AIM
ASIA-PACIFIC INTEGRATED MODEL
http://www-iam.nies.go.jp/aim/


LOW-CARBON ASIA SCENARIOS and ACTIONS
http://2050.nies.go.jp/LCS/

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

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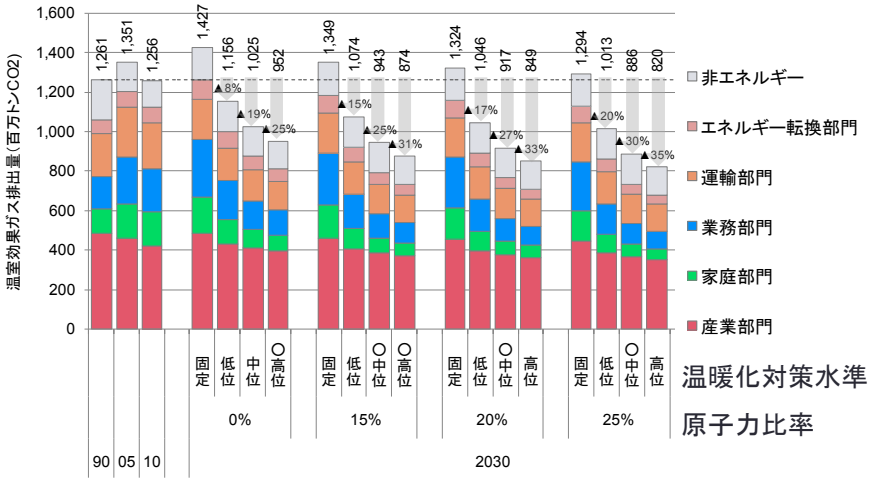
The presentation includes research outcomes from The Environment Research and Technology Development Fund (ERTDF: 2-1402, 2A-1103 and S-6) of Ministry of the Environment, Japan.

Report Seminar of DDPP and Debrief Session of the Environment Research and Technology Development Fund 2-1402
Oct 7, 2014 at Kuramae Hall, Tokyo Tech Front

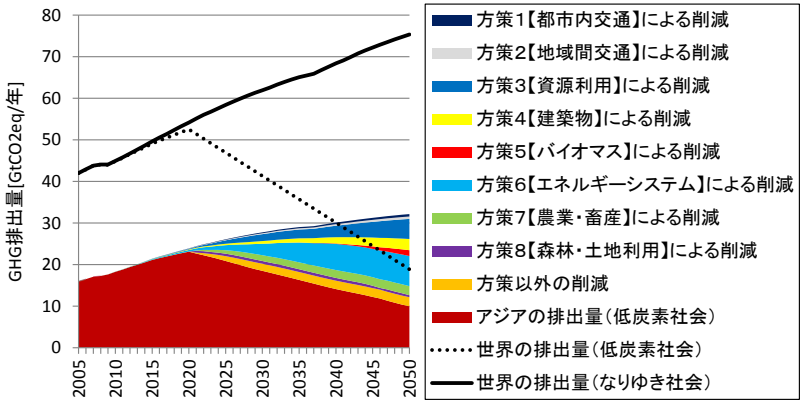
Necessity of Deep Decarbonization Pathway in Japan: Turning Energy and Environmental Policy Situation

- 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)

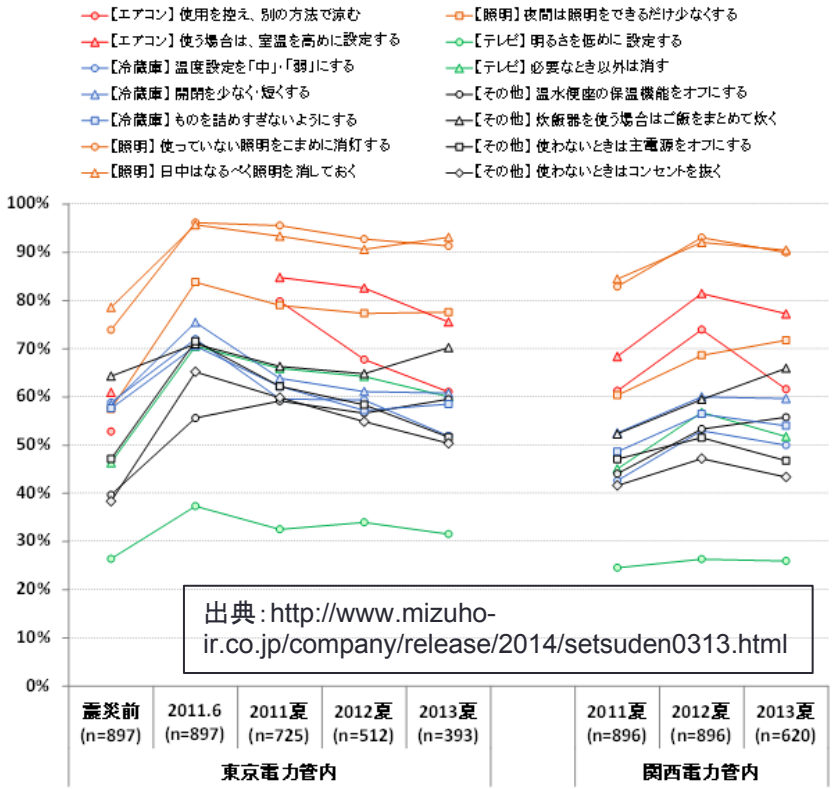


Pathways to Low Carbon Asia and Wedges of 10 Actions by using AIM/CGE[Global]

Key points for Designing Deep Decarbonization Pathways (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.

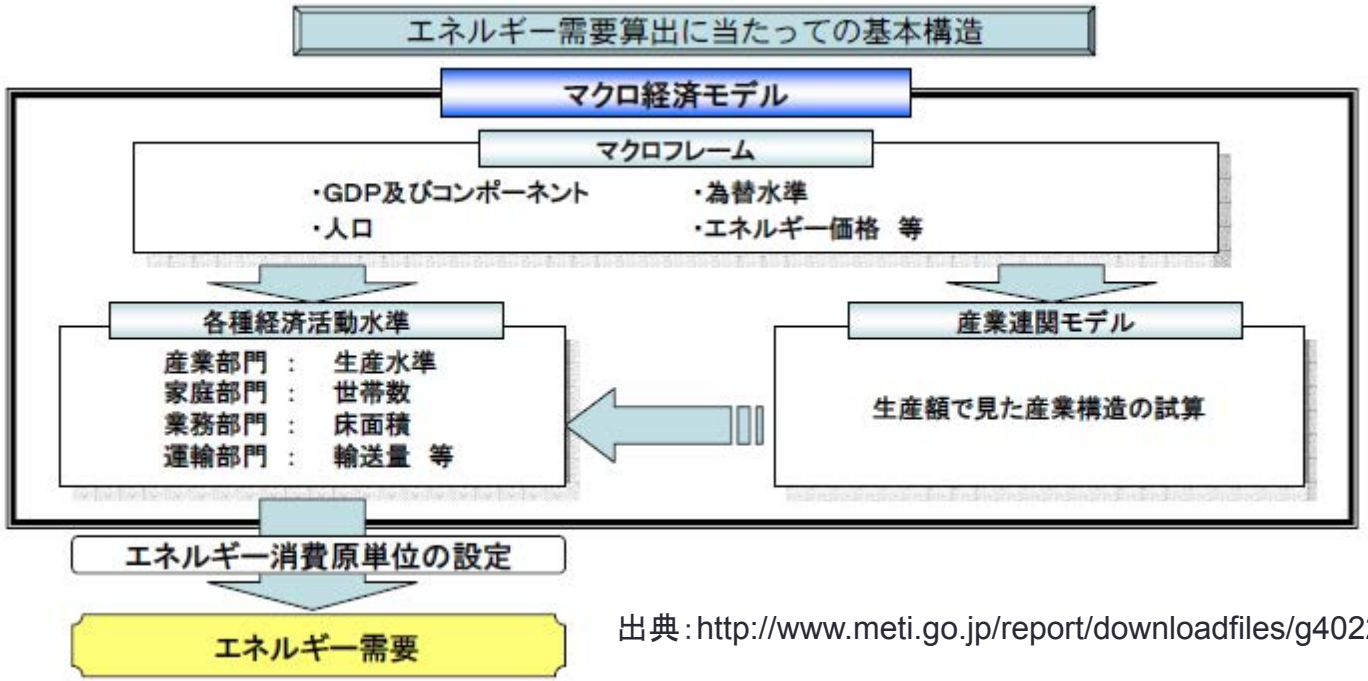
- Actions for energy saving and GHG reduction are widely accepted in Japan.



Execution Rate of Energy Saving Actions

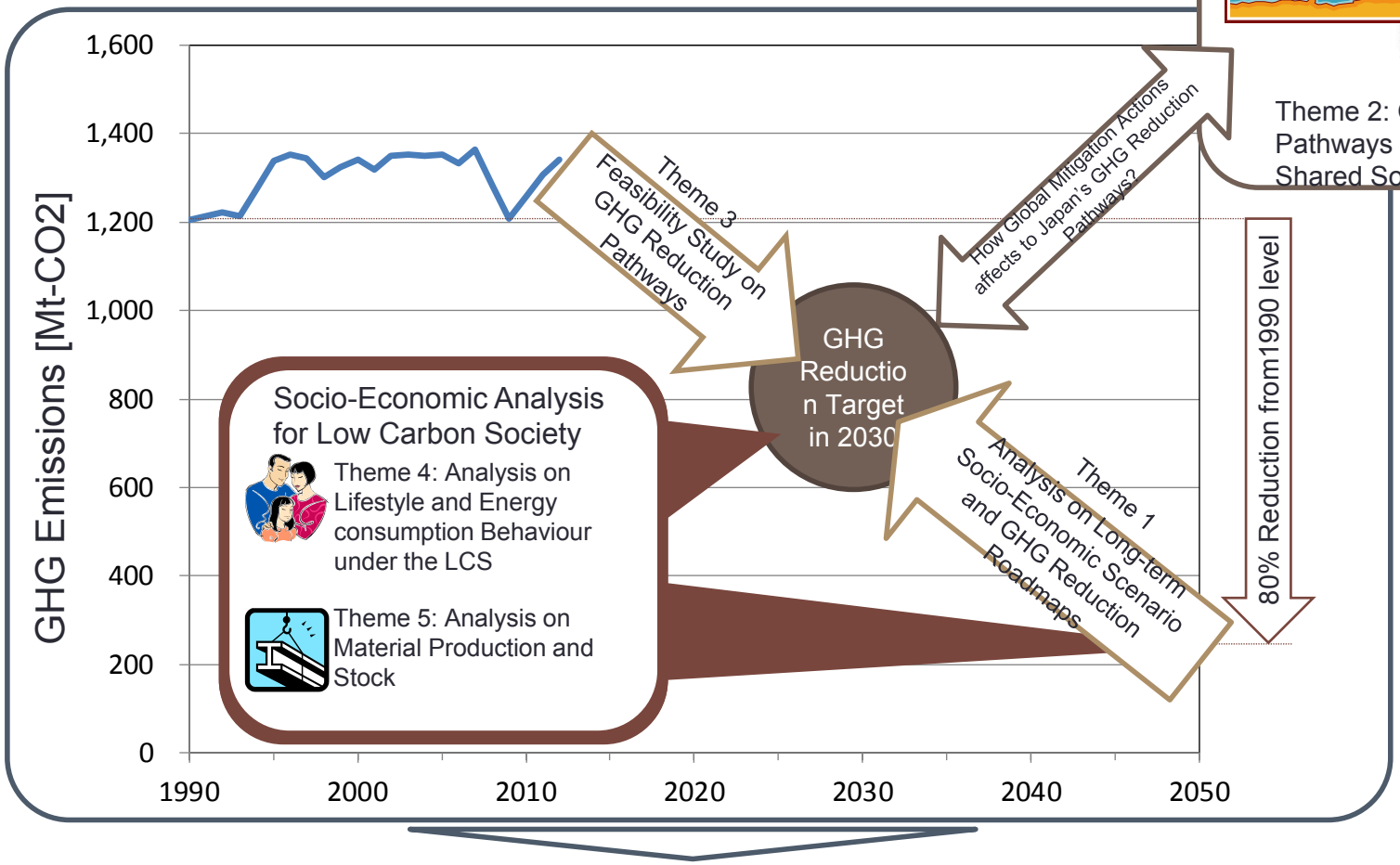
Key points for Designing Deep Decarbonization Pathways (2): New Socio-Economic Scenarios after 3.11

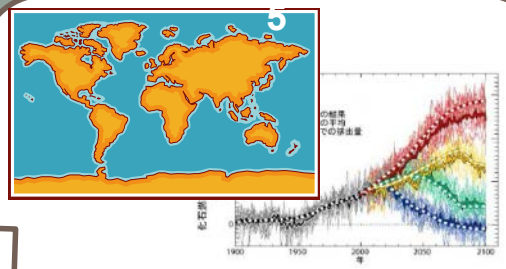
- 3.11 also affects Socio-Economic situation, such as population, energy/electricity price, economic growth, consumer behaviour and material stocks.
- Low carbon actions not only levy monetary loads to consumers, but also gives occasion of economic growth, so-called ‘green growth’, through market vitalization 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 desiging Deep Decarbonization Pathways for Japan.



出典：http://www.meti.go.jp/report/downloadfiles/g40225b20j.pdf

Overview of the 2-1402 Project





Theme 2: Global Mitigation Pathways Analysis Based on Shared Society Pathways

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
- Desiging 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 Diffution 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 Structure and Core Models for the Analysis

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

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AIM/CGE[Japan]

Reported as "Deep Decarbonization Pathways in Japan" by Ken Oshiro

Designing New Socio-Economic Scenarios for the World

Theme 2: Analysis on Global Mitigation Scenarios
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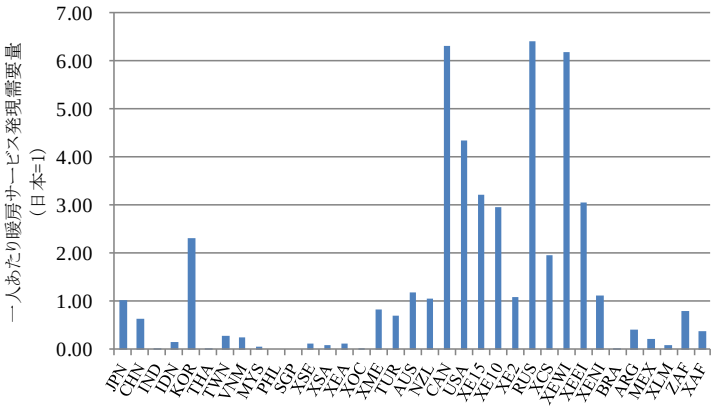
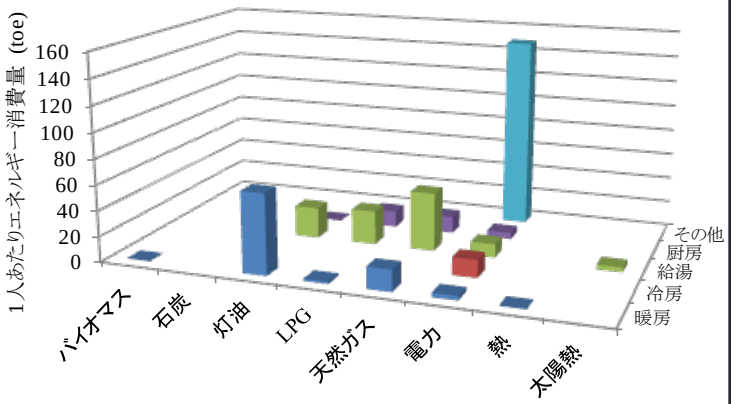
AIM/CGE[Global]

Overview of Analysis on Lifestyle and Energy Consumption Behaviour under the LCS (Theme 4)

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.

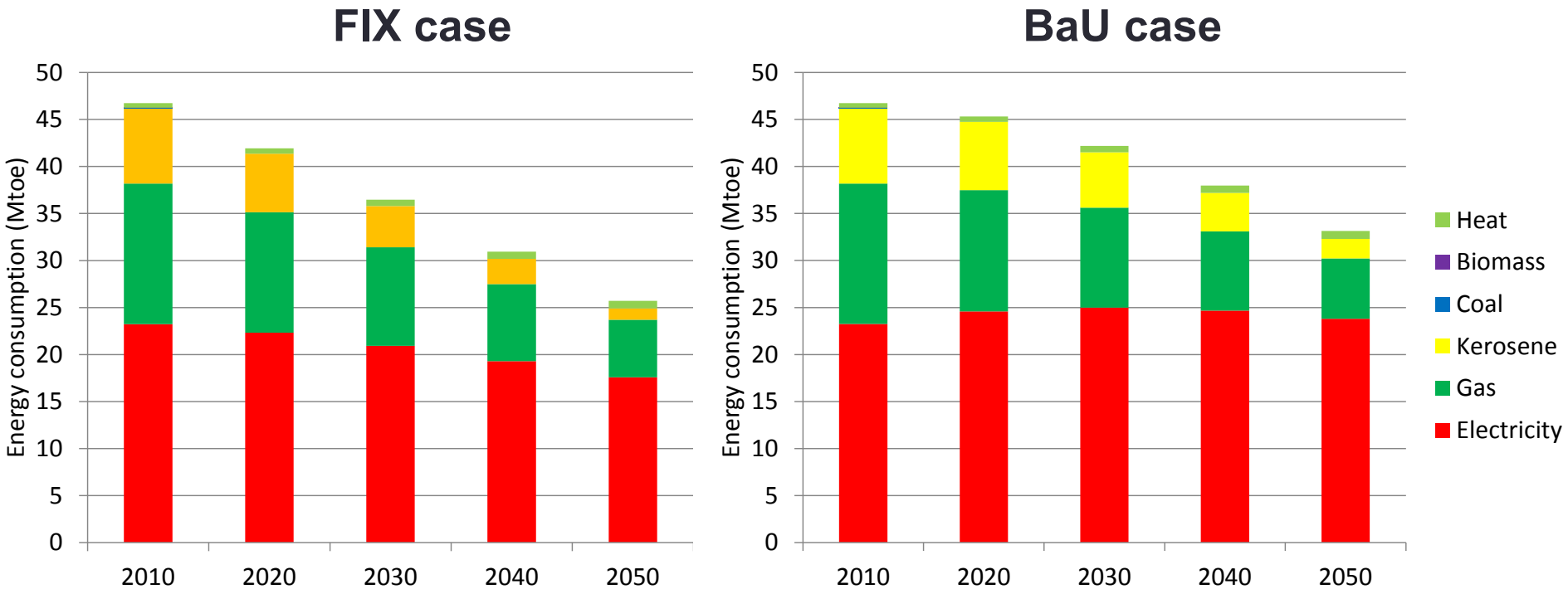
Outputs
- Regional Energy Service demand per household by energy service

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 (Theme 4)



Energy service demand scenario:

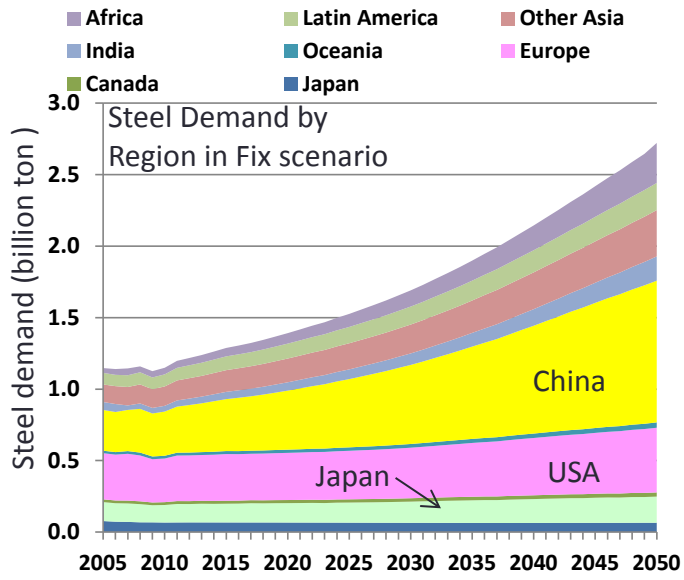
FIX case: Continue 2010 level

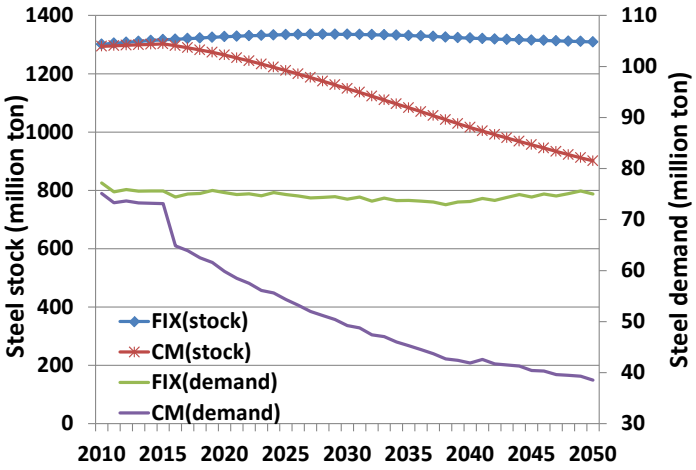
BaU case: Extrapolate past trends about floor space, time use, rate of eating at home, bathing style, and possession of electric device

Future device scenario:

Increase in electric device / Improve efficiency of electric device

Overview of Scenario Analysis on Energy-intensive Material Production and Stock





Steel Demand and Stock in Japan on Fix Scenario and CM scenario

Material Demand Estimation

Inputs
- Improved Methodology for Service Demand Estimation
- Parameters for Global Service Demands
- Scenario for De-materialize Society

Outputs
- Future Material Stock and Demands
- Utilization Strategy for Energy-intensive Materials under the LCS

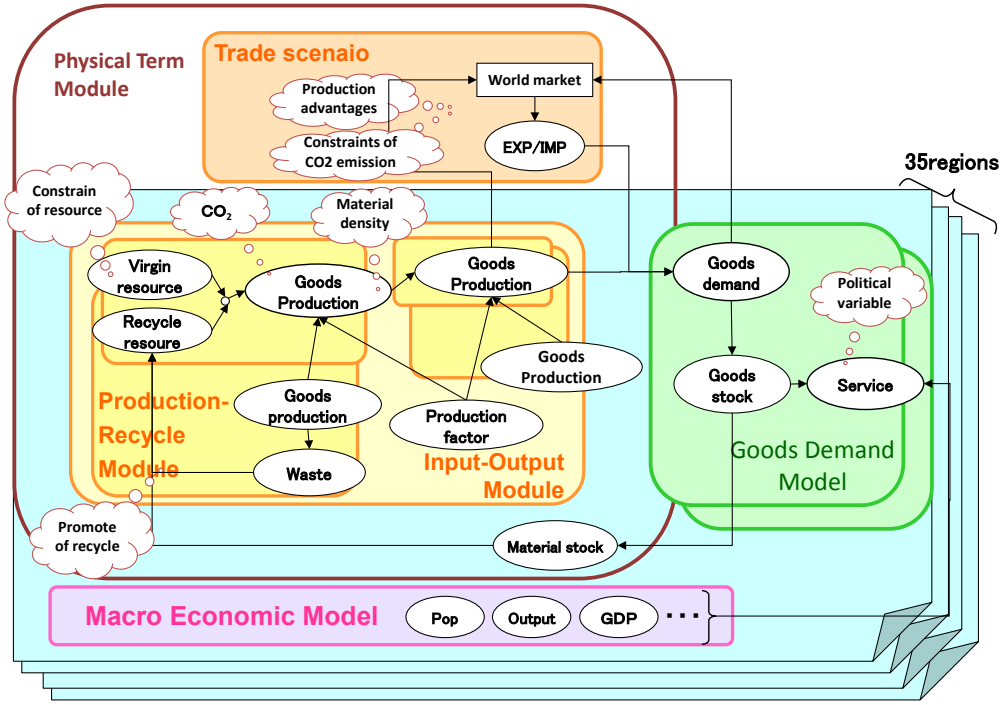
Modules for Material Production, Flow and Recycle

Inputs
- IO table for Materials
- Production Function with Steel Quality
- Scenario for Global Material Demand

Outputs
- Estimation of Material Flow
- Global Distribution for Material Demand and Supply

Overview of Material Stock and Flow Model

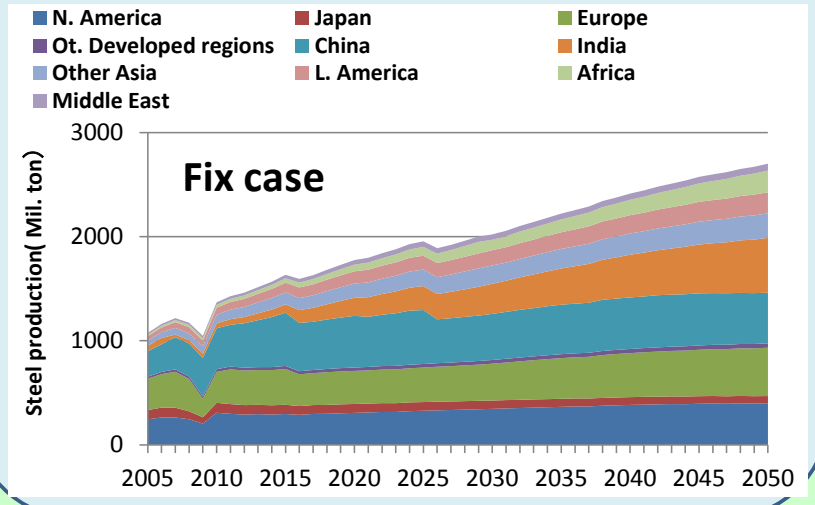
- Features: Energy-intensive Material Service demand is estimated from socio-economic indicators
  - Region: 35 regions in Global
  - Service: 11 type
  - Goods：23 type
- Material demand is quantity to produce goods to supply and maintain the goods stocks such as social and production infrastructures.
- Material production is distributed by production advantage and technological capacity.
- Analyze the impacts on steel demand and CO_2 emissions reduction by introduction of policies (control of service demand, efficiency improvement of goods stock , and substitution with high performance materials.



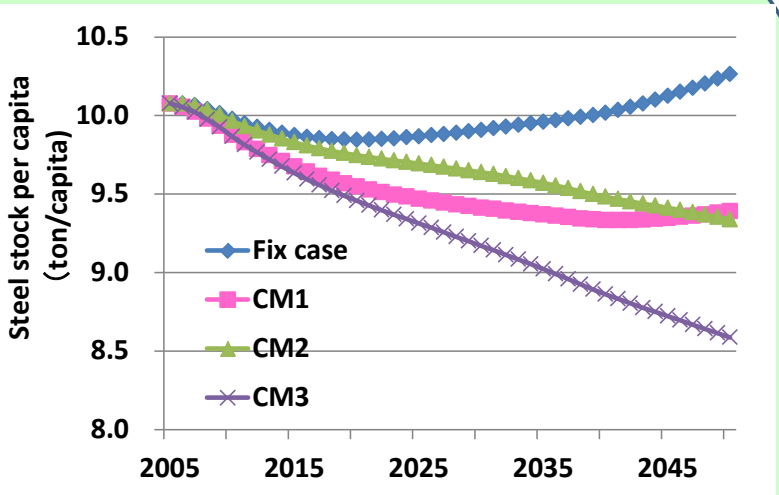
Service	Goods
Dwelling	Dwelling (structure)
Other Household	Other metal products
Production	Production capital(machine, other facility)
Power Generation	Power generation facility (Hydro, Thermal)
Ps. Transport	Ps-car, Bike, Bus, Bycycle, Ps-train, Airplain, Road, Rail, Airport
Fr. Transport	Truck, Fr-train, Ship, Harbor, etc
Agr. Water	Irrigation facility
Ind. Water	Industrial water facility
Dom. Water	Water supply facility
Waste Water Pr.	Water water process facility
Other Infra.	Bund, Park, etc

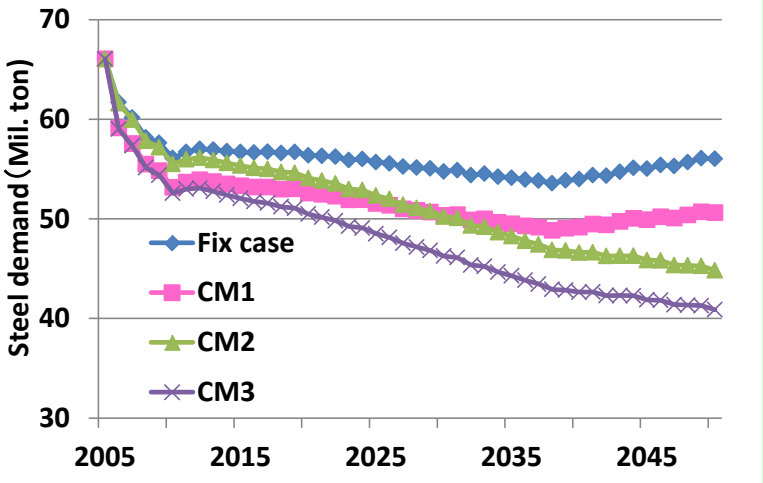
Output from Scenario Analysis on Energy-intensive Material Production and Stock

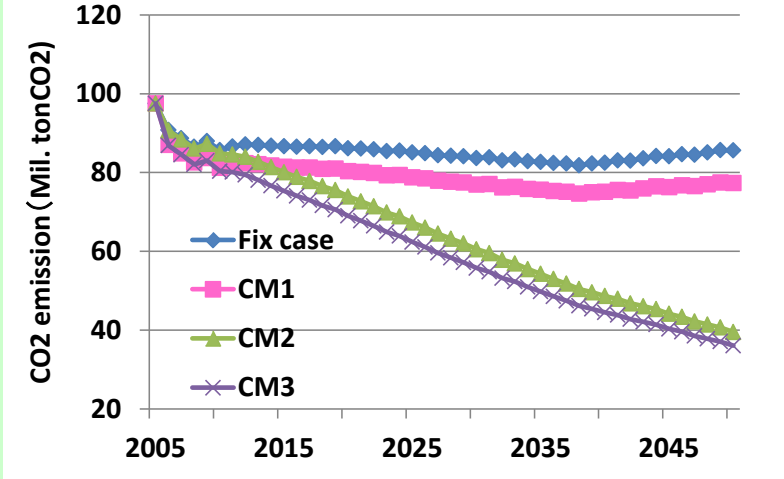
World steel demand by regions



Result of Japan







New Viewpoint for Shifting to the Deep Decarbonization Pathways

- New social trends such as socio-economic change, behaviour change for energy saving and positive impacts by taking Low Carbon Actions like green growth, are inevitable for designing deep decarbonization pathways.
  - However, in the past research, above viewpoint could not fully incorporated
- This research project reviews the past socio-economic scenarios for Japan, and will propose additional viewpoints for desiging deep decarbonization pathways.

Keywords for Past Japan Low Carbon Society Scenarios (2007)

キーワード		ビジョン A	ビジョン B
考え方の主流			
	個人が目指す姿・夢	・社会的成功	・社会貢献
	生活・居住地	・都市居住志向	・地方居住志向
	家族	・個人志向	・共生志向
	先進技術	・積極的受容	・導入に慎重
人口			
	出生率	・低位で推移	・やや回復
	移民受け入れ	・積極的に受け入れ	・現状程度
	海外への移動	・増加	・現状程度
国土利用			
	国内人口移動	・大都市に集中	・分散化
	都心部	・中心部に集中 ・土地の高度利用進展	・都市人口減少 ・最小限の都市機能維持
	地方都市	・人口大幅減少 ・土地資源を効率的に利用した新しいビジネスが普及	・人口は徐々に減少 ・地域の独自性や文化を前面に出した活気ある地方都市が出現
生活・家庭			
	仕事	・プロフェッショナルの増加 ・高収入、長時間労働	・ワークシェアリング ・労働時間の短縮・均等化
	家事	・機械化や外部サービス化が進展	・家族や近所住民との協力
	自由時間	・キャリアアップ ・スキルアップ	・家族との時間 ・趣味・社会活動（ボランティア等）
	住宅	・集合住宅選好	・戸建住宅選好
	消費	・消費・買い替えサイクルは短い	・消費・買い替えサイクルは長い
経済			
	成長率	・一人当たり GDP 成長率 2%	・一人当たり GDP 成長率 1%
	技術進歩	・高い技術進歩率	・ビジョン A ほどは高くない
産業			
	市場	・規制緩和進展	・適度に規制されたルール浸透
	第一次産業	・GDP シェア減少 ・主に輸入に依存	・GDP シェア回復 ・農林水産業活発化
	第二次産業	・付加価値増加 ・生産拠点の海外移転	・シェア減少 ・地域ブランドの多品種少量生産
	第三次産業	・シェア増加 ・生産性改善	・シェアやや増加 ・社会活動が普及

Examples of Additional Viewpoints for Shifting to the Deep Decarbonization Pathways

No.	部門など		2050年の状況				
			極端シナリオB		中庸		極端シナリオA
1	価値観	リスクへの態度	リスクを回避する				リスクヘッジが広まり、比較的リスクに対して積極的に取りに行く
2	国際	経済活動の世界との関係性	鎖国				完全自由貿易
3	国際	産業部門の国際展開	国内回帰が強まる				他国への進出の強化
4	国際	外国からの移民受け入れ	単純労働を行う外国人が多く移住するが、日本の生活、文化になじめず、孤立する。				知的な活動を行う外国人労働者が日本を訪れ、文化交流も盛んとなり、新たな文化的な発信が可能となる。
5	経済	経済成長	TPPによって、国内産業が打撃を受け、所得が低下し、外国製の安い製品を求める。				いずれの産業においても国際競争力を維持できる。
6	経済	投資マインド		短期的利潤しか考えない	長期的視点にたった投資もやや行う	長期的視点にたった投資が効果を現す	
7	経済	老朽インフラ更新	新規設備建設が中心となり、老朽化した施設・インフラは維持管理されない。				新規設備建設とともに、老朽インフラ更新へも投資がなされる。
8	経済	経済的不平等	セーフティネットが整備されず、格差が拡大する				セーフティネットが整備され、最低限の経済生活水準の確保が保証される。
9	環境	環境への価値付け	環境への価値付けが進まない				環境の価値など非市場的価値の内部化が進む。
10	環境	温暖化問題への関心	影響の有無にかかわらず低い				関心が高く、対策を積極的に実施する
11	時間	時間管理	意思に反する時間管理が実施される				望み通りの時間管理が実現できる
12	時間	余暇時間の使途	安近短				遠方への旅行頻度が増える
13	国土	都市集中度	地方分散・戸建て				都市集中
14	労働	復職の自由度	退職後の復職は、比較的低賃金の労働に限られ、一般化しない。				意思に合わせて復職は自由に可能であり、復職後に高位のポジションまで到達することもできる。

Expected Contribution of the 2-1402 Project for Designing Strategy to the Deep Decarbonization Pathways (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 Contribution of the 2-1402 Project for Designing Strategy to the Deep Decarbonization Pathways (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 emissins in Asia could be identified.

Summary: Way forward of the 2-1402 Project

- Achieving Deep Decarbonization Pathway in Japan needs shift to the New Society Era.
- Roadmaps for shifting society should include several aspects those have not included in the past study such as consumption behaviour change, utilization of material stocks and economic impacts through green growth.

- The 2-1402 project aims to establish methodology for designing visions/scenarios and its implementation strategies by using integrated assessment models.

- Through the project, we will propose concrete strategy for achieving Japan Low Carbon Society by 2050 and determine mid-term (esp. 2030) GHG reduction target in line with long-term target of 80% reduction from 1990 level.
- We also aim to propose new growth patterns and innovation strategies for Japan in order to achieve the Deep Decarbonization Pathways.