

IINO HALL (Tokyo) / Web conference

March 9th, 2021

FY2020 ALPS International Symposium

- Future strategy towards carbon neutral society -

**Research Institute of Innovative Technology
for the Earth (RITE)**



ALPSIII Background and Objective

- ◆ As global warming is bound to have severe impacts on the whole planet, there are high expectations for solutions to this issue. However, while global warming affects various sectors in every country of the world, its impacts are not uniform. Mitigation measures and associated costs that countries can afford to take and pay may differ to very large extent. Therefore, model development and model-based analysis and evaluation for global warming countermeasures and policies considering the status of each country/region and industry are needed in order to build truly effective climate policies.
- ◆ Within this project, we assess mitigation and adaptation measures, climate finance and climate policy in a consistent and comprehensive manner, taking into account the latest scientific knowledge on the subject, recent trends in international negotiations, and cooperating with international research organizations. Our goal is to contribute to the discussions in international negotiations, e.g., IPCC and COP, and to the development of an international framework and of a national strategy for green growth, namely, a virtuous cycle of environment and growth in the long-term strategy.

ALPSIII Overview

Risk management strategy for climate change responses

- Understanding uncertainties, e.g., climate change science, damages and adaptations, countermeasures and mitigation costs, socioeconomics and international framework.
- Analysis on long-term target and the emission pathways for 2050, 2100 and further (global CO₂ net zero emissions).
- Evaluation of impacts of mitigation costs and international competitiveness regarding short-and-mid-term target up to 2030 (NDCs) and evaluation of Border Carbon Adjustment.
- Research on damages and adaptations and model development to be reflected on risk management strategy.
- Evaluation of long-term low emission scenarios of NETs (BECCS, DACS, etc.) to be reflected on risk management strategy.
- Evaluation of Solar Radiation Management (SRM).
- Evaluation of innovation.
- Synergies and trade-offs with SDGs.

Modeling and Analysis in systematic and quantitative manner

- Improvement of DNE21+, DEARS, and GLaW and analysis using those models.
- Participation in international model comparison projects mainly in Europe & US and presentation of model analysis results.

Evaluation of Green Growth in economic perspective

- Evaluation of Green Growth (decoupling) and data-based analysis.
- Estimation of CO₂ emissions based on consumption.
- Analysis on energy efficiency of Japan and major countries.
- Evaluation of equity of burden by income class due to FIT or other policies.
- Issues regarding CO₂ emission reduction policies under electricity deregulation (learning from Europe).

Technological evaluation in cross-sectoral perspective

- Integrated evaluation of social changes, such as acceleration of sharing economy induced by IoT & AI and reduction in embodied goods by improving demand-supply efficiency.
- Evaluation of hydrogen use including CCUS and whole system of oil refinery, petrochemical, shale gas and biorefinery.
- Evaluation of food system.
- Research on other technologies.

Evaluation of innovation and investment

- Evaluation of the role of general-purpose technologies (e.g., ICT, material technology).
- Evaluation of innovation inducing policies.
- Research on the trend of ESG investment and green finance analysis.

CO₂ emission reduction targets

- EU declared more ambitious CO₂ emission reduction goals for 2050 (EU and UK made it obligatory to achieve carbon neutrality by 2050). US Democratic President candidate (current President) Biden showed a positive attitude for decarbonization indicating 100% clean electricity by 2035 and carbon neutrality by 2050. China expressed intention for carbon neutrality.

EU

- ✓ Submitted long-term strategy in Mar. 2020 aiming to achieve Climate Neutrality by 2050.
- ✓ Stepped up CO₂ emission target to at least 55% reduction in 2030 compared to 1990. The draft is to be submitted by Jun. 2021.
- ✓ Agreed on total 1.8 trillion Euro of MFF and recovery fund. 30% of the budget (37% of recovery fund) is appropriated to climate policies.

UK

- ✓ Climate Neutrality by 2050 legislated in Climate Change Act (amended in Jun. 2019).
- ✓ Under preparation for long-term strategy, to be submitted by 2021.

China

- ✓ President Xi Jinping expressed intention for carbon neutrality by 2060 in his speech via video at the UN General Assembly in Sep. 2020.
- ✓ Promotion of decarbonizing technologies, e.g., EV and FCV, will be focused with 450 billion yuan budget as subsidy for new energy cars.

US

- ✓ President Trump decided withdrawal from the Paris Agreement in Nov. 2019, becoming effective as of Nov. 2020.
- ✓ The Democratic Party prioritized climate change as one of important agenda. The president candidate Biden announced policies for decarbonizing electricity by 2035, net zero emission by 2050 and investment of 2 trillion dollars in 4 years for clean energy infrastructures.

- Prime Minister Suga declared the goal of realizing a carbon-neutral, decarbonized society by 2050 at his first policy speech in October 26th, 2020.
- For actualizing carbon neutrality, the actions are needed in the energy sector, which emits 85% of GHG (including non-CO₂ such as methane and chlorofluorocarbon) and 93% of CO₂.
- The government will present the road map for carbon neutrality by 2050 mainly in energy related field and necessary policies in the next Energy Strategic Plan.

Policy Speech by PM on Oct. 26

< Realizing a green society >

We hereby declare that by 2050 Japan will aim to reduce greenhouse gas emissions to net-zero, that is, to **realize a carbon-neutral, decarbonized society**.

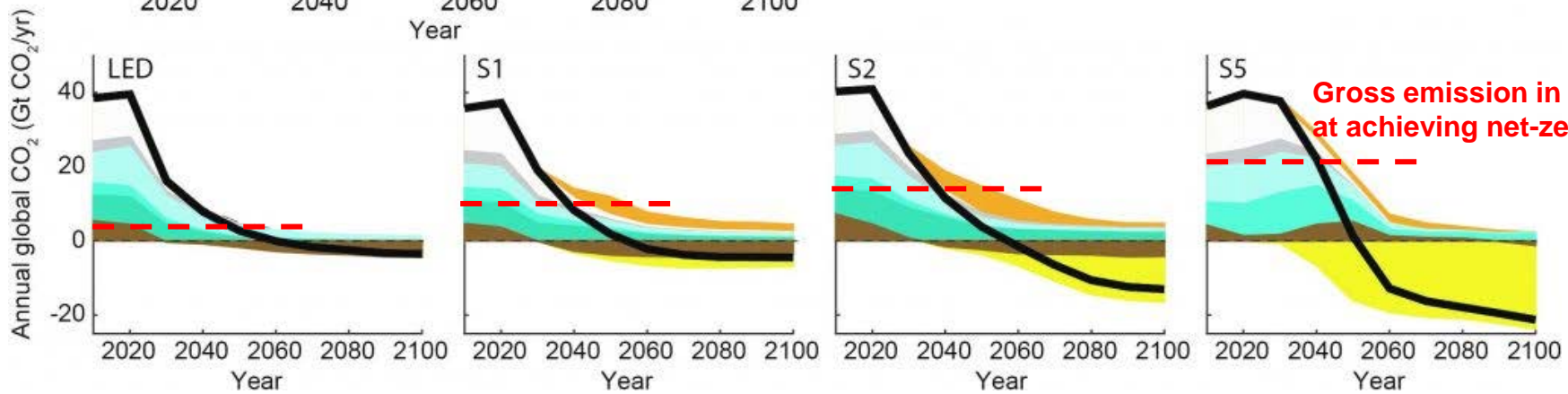
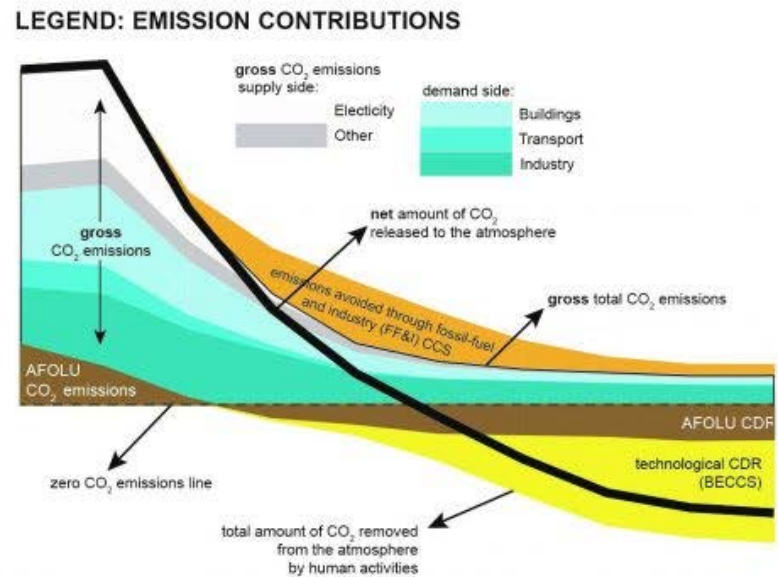
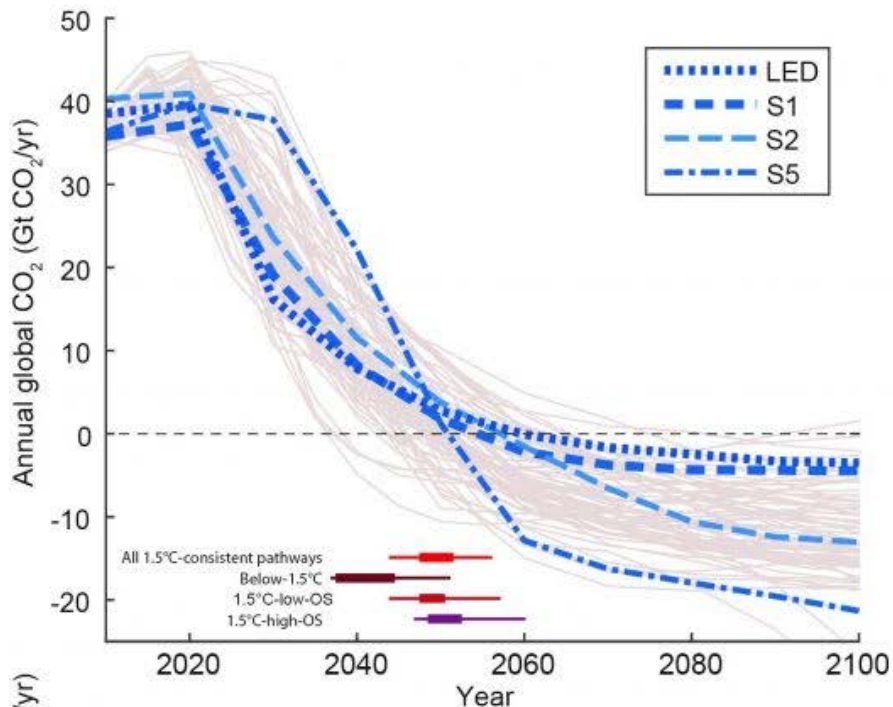
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We will establish a stable supply of energy by thoroughly conserving energy and **introducing renewable energies to the greatest possible extent**, as well as by **advancing our nuclear energy policy with the highest priority on safety**. We will also drastically change our longstanding policies on coal-fired power generation.

Press Conference by Minister Kajiyama on Oct. 26

Efforts in the energy field, which accounts for more than eighty percent of greenhouse gas emissions, are particularly important for achieving carbon neutrality. In a carbon-neutral society, demand for electricity is expected to increase, but in order to respond to this, we will **make maximum use of what is viable, such as renewable energy and nuclear power**, and also **pursue new options, such as hydrogen**.

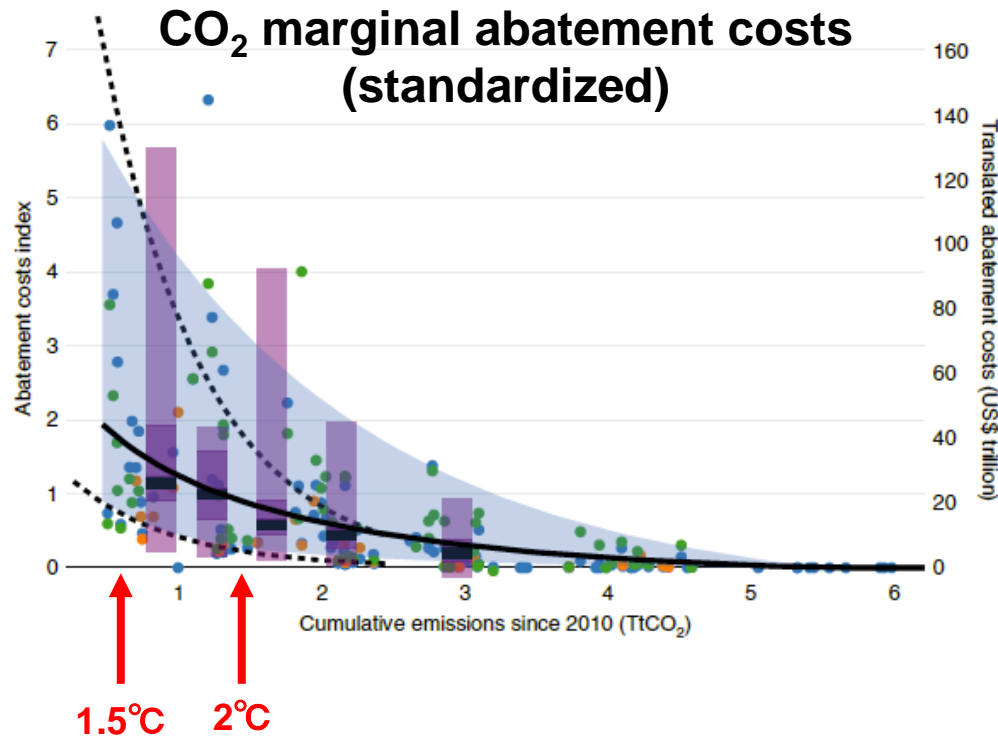
Comparison of global CO₂ emissions in 1.5°C scenarios (IPCC SR15)



Gross emission in 2050 at achieving net-zero

There are various emission reduction pathways and measures for achieving carbon neutrality.

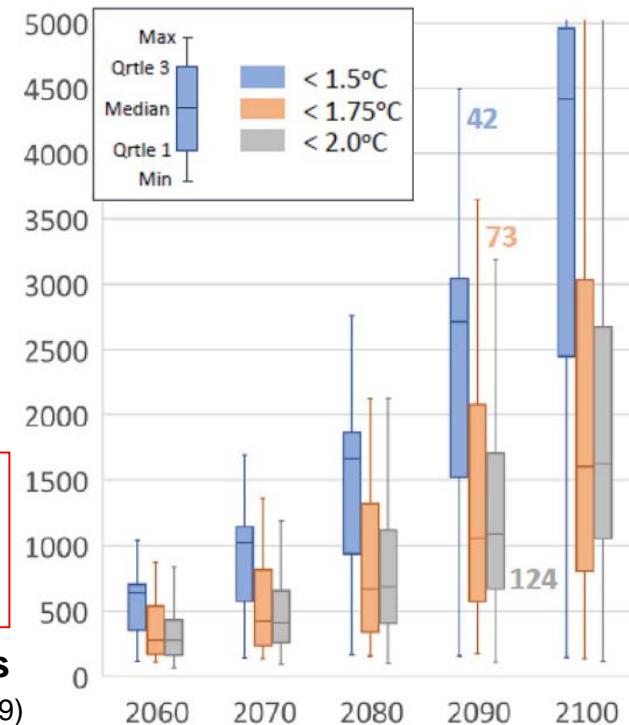
CO₂ emission reduction cost



Source) D. van Vuuren et al., Nature Climate Change (2020)

- SR1.5: 5-95th percentile
- AR5: median
- AR5: 25-75th percentile
- AR5: full range
- Model: median
- Model: 5-95th percentile
- SSP: consumption loss
- SSP: abatement costs
- SSP: cost estimate

CO₂ marginal abatement costs



Cost estimates vary widely among models under stringent emissions reduction such as 1.5°C.

MACs for 1.5°C are estimated to be approx. three times higher than those for 1.75°C or 2.0°C

Results of 240 scenarios by 5 IAMs

Source) A. Gambhir et al., Energy Strategy Reviews (2019)

Importance of quantitative and consistent scenario analysis

- ◆ To achieve more stringent emission reductions, such as carbon neutrality, measures in a cross-sectoral manner on both energy demand and supply sides will be required, which will increase the importance of systematic analysis based on models.
- ◆ Also, stringent emission reductions may require large costs. It is important to present the effects of overall measures as well as emission reduction costs etc., considering the uncertainties and the prospects of technologies, and to discuss opportunities and challenges thoroughly.
- ◆ Furthermore, it is important to systematically evaluate consistency in the whole world, referring to the possibility of industrial transfer and carbon leakage, in order to achieve a balance between environment and economy.
- ◆ Major themes covered in this symposium will be: how uncertainties over long timeframe are considered and evaluated in the quantitative scenario analyses in the context of the world proceeding to carbon neutrality; what are the implications from the current analyses for achieving carbon neutrality, and how they should be reflected to political decision-making and leveraged in the communication with industry and public; and what are the points to consider in interpreting and using scenarios, and so forth.

Model Analyses

Subject area	Speaker	Model, Scenario analysis
World	Keywan Riahi, IIASA	MESSAGE (PEM) to analyze world scenarios, mainly IPCC scenarios
World and Japan	Keigo Akimoto, RITE	DNE21+ (PEM) to analyze world and Japan scenarios
US	Leon Clarke, University of Maryland, U.S.	Mini-CAM (PEM) to analyze world and US scenarios
EU	Leonidas Paroussos / Alessia de Vita, E3-Modeling	GEM-E3 (applied CGE model) to analyze EU scenarios
UK	Vivian Scott / Richard Millar, The Climate Change Committee, U.K.	Quantitative analysis for UK policies
China	Kejun Jiang, Energy Research Institute in China	IPAC (CGE model) to analyze China scenarios

PEM: Partial Equilibrium Model

These institutes are abundant in dialogue with the governments.

Examples of carbon neutrality declaration in Japanese industry

カーボンニュートラル宣言企業例 (CN宣言：72社)

2020年12月11日時点

業種	企業名	カーボンニュートラル目標
建設	西松建設	2030年までに実現
	大林組、鹿島建設、積水ハウス、東急建設	2050年までに実現。
食料品	アサヒ、キリン、サッポロ、サントリー	2050年までに実現。
自動車・ 自動車部品	アイシン精機、いすゞ自動車、イビデン、ケーヒン、トヨタ、豊田自動織機、トヨタ紡織、ホンダ	2050年までに実現。
エレクトロニクス	コニカミノルタ、シーメンス、日立製作所、日立ハイテクノロジーズ	2030年までに実現。
	アズビル、オムロン、シャープ、ソニー、ダイキン工業、NEC Panasonic 、富士通、マクセル、リコー	2050年までに実現。
化学・製薬	武田薬品工業	2040年までに実現。
	小野薬品工業、栗田工業、積水化学工業、中外製薬、デンカ、富士フィルム、三井化学、ライオン	2050年までに実現。
その他製造業	王子HD、川崎重工業、住友大阪セメント、大日本印刷、帝人、フジクラ、北越コーポレーション、三菱重工業、ユニ・チャーム、LIXIL	2050年までに実現。
電気	沖縄電力 JERA	2050年までに実現。
ガス	東京ガス 昨年度シンポジウムでご登壇	2050年より早い時期に実現。
石油	ENEOS	2040年までに実現。
運輸	JR東日本、東急、日本航空、ヤマトHD	2050年までに実現。
商社	住友商事、三井物産	2050年までに実現。
その他サービス業	アスクル	2030年までに実現。
	イオン、伊藤忠テクノ、J.フロントリテイリング、セブン&アイHD、Zホールディングス、野村総合研究所、日本アジアグループ、日本ユニシス、日立キャピタル、ファミリーマート、ローソン	2050年までに実現。

Other than above, the Japan Iron and Steel Federation and the Japan Gas Association declared carbon neutrality.

Today's Program

10:00	Welcome Remarks	Yoichi Kaya, President, RITE
10:05	Introductory Remarks	Takashi Omote, Deputy Director-General for Environment, Energy and Innovation, Ministry of Economy, Trade and Industry (METI)
10:10	Introduction	Keigo Akimoto, Group Leader, Systems Analysis Group, RITE
10:15	Lecture	Leon Clarke, Research Professor, University of Maryland, Charting an Ambitious U.S. NDC
10:50	Lecture	Kenji Yamaji, Senior Vice President/Director-General, RITE, Actions and Scenarios for the Carbon Neutral Society
11:25	Lecture	Kejun Jiang, Senior Researcher, Energy Research Institute in China Energy and Economy Transition in China under the Global 1.5C target
12:00	Lunch	
13:20	Panel discussion	Industries' activities and visions toward a Carbon Neutral society Moderator: Kenji YAMAJI, Senior Vice President/Director-General, RITE Panelist: -Junya Tawa, Executive Officer, Head of Planning Group, Corporate Strategy Department, JERA Co., Inc. -Yukiyoshi Fukano, Senior General Manager, Environment Division, The Japan Gas Association -Shoji Kusumoto, Director, Environmental Management Department, Quality & Environment Division, Panasonic Corporation.
14:50	Coffee Break	
15:00	Lecture	Keigo Akimoto, Group Leader, Systems Analysis Group, RITE, Recent trends for carbon neutrality and Scenario analysis in Japan
15:35	Lecture	Keywan Riahi, Director of the Energy program, IIASA, Rapid global transformations towards net zero CO2 emissions
16:10	Lecture	Leonidas Paroussos, Managing Director, Project Manager Economic analysis and modelling Alessia de Vita, Project Manager energy analysis and policy Modeling carbon neutral pathways for the EU
16:45	Lecture	Scott Vivian, Senior Analyst, The Climate Change Committee, UK, Richard Millar, Senior Analyst, The Climate Change Committee, UK The UK's Sixth Carbon Budget – the pathway to Net Zero
17:20	Closing Remarks	Takashi Honjo, Senior Managing Director, RITE

The program is arranged according to time differences.