Prices by Industrial Origin Per Sector-Sub Sectr 110 Version] GRDP of Semarang Municipality at Current Market Prices [2010] by Type tistik, Provinsi Jawa Tengah (2015): Table Input Output Jawa Tengah 2013. j Kota - Kota Semarang Tahun 2000 - 2010 (Bagian Wilayah Kota I - X). a nota - Kota semarang Tantur 2000 - 2010 (aligner vinagram nota - n). esia (2011): Masterplan for Acceleration and Expansion of Indonesia's Economic nux Kendaraan Bermotor di Perkotaan: Aspek Permodelan. Jurnal Sains dan Teknologi 109. Badan Pusat Statistik, Indonesia (2017): Statistik Indonesia 2017. Indonesia 2050 Pathway Calculator - Panduan Penggi

- Re-Analysis of the Model structure
- Re check -Data Need Investigation and Assessment
- Re check availability of Data
- Re-Running the model and discussing the scenario
- Discussion with student and other academic view point
- Discussion with stakeholder concerning to practical utilization
- Considering local action concerning to local condition
- Fostering collaboration in local, national, Regional and global action in any possibility of situation

Thanks you so much for attention