



Research Activities toward Low Carbon City in Japan

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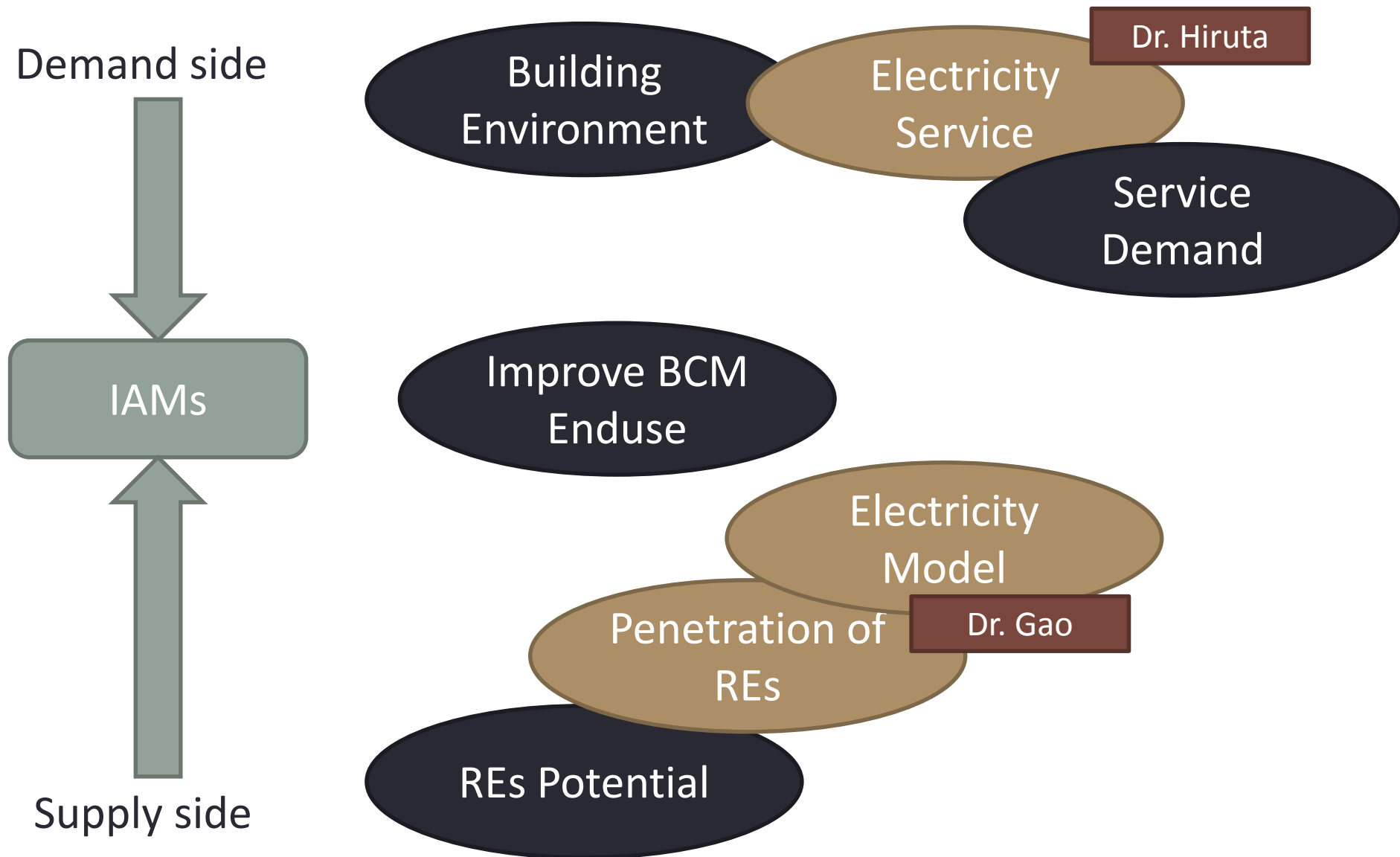
The presentation includes research outcomes from The Environment Research and Technology Development Fund (ERTDF, 2-1711) of Environmental Restoration and Conservation Agency and Ministry of the Environment, Climate Change Adaptation Research Program of NIES, the “Project to Promote CO₂ Technology Assessment (from FY2014-2017)” of Ministry of the Environment, Japan, and JSPS-DG-RSTHE Joint Research Project funded by the Japan Society for the Promotion of Science.

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KEYWORDS

- DEVELOPMENT
- DATABASE & DIAGNOSIS
- DISSERMINATION

DEVELOPMENT of Models and Tools



Analysis of Energy Service in Buildings

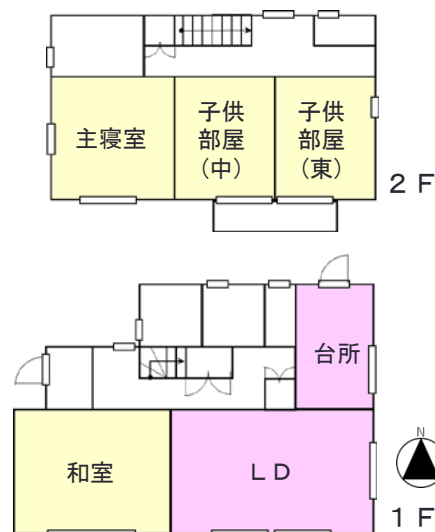
Cooling and heating demand in new/renovated **detached houses and multi-family buildings** are analyzed.

● Assumptions

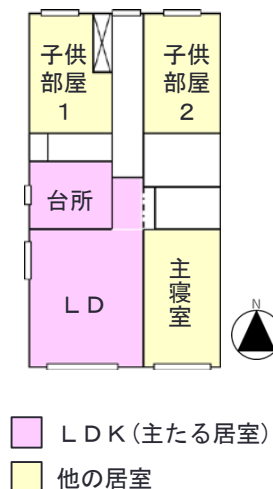
	Detached	Multi-family
Scale	120.08m ² LDK 29.81m ² Other area 51.35m ²	70.00m ² LDK 24.23m ² Other area 29.75m ²
Structure	Wood	RC
Installed System	Cooling: Airconditioner Heating: FF heater or Airconditioner	

Floor Map (Assumption)

【戸建住宅 概要図】



【集合住宅 住戸概要図】

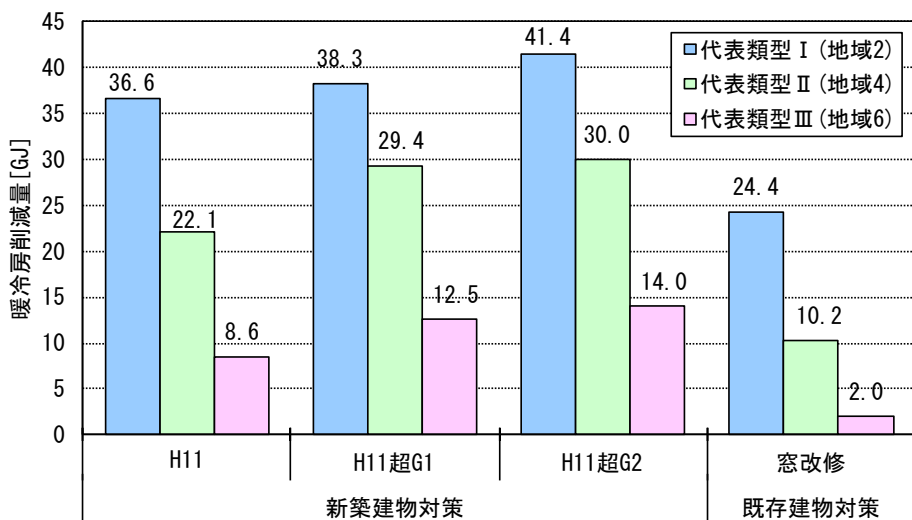


LDK (主たる居室)
 他の居室

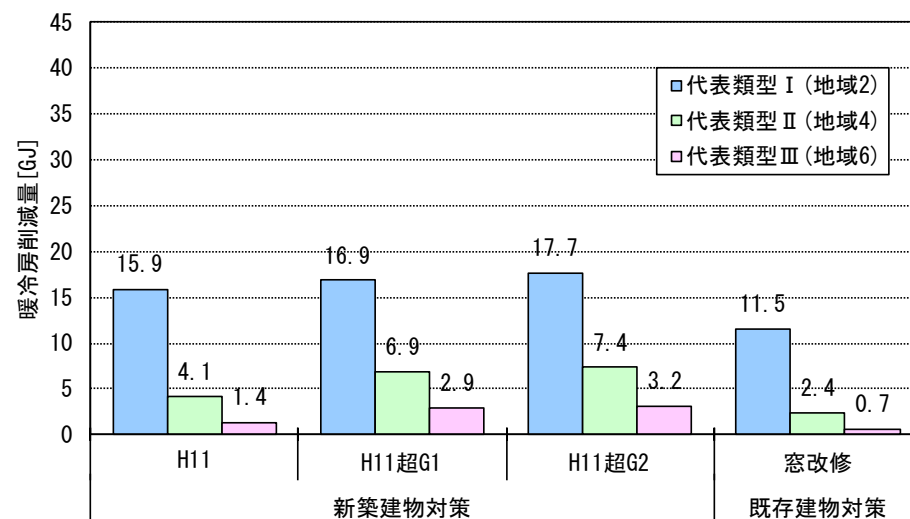
Results: Impacts of Insulation on S55 level

- Reduction in Hokkaido is larger than other areas.
- Impacts on multi-family buildings are less than that on detached due to area of outer wall.
- Shielding film leads to reduction in cooling demand but increase in heating.

● Results in Detached houses



● Results in Multi-family building (intermediate story)

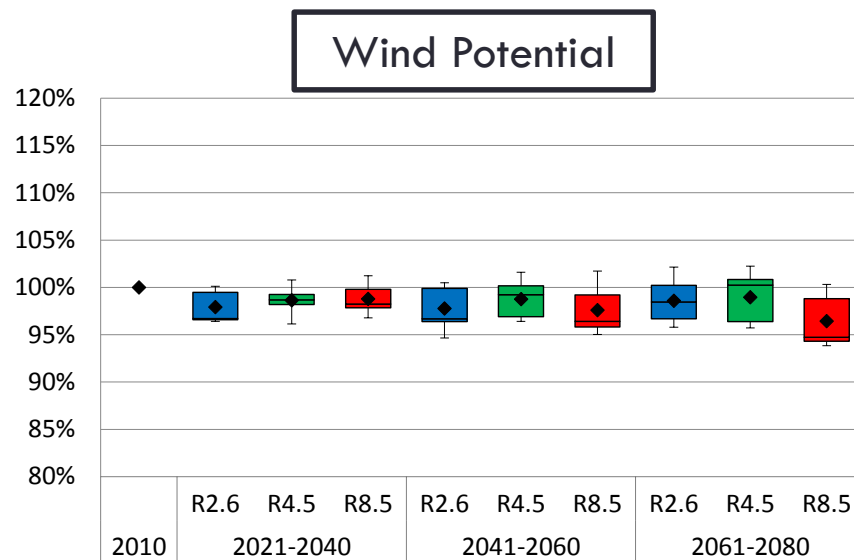
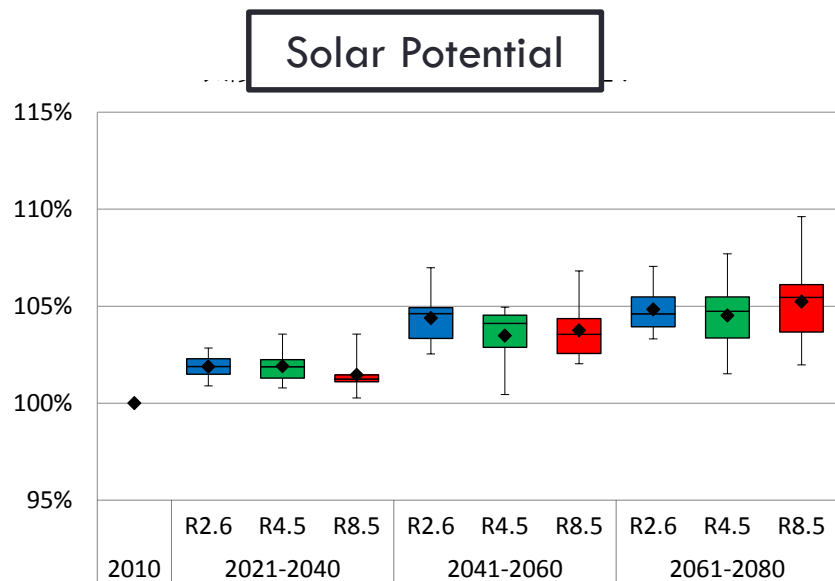


I: Hokkaido, II: Fukushima, III: Kitakyushu

Climate Change affects Solar and Wind Outputs

Renew-able but Vari-able over the Period

- Solar potential tends to increase from current level.
- Wind potential may decrease over the period even in RCP2.6 scenario.



7 GCMs are used for future climate change: GFDL-CM3, GFDL-ESM2M, IPSL-CM5A-LR, HadGEM2-ES, MIROC-ESM-CHEM, MIROC5, MRI-CGCM3.0

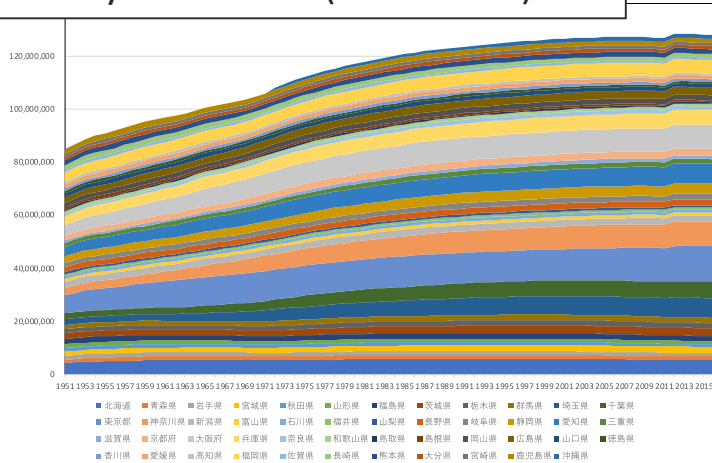
Regional climate information created by downscaling.

Target area: Fukushima Prefecture, 1km resolution DEM

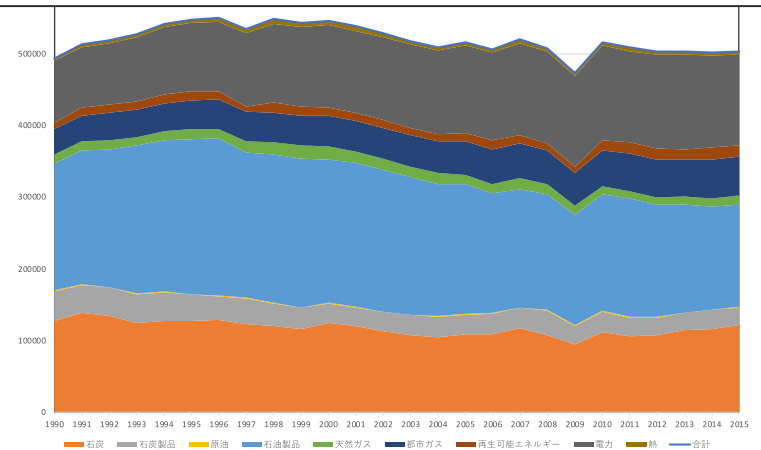
DATABASE Architecture

- Statistical data of socio-economic data has been collected by prefecture/municipality.

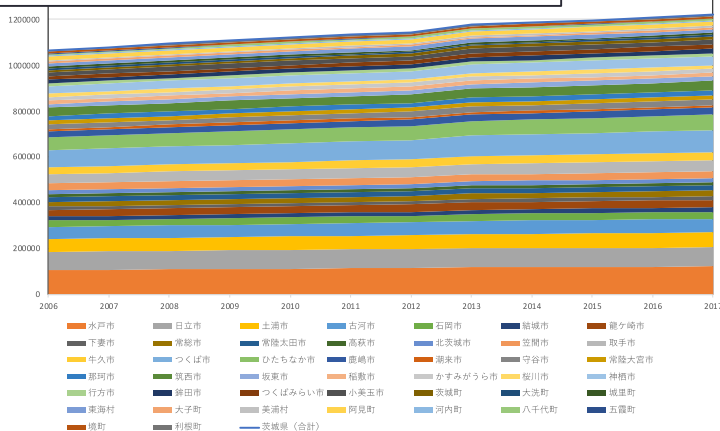
Population by Prefecture (1951-2015)



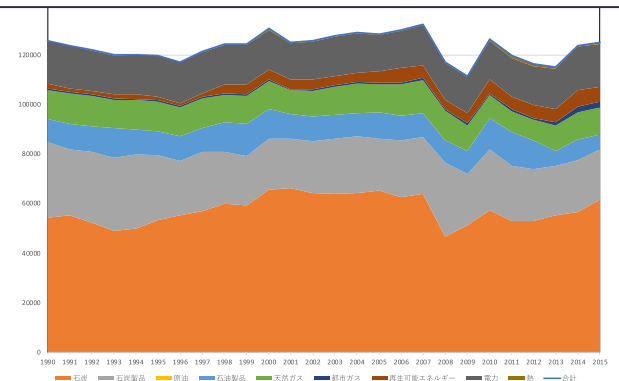
Energy Consumption in Fukuoka (1990-2015)



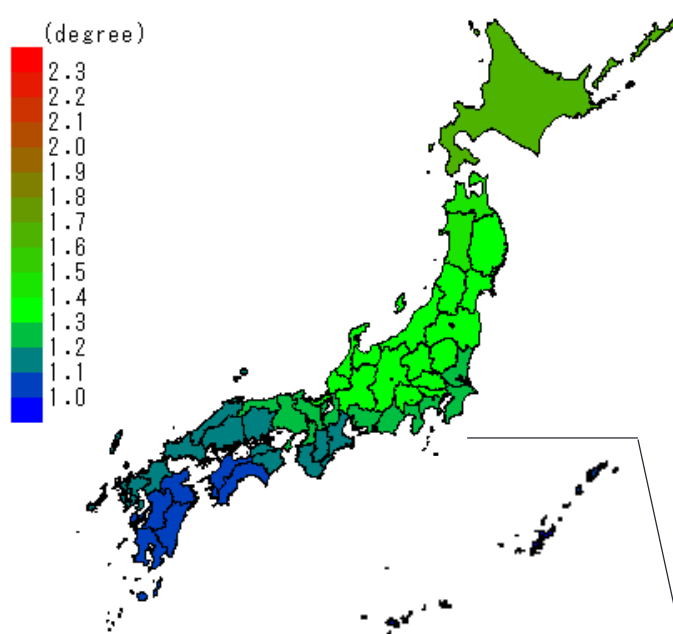
Households in Ibaraki (2006-2017)



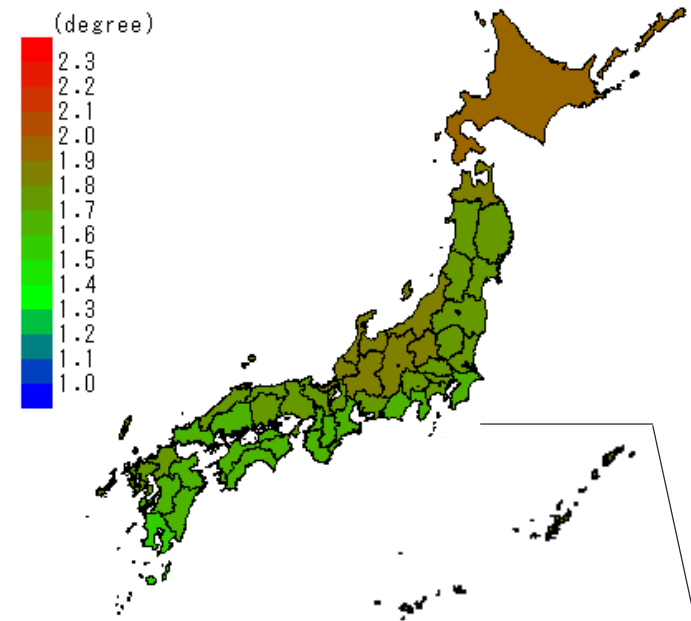
Energy Consumption in Steel Industry of Fukuoka (1990-2015)



Temperature change by Prefecture



Temperature change in 2030
(MIROC5, average of RCP2.6)



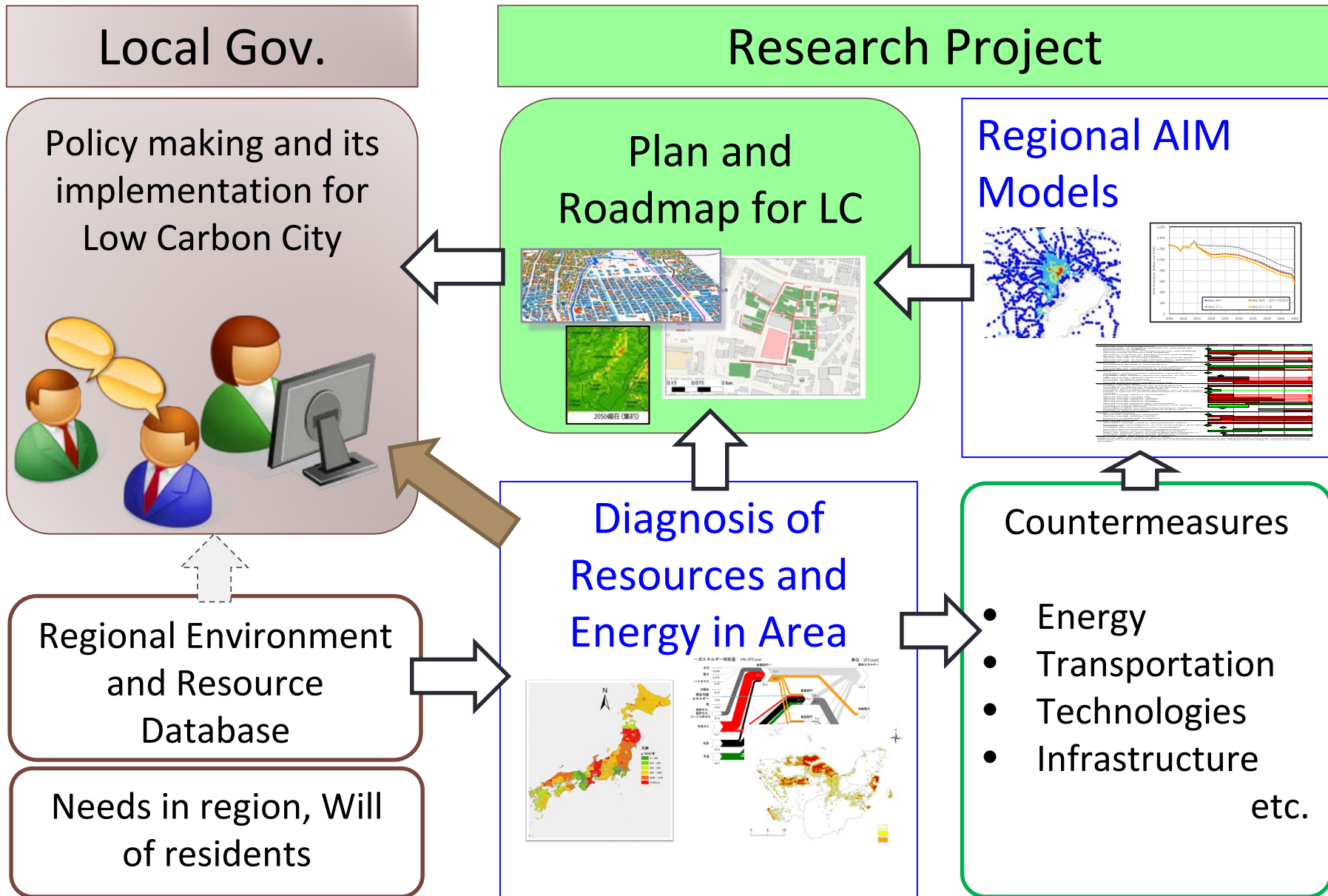
Temperature change in 2050
(MIROC5, average of RCP2.6)

■ Temperature change (ΔT)

[°C]

	都道府県	MIROC5			MRI		
		rcp2.6	rcp4.5	rcp8.5	rcp2.6	rcp4.5	rcp8.5
2030年 (2021-2040年の平均値)	北海道	1.68	1.71	1.35	0.58	1.04	0.95
	福島県	1.34	1.34	1.22	0.33	0.60	0.64
	福岡県	1.13	1.03	1.20	0.38	0.54	0.65
2050年 (2041-2060年の平均値)	北海道	1.98	2.26	2.69	0.97	1.55	1.88
	福島県	1.75	1.94	2.41	0.68	1.27	1.31
	福岡県	1.72	1.69	2.31	0.68	1.28	1.32

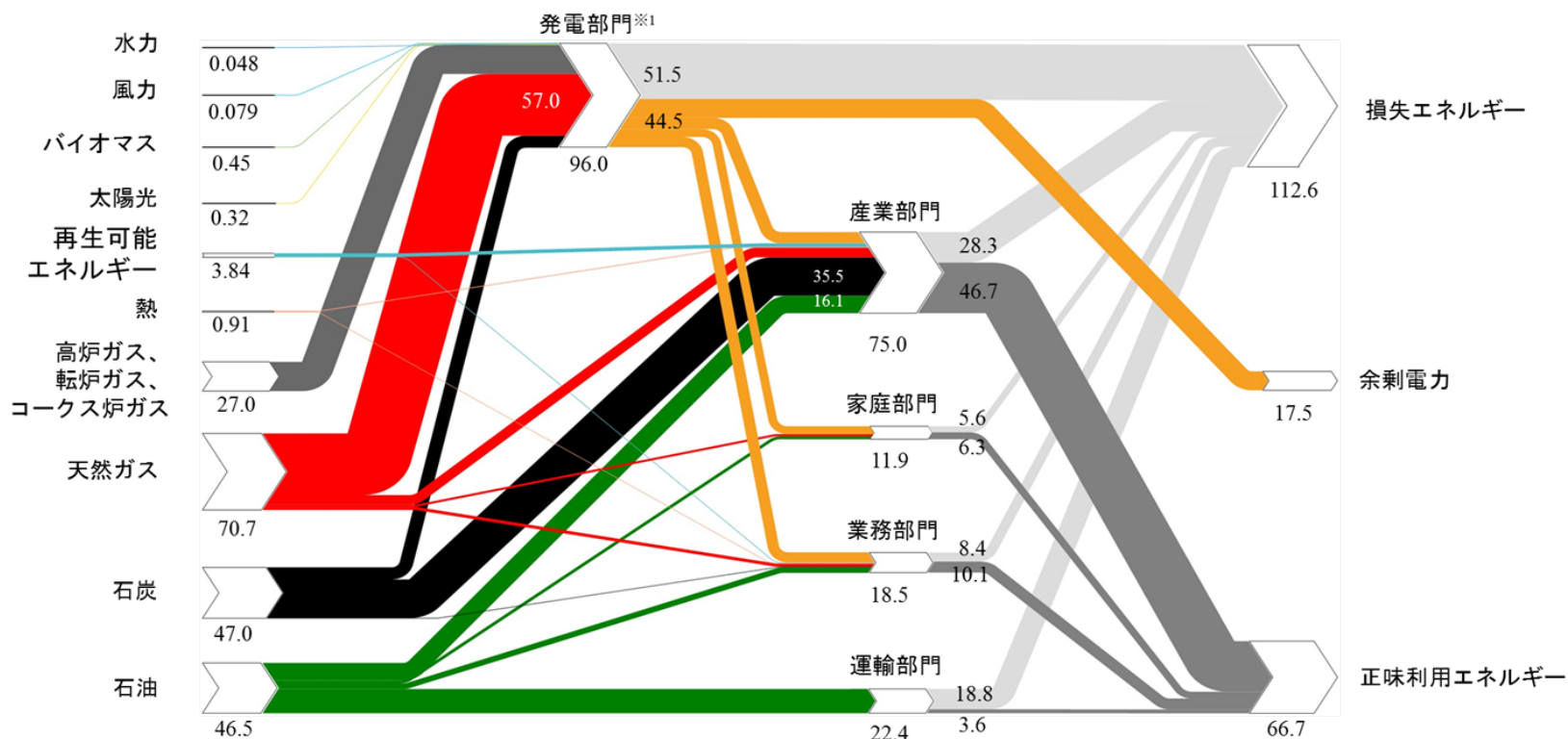
DIAGNOSIS of Area



Energy Flow in Kitakyushu

一次エネルギー供給量：196.8PJ/year

単位：[PJ/year]

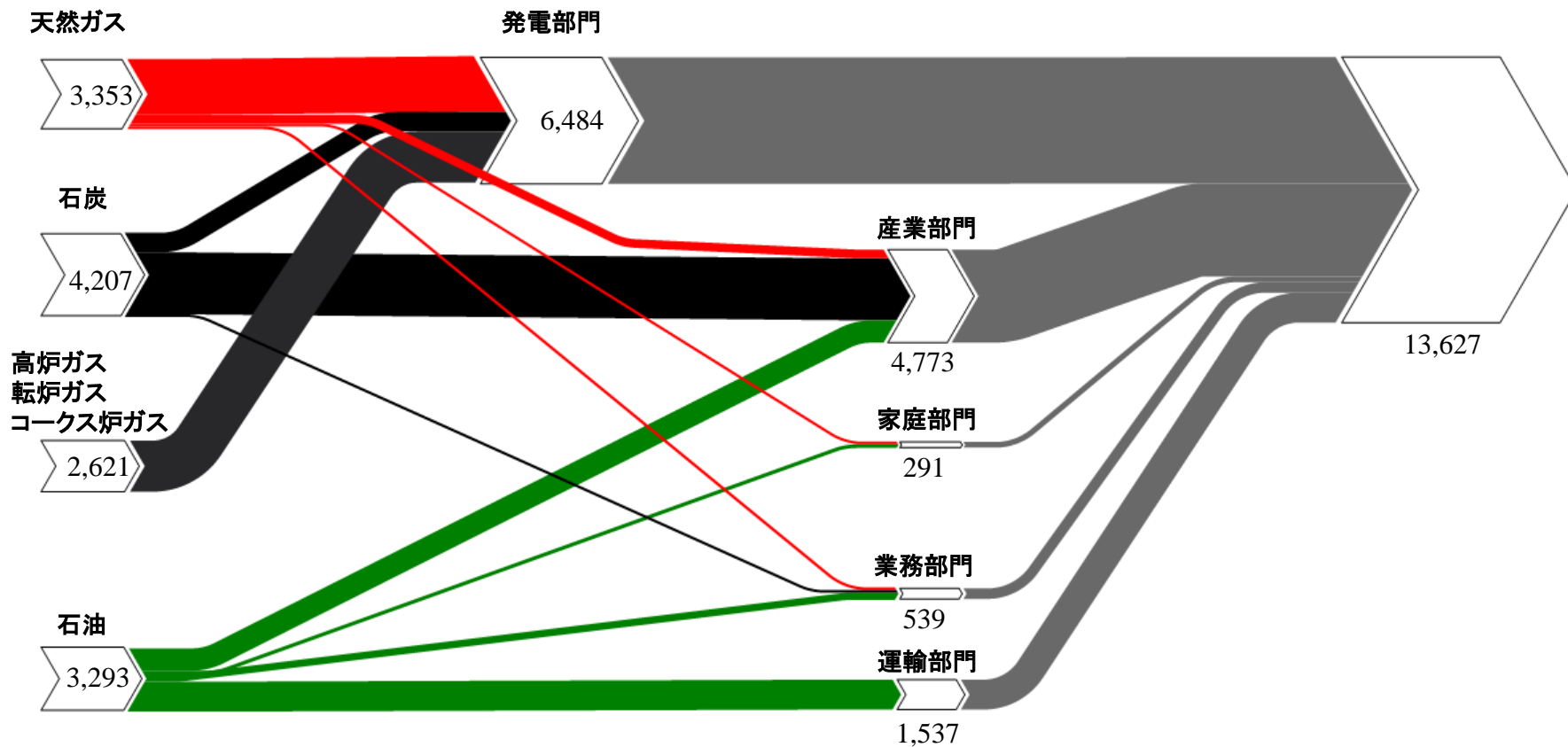


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 国土交通省国土政策局国土情報課, 国土数値情報ダウンロードサービス 発電施設
 九州電力, 九州電力データブック2014
 経済産業省, 工業統計, 2014
 福岡県HP, 福岡県の工業統計, 2014
 総務省統計局, 国勢調査, 2015
 国土交通省九州運輸局, 各県市町村別保有車両数, 2017
 etc.

※1: 戸畑共同火力については、3,4,5号機が高炉ガス、転炉ガス、コークス炉ガス、2,6号機が石炭による発電と仮定。

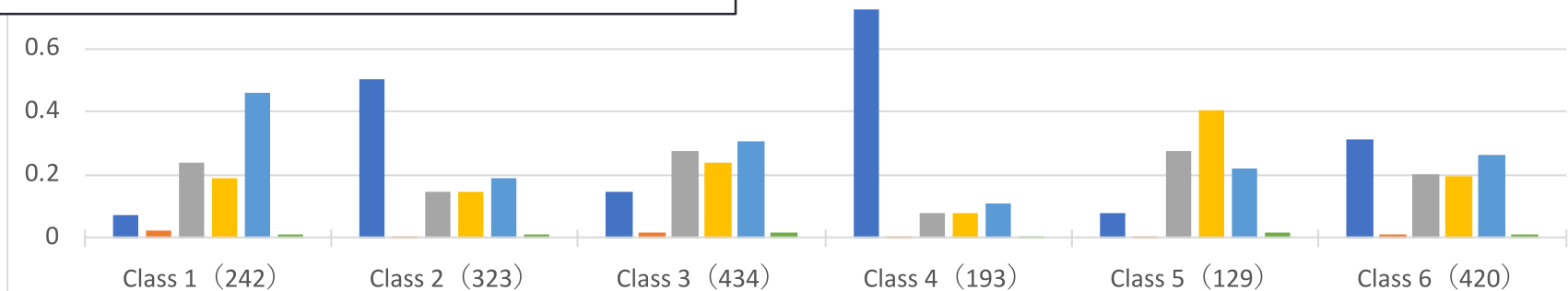
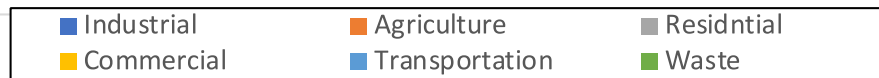
July 3, 2017 N.Murakata @Nakata lab.

Carbon Flow in Kitakyushu



Classification of Region

Region classified into 6 category based on composition of sectoral CO2.



Transport High
 Industrial Mid
 Res and Ind H
 Industrial High
 Res High
 Silimar

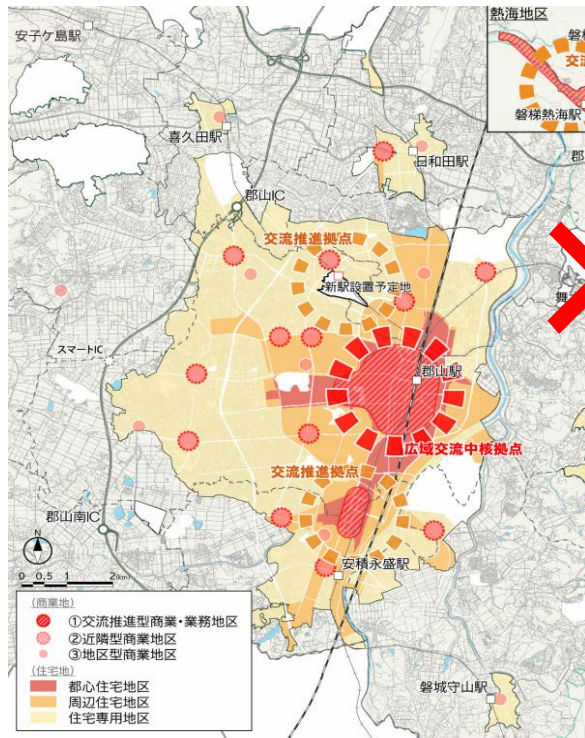
Energy Saving Standard

	Transport High	Industrial Mid	Res and Ind H	Industrial High	Res High	Silimar
1	真狩村 (2)	根室市 (21)	旭川市 (44)	別海町 (4)	留寿都村 (5)	釧路市 (19)
2	新篠津村 (6)	石狩市 (16)	葛巻町 (30)	室蘭市 (3)	札幌市 (7)	小樽市 (17)
3	孺恋村 (42)	八戸市 (9)	三島町 (72)	忍野村 (5)	盛岡市 (9)	日光市 (53)
4	下仁田町 (30)	小美玉市 (35)	南相馬市 (48)	大衡村 (11)	仙台市 (3)	郡山 / 新地 (65)
5	小国町 (51)	彦根市 (102)	桐生市 (110)	日立市 (55)	甲府市 (19)	つくば市 (108)
6	伊方町 (48)	川崎市/北九州 (124)	鳥取市 (91)	四日市市 (111)	千代田区 (67)	静岡市 (140)
7	南大隅町 (49)	水俣市 (15)	安芸市 (28)	銚子市 (4)	熱海市 (4)	高知市 (18)
8	今帰仁村 (14)	西原町 (1)	糸満市 (11)	(0)	那覇市 (15)	(0)

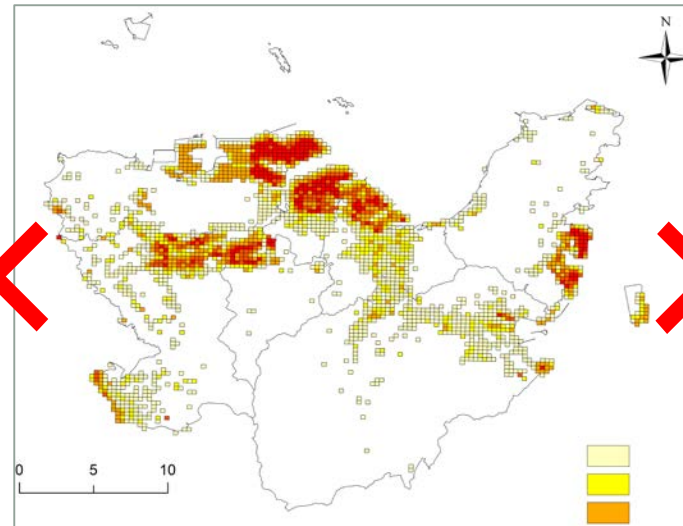
Low Carbon City Planning with Climate Change Risk Management

- City planning may adjust with consideration for regional climate change risk, such as flood, landslides and tsunami.
- Take risk or avoid risk?

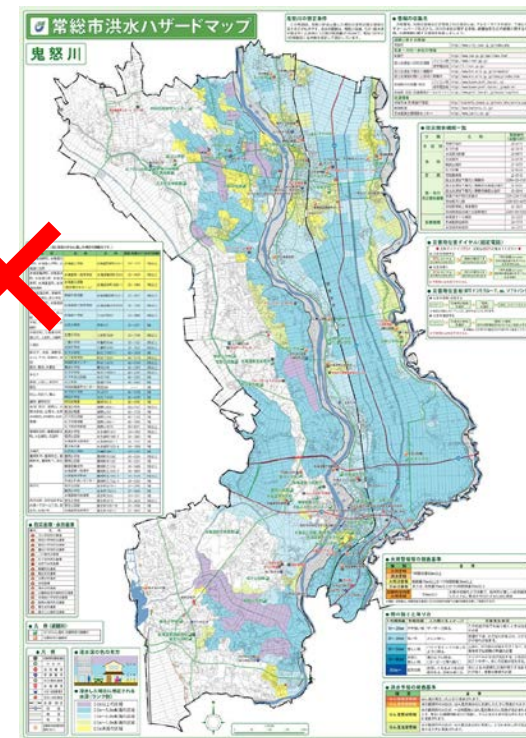
City Planning



Renewable Potential

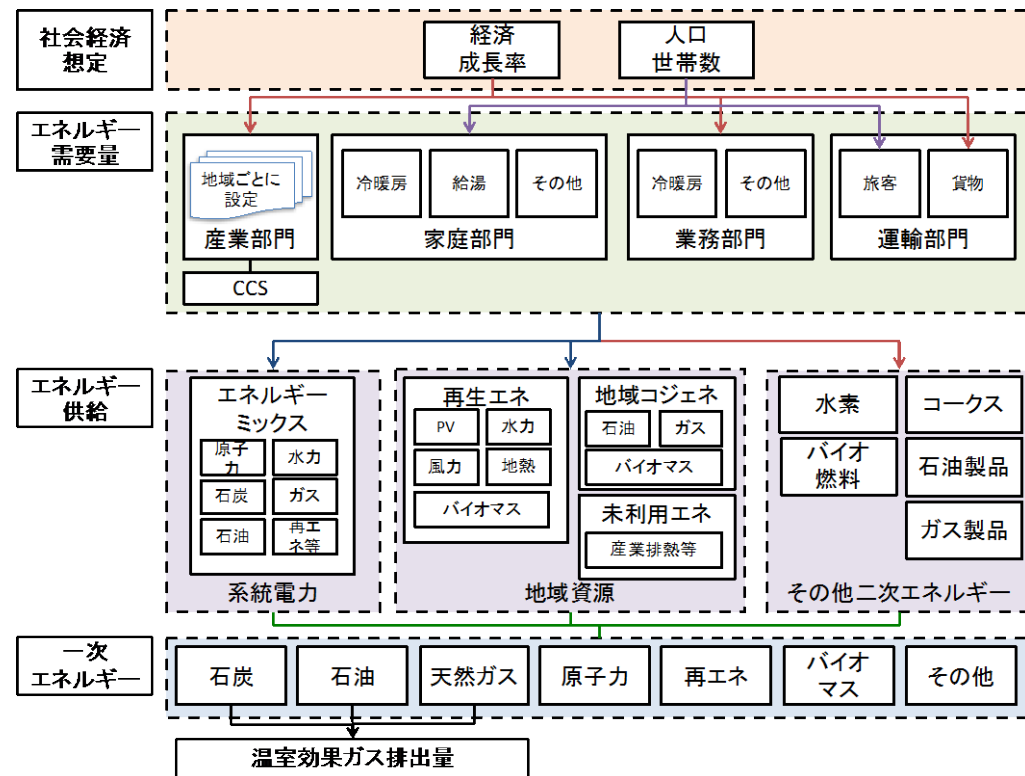
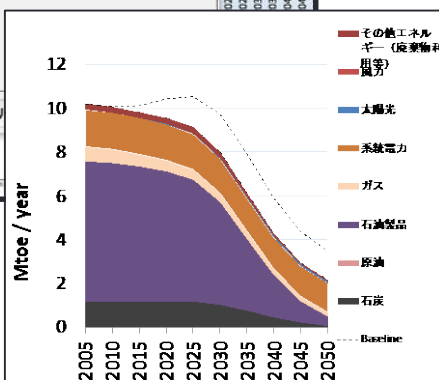


Risk of Flood



DISSERMINATION of Tools and Results

- Excel-based tool for regional Low Carbon Scenario Analysis has been developed.
- Trial experiment has been conducted in Kawasaki Workshop with citizens, businesses and city council members.



Overview of Tool and Trial WS

Structure of Regional Tool

Current Research Questions



(1) What is National/Regional Targets and Actions towards the SDGs in Asia?

(2) How to Design Roadmaps/Pathways towards the SDGs at Regional Scale?

Sustainable Society

Now

2015 2020 2030 2040 2050

(3) How to Monitor Progresses and Impacts of Actions (or MRV for Actions) towards the SDGs?

(4) How to Integrate (1) to (3), and the Role of S&T