

Research Project on Reviewing Long-term Mitigation Pathways and Strategies toward LCS in Japan

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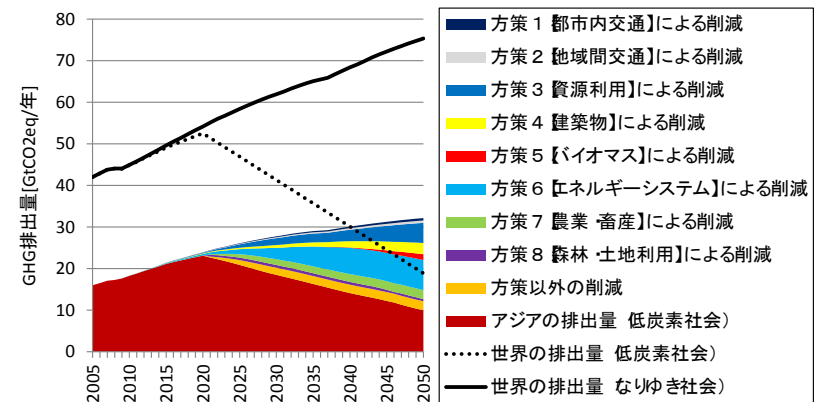
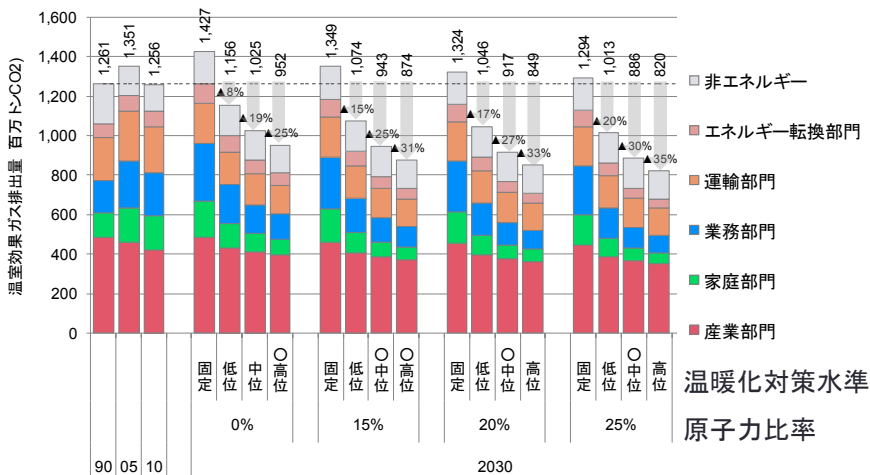
The presentation includes research outcomes from The Environment Research and Technology Development Fund (ERTDF: 2-1402, 2A-1103 and S-6) of Ministry of the Environment, Japan.

The 20th AIM International Workshop
January 24, 2015 at Ohyama Memorial Hall, NIES, Tsukuba

Necessity of Reviewing Pathways and Strategies in Japan: Turning Energy and Environmental Policy Situation

- After Great East Japan Earthquake on March 11, 2011 and Fukushima Nuclear Power Plant Accident, Japan's energy policy forced to change from conventional way of thinking.
- Low Carbon Society Scenario also faces revision by the accident and domestic/international situation change.
 - Restarting policy discussion for mid-term target of GHG emissions at the Central Environmental Council and Energy and Environment Council.
 - Statement of re-design of 2020 Target by PM Abe at 2013.
 - Publication of IPCC AR5 Reports.
 - At the COP19, all Parties are invited to initiate domestic preparations for their intended nationally determined contributions and to communicate them well in advance of the COP21 (by the first quarter of 2015 by those Parties ready to do so).

[Past Research Activity and Outcomes on Japan and Asia LCS Research]

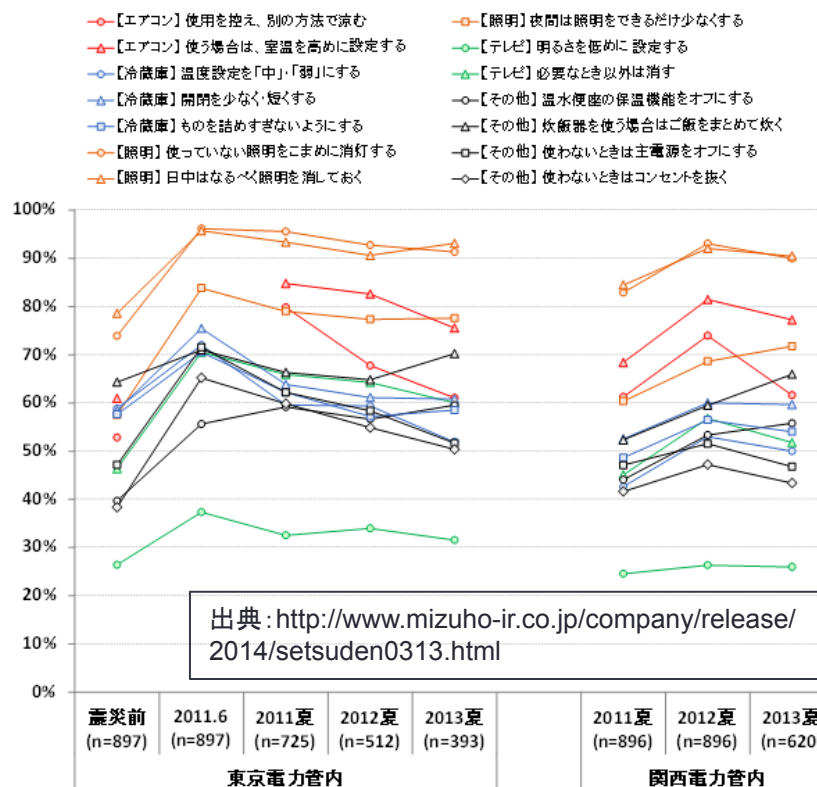


Bottom-up analysis on GHG reduction target in 2030 by AIM/Enduse Model (Low Growth Case)

Pathways to Low Carbon Asia and Wedges of 10 Actions by using AIM/CGE[Global]

Key points for Re-designing LCS Scenarios (1): New Social Trend on Energy and Environment after 3.11

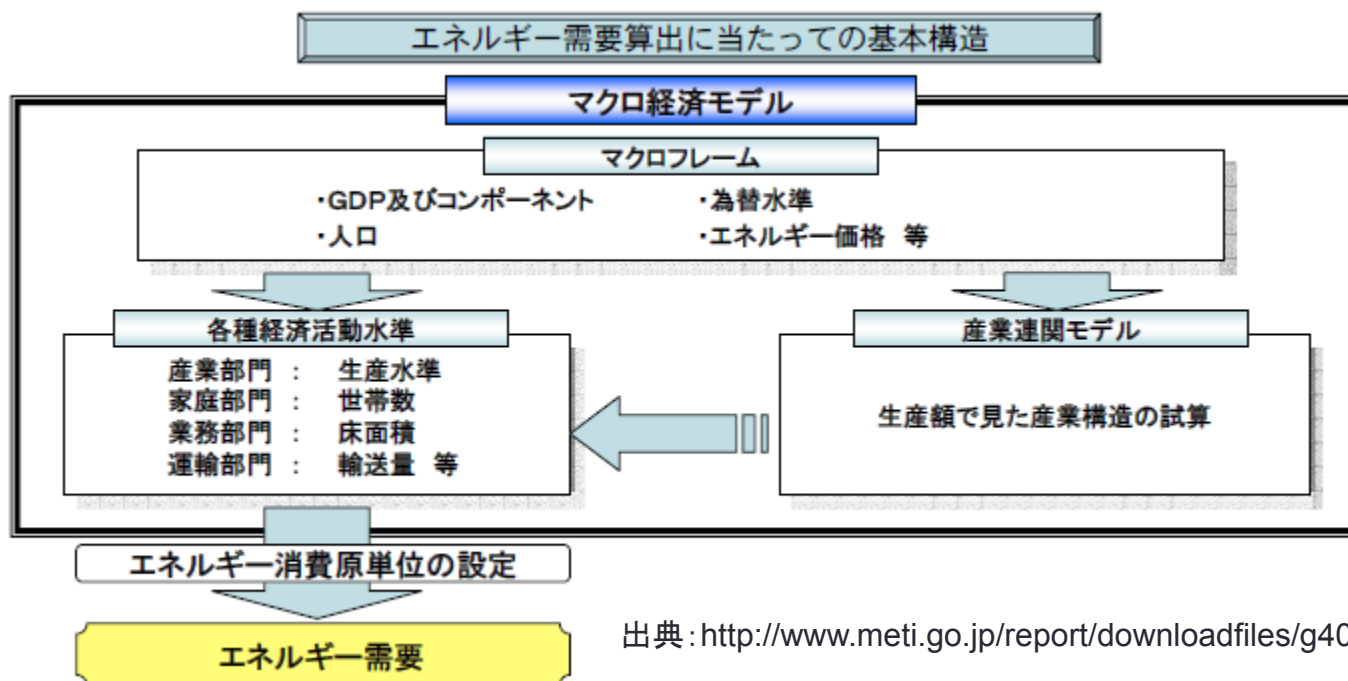
- Energy (esp. electricity) saving activity become common after experience of tight electricity supply summer of 2011.
- FIT scheme, implemented on July 2012, accelerates installation of renewable energies such as Solar PV and Wind power.
- Actions for energy saving and GHG reduction are widely accepted in Japan.



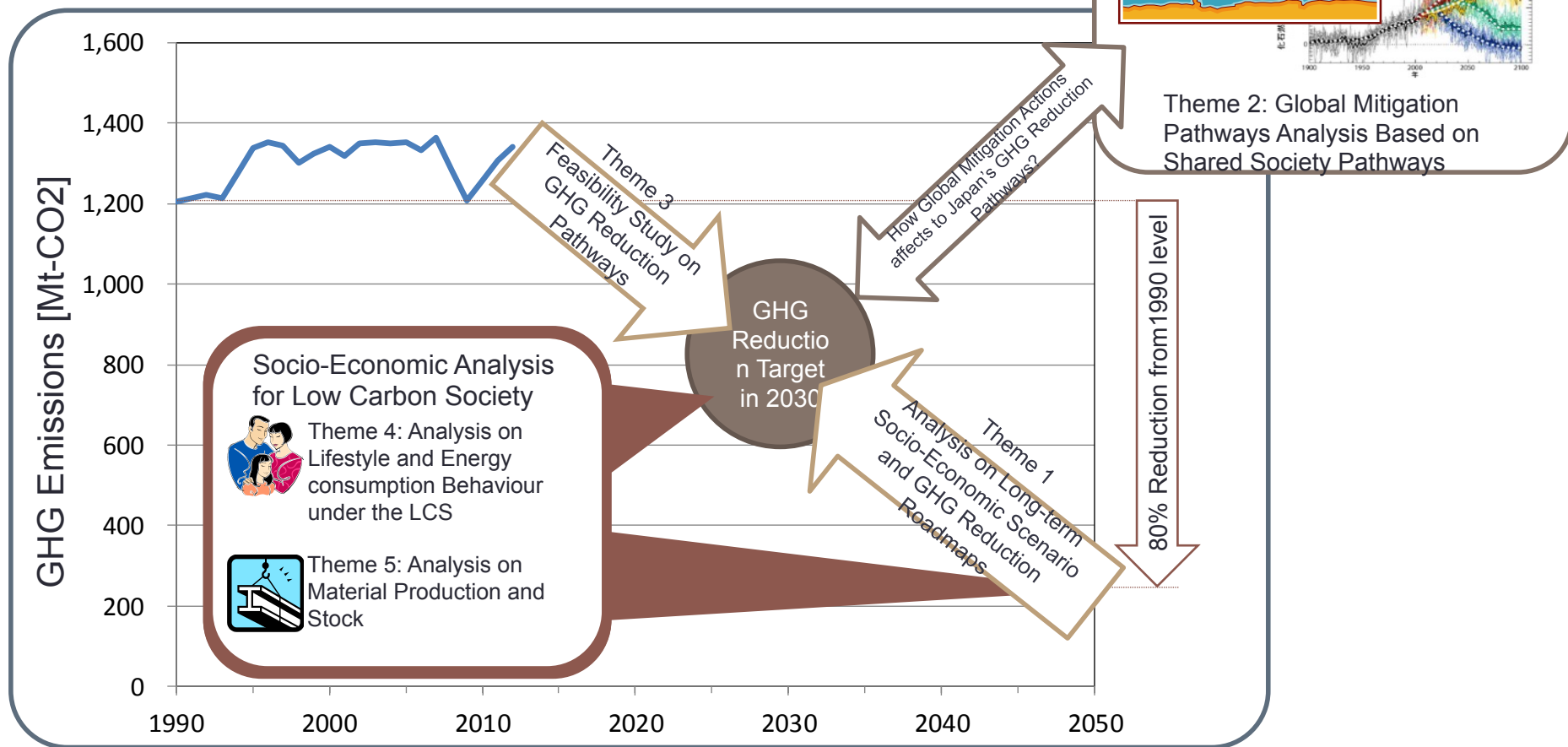
Execution Rate of Energy Saving Actions

Key points for Re-designing LCS Scenarios (2): New Socio-Economic Scenarios after 3.11

- 3.11 also affects Socio-Economic situation, such as population, energy/ electricity price, economic growth, consumer behaviour and material stocks.
- Low carbon actions not only levy monetary loads to consumers, but also gives occasion of economic growth, so-called 'green growth', through market vitalization of energy efficiency appliances.
- New Socio-Economic scenarios, which includes green growth and other co-benefits of taking actions for LCS, need to depict for designing Deep Decarbonization Pathways for Japan.



Overview of the 2-1402 Project



Japan's Opportunity for Shifting to the New Society Era through Achieving Deep Decarbonization Pathways

- Identifying Socio-Economic Scenarios for Achieving Deep Decarbonization
- Designing Desirable GHG Mitigation Pathways after 2020 for Japan and the World
- Determining Future Visions for Industrial Structure considering Green Growth Actions.
- Depicting New Growth Strategy for Low Carbon Society for Opening Technology and Society Innovations.



2-1402 Project Structure and Core Models for the Analysis

Socio-Economic Analysis for Low Carbon Society

Household Energy Service Model

Theme 4: Analysis on Lifestyle and Energy consumption Behaviour under the LCS

- Analysis of Relationships between Lifestyle and Energy Consumption Behaviour
- Designing Lifestyle under the Low Carbon Society

Theme 5: Analysis on Energy-intensive Material Production and Stock

- Estimation of Future Material Stock
- Evaluation of Future Demands of Material Production

Material Stock and Flow Model

Analysis on Socio-Economic Scenarios and GHG Reduction Pathways for Japan

Theme 3: Feasibility Study on Japan's GHG Reduction Target in 2030

- Quantification of Socio-Economic Situations
- Detailed Analysis on Socio-Economic Scenarios and Technology Diffusion Pathways
- Analysis of Robustness of GHG Reduction Target in 2030

AIM/Enduse[Japan]
AIM/CGE[Japan]

Theme 1: Analysis on Long-term Socio-Economic Scenario and GHG Reduction Roadmaps

- Analysis on Socio-Economic Scenario and GHG Reduction Roadmaps toward 2050
- Analysis on Opportunity on Green Growth
- Designing New Growth Strategy for Japan

Backcasting Model

Designing New Socio-Economic Scenarios for the World

Theme 2: Analysis on Global Mitigation Scenarios

- Analysis on Long-term Socio-Economic Scenarios in Global Scale
- International Model Comparison
- International Policy Comparison

AIM/CGE[Global]

2-1402 Project Members

Socio-Economic Analysis for Low Carbon Society

Household Energy Service Model

Theme 4: Analysis on Lifestyle and Energy consumption Behaviour under the LCS

(Leader) Yuko Kanamori

Theme 5: Analysis on Energy-intensive Material Production and Stock

(Leader) Reina Kawase

Material Stock and Flow Model

Analysis on Socio-Economic Scenarios and GHG Reduction Pathways for Japan

Theme 3: Feasibility Study on Japan's GHG Reduction Target in 2030

(Leader) Go Hibino
 - Oka Kazutaka
 - Kazuya Fujiwara
 - Yuko Motoki
 - Ken Oshiro

AIM/Enduse[Japan]
 AIM/CGE[Japan]

Theme 1: Analysis on Long-term Socio-Economic Scenario and GHG Reduction Roadmaps

(Leader) Shuichi Ashina
 - Toshihiko Masui
 - Junichi Fujino
 - Tatsuya Hanoaka

Backcasting Model

Designing New Socio-Economic Scenarios for the World

Theme 2: Analysis on Global Mitigation Scenarios

(Leader) Shinichiro Fujimori

AIM/CGE[Global]

2-1402 Project Structure and Core Models for the Analysis

Socio-Economic Analysis
for Low Carbon Society

Analysis on
Lifestyle and
Energy
Consumption
Behaviour

Theme 5: Analysis on
Energy-intensive Material
Production and Stock

- Estimation of Future
Material Stock
- Evaluation of Future
Demands of Material
Production

Material Stock and
Flow Model

Analysis on Socio-Economic Scenarios and GHG Reduction
Pathways for Japan

Feasibility Analysis on Deep
Decarbonization by
Technology in Japan

Designing New
Socio-Economic
Scenarios for the
World

AIM/CGE[Global]

Theme 2: Analysis on Global
Mitigation Scenarios

- Analysis on Long-term Socio-
Economic Scenarios in Global
Scale
- International Model Comparison
- International Policy Comparison

Feasibility Analysis on Deep Decarbonization in Japan (1):

Methodology

By Ken Oshiro, Toshihiko Masui, Go Hibino, Mikiko Kainuma

- AIM/Enduse Model is applied to the analysis
 - Dynamic recursive, technology selection model for the mid- to long-term mitigation policy assessment
- Major low carbon technology options are:

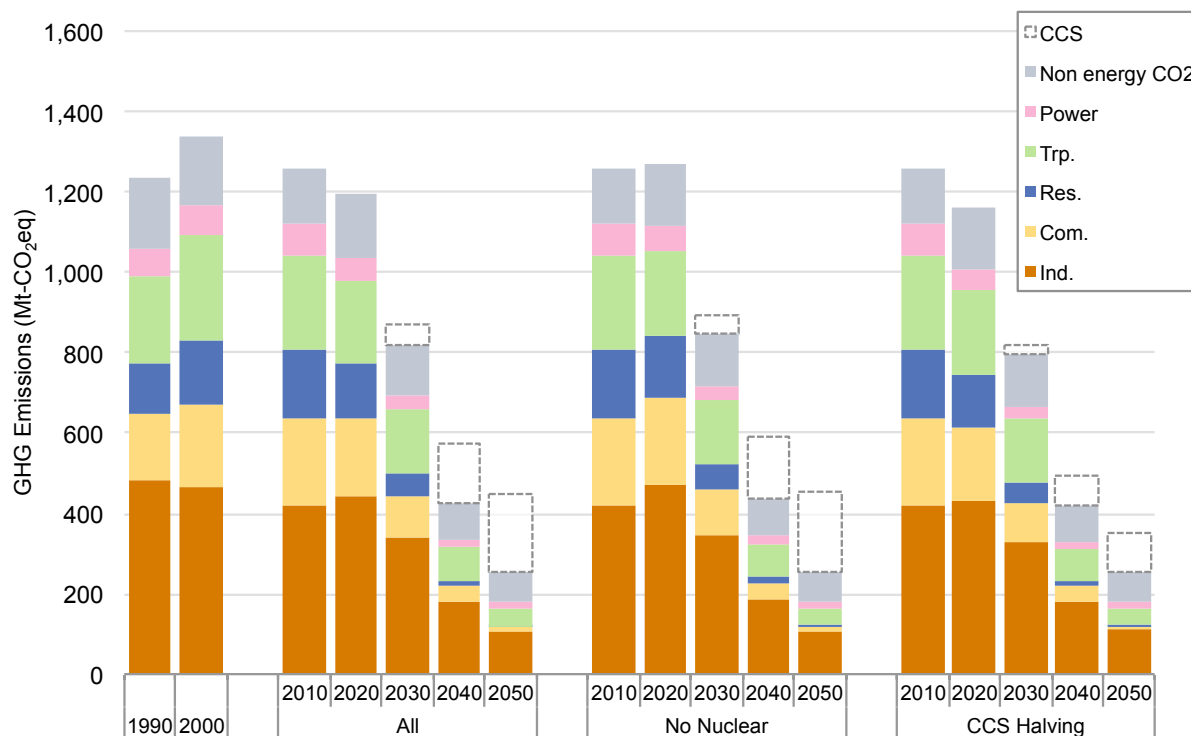
Electricity generation	Efficiency improvement of power generation, coal and gas with CCS , reduced T&D (Transmission & Distribution) line losses, wind power, solar PV, geothermal, bioenergy
Industry	Energy efficiency improvement, electrification wherever feasible in industrial processes, natural gas use, CCS for iron making and cement lime, fuel economy improvement of agricultural machine, bioenergy use, nitrogen fertilizer management
Buildings	Improvement of the energy efficiency performance of buildings, high-efficiency equipment and appliances, electric heat pump water heaters, energy management system
Transport	Energy efficiency improvement, gas-powered heavy duty vehicles (HDVs), vehicle electrification, hydrogen vehicles

Feasibility Analysis on Deep Decarbonization in Japan (2):

Results

By Ken Oshiro, Toshihiko Masui, Go Hibino, Mikiko Kainuma

- GHG Mitigation Pathways toward 2 degree target is investigated by using AIM/Enduse.
- Even availability of technology will be limited such as no nuclear and CCS halving, Japan has a window for achieving 80% reduction in 2050, under the condition of enhancing renewables.

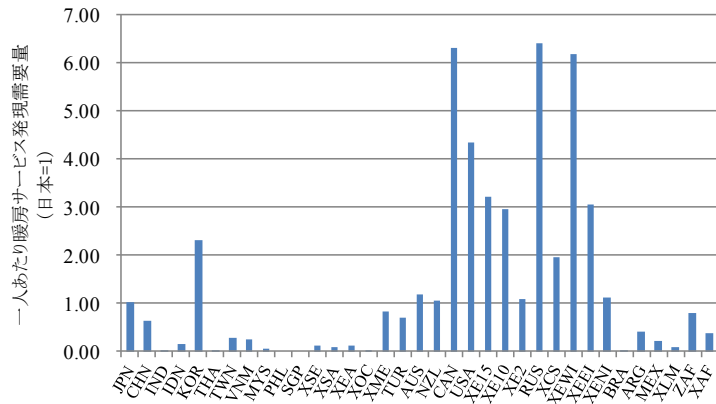


Results are delivered to the DDPP (Deep Decarbonization Project) by UN/SDSN

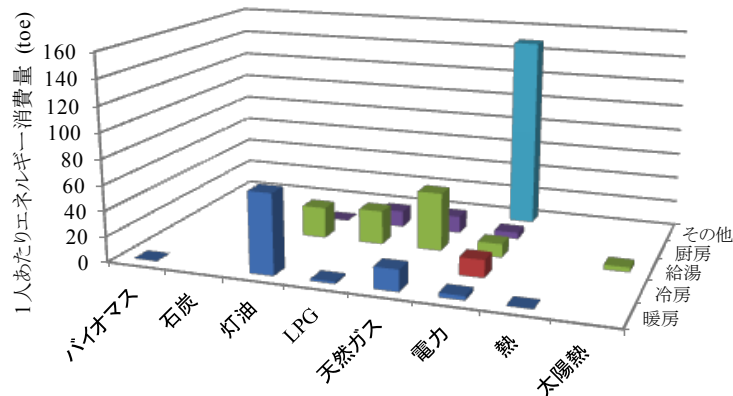


Overview of Analysis on Lifestyle and Energy Consumption Behaviour under the LCS (1) By Yuko Kanamori

Space Heating Service by Region in 2005



Energy Consumption per capita by Energy Service in 2005



Analysis of Current Situation

Development of Energy Service Model

Inputs

- Types of Household Energy Service: 6-8 type
- Regional Classification: 35 regions in global scale
- Explicit demands and implicit demands are classified.

Outputs

- Regional Energy Service demand per household by energy service



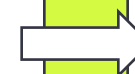
Analysis on Energy Consumption Behaviour

Inputs

- Characteristics on regional demand structure
- Parameters for implicit demands of household energy consumptions

Outputs

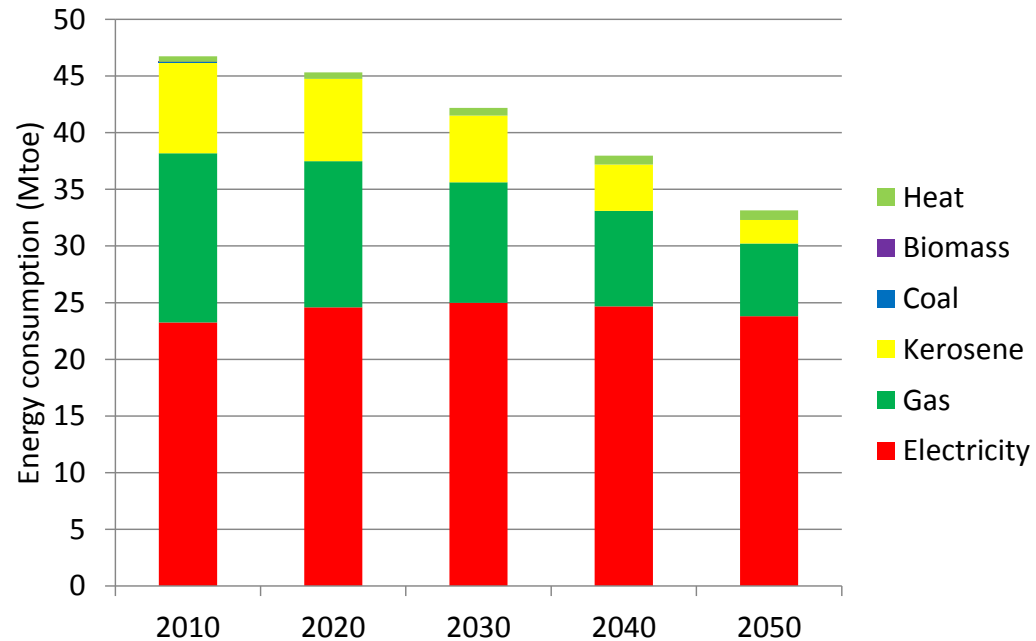
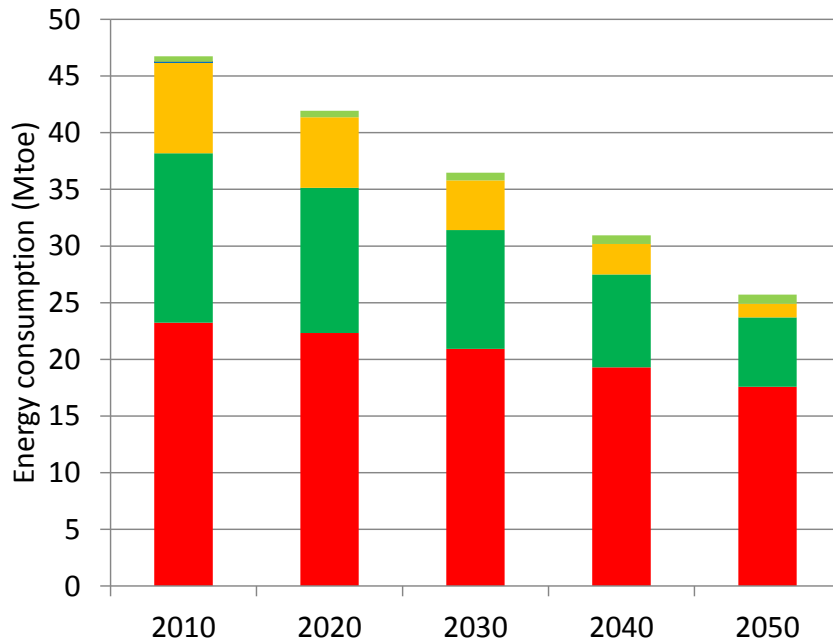
- Regional Energy Service demand per household
- Lifestyle and Energy Consumption Behaviour



Output from Analysis on Lifestyle and Energy Consumption Behaviour under the LCS (2) By Yuko Kanamori

FIX case

BaU case



Energy service demand scenario:

FIX case: Continue 2010 level

BaU case: Extrapolate past trends about floor space, time use, rate of eating at home, bathing style, and possession of electric device

Future device scenario:

Increase in electric device / Improve efficiency of electric device

Expected Outcomes from the Project (1)

Strategies for Diffusion of Low Carbon Technology in Japan and the World

(a) Identification of Required Technology Level for Japan and Global LCS

- By combining Japan's analysis and global scale analysis, required technology level for given climate stabilization goals could be analyzed both for Japan and global scale.

(b) Evaluation of Contribution of Japan's Technology for Global Mitigation Scenarios

- Through scenario analysis for technology diffusion of Japan's technology, potentials of GHG reduction of the technologies could be evaluated.

Designing Visions for Future Society and Energy Consumption Behaviour

(a) Identification of Consumption Behaviour under the Low Carbon/Mature Society

- Through analysis of industrial structure and material stock in Japan and Global scale, Low Carbon actions under the mature society could be designed.

(b) Designing strategy for Low Carbon and Resilient Society

- The society visions which could be secured from energy supply interruption due to disaster and lack of stability of international situation, could be designed through scenario analysis for energy-related crisis such as energy price change and restriction of energy supply,

Expected Outcomes from the Project (2)

Strategies for Achieving Long-term Deep Decarbonization Pathways for Japan

(a) Designing Strategies for Overcoming Lock-in Effects

- Strategies for avoiding lock-in effects of technology, infrastructure, social capitals, and lifestyles could be determined through the analysis of deep decarbonization pathways for Japan.

(b) Development Tools for Stakeholder Communication on GHG Mitigation Pathways

- Low Carbon Navigator has been developed and will be applied to stakeholder dialogue and/or communication with citizens to getting wider interests on Deep Decarbonization Pathways.

Dialogue with Policymakers in the field of GHG Mitigation Strategies

(a) Proposing 2030 Target in 2030 in line with Deep Decarbonization Pathways

- Long-term mitigation scenarios and pathways for Deep Decarbonization could be proposed by combining short-/mid-term detailed analysis and long-term broad scenario analysis.

(b) Designing Japan's Strategy for Contributing Asia Low Carbon Society

- Contribution of transferring Japan's technology and institutional systems to reduction of GHG emissions in Asia could be identified.