

Updates from The Engineering Academy of Japan (EAJ)



Prof. Taikan Oki
Special Advisor to the President
The University of Tokyo
Senior Vice-Rector, United Nations University



CAETS Engineering for SDGs Working Group, Sep. 15th, 2021, online



The Engineering Academy of Japan (EAJ)



Voluntarily, Independently, and Internationally

- Established in 1987, Incorporated in 1998
- Elected as a CAETS (International **C**ouncil of **A**cademies of **E**ngineering and **T**echnological **S**ciences) member in 1990
- EAJ is a non-profit, non-governmental organization to contribute to the advancement of engineering and technological sciences, whose members are in leading positions with outstanding achievements and extensive knowledge in engineering and related fields.
- 832 Members, 43 Foreign associates
53 Supporting corporate members (As of March 1, 2021)

The Engineering Academy of Japan

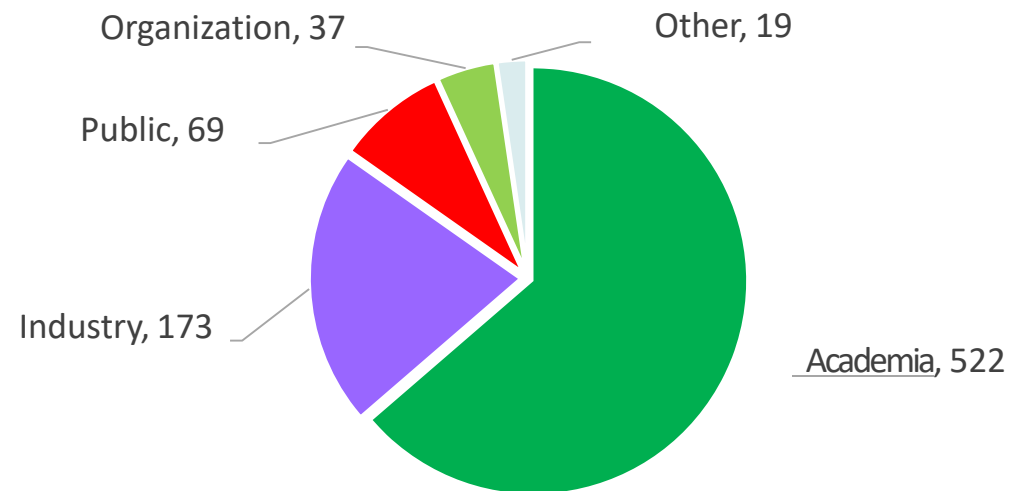
820 Full members

Leading engineers in industrial, academic, and public sectors with Japanese nationality.

Major	Share
Mechanical	176 (21%)
Information, E&E	196 (24%)
Chemical, material	158 (19%)
Civil	100 (12%)
Resources, energy	37 (5%)
Physics	34 (4%)
Life science	42 (5%)
Management & policy	58 (7%)
Interdisciplinary	19 (2%)

421 Ph.D, 37 Ph.D overseas, 8 MSc overseas.

13 economics, law, arts and science.



Guest Member: 39

1. Full member of Academies in overseas contributing to EAJ: 17
2. Members with foreign nationality in Japan contributing to EAJ: 22

Supporting Member: 53

Individuals or organizations that agree with the objectives of the organization and Individuals or groups who agree with the purpose of the organization and support its activities



Dr. Kobayashi, the President of EAJ



Yoshimitsu Kobayashi, PhD

Chairman of the Board, Tokyo Electric Power Company Holdings, Inc.
 Chairperson, Director of the Board,
 Mitsubishi Chemical Holdings Corporation
 President, The Engineering Academy of Japan
 President, The Chemical Society of Japan

■ Education:

March 1971

MSc in interdisciplinary science, The University of Tokyo, Japan
 — majored in radiation chemistry.

July 1972

Government-sponsored foreign study in physical chemistry
 at the Hebrew University of Jerusalem, Israel
 —exposed to the cutting-edge research of radiation chemistry.
 —received a revelation in the Sinai Desert.
 “I have to live!”

September 1973

Study in chemistry at the Scuola Normale
 Superiore in Pisa, Italy



July 1975

PhD in radiation physics, the University of Tokyo, Japan

Japan's Growth Strategy

- Japan will turn to “Green × Digital”, attaching great importance to innovation.

The driving force for the next growth . . . “Green and Digital”

Policy speech, Japan's prime minister Yoshihide Suga (January 18, 2021)

□ Green Growth Strategy (Formulated on December 25, 2020)

- Realization of carbon neutrality by 2050
- Setting high goals for each of the 14 priority fields

□ Accelerating digitalization

- Establishment of Japan Digital Agency (established on September 1, 2021)
- Development of next-generation infrastructure and technologies such as Beyond5G, supercomputers, and space systems

■ Integrated Innovation Strategy 2020

—Key areas to focus on—

- Strengthening efforts in important fields
basic technologies such as AI, biotechnology, quantum technology, and materials; science and technology related to safety and security against infectious diseases and natural disasters; and environmental energy.

Initial Speech of PM Yoshihide Suga (26/Oct./2020)

- Japan hereby declares that it aims to reduce its overall greenhouse gas emissions to zero by 2050, that is, to achieve a carbon-neutral, decarbonized society by 2050.



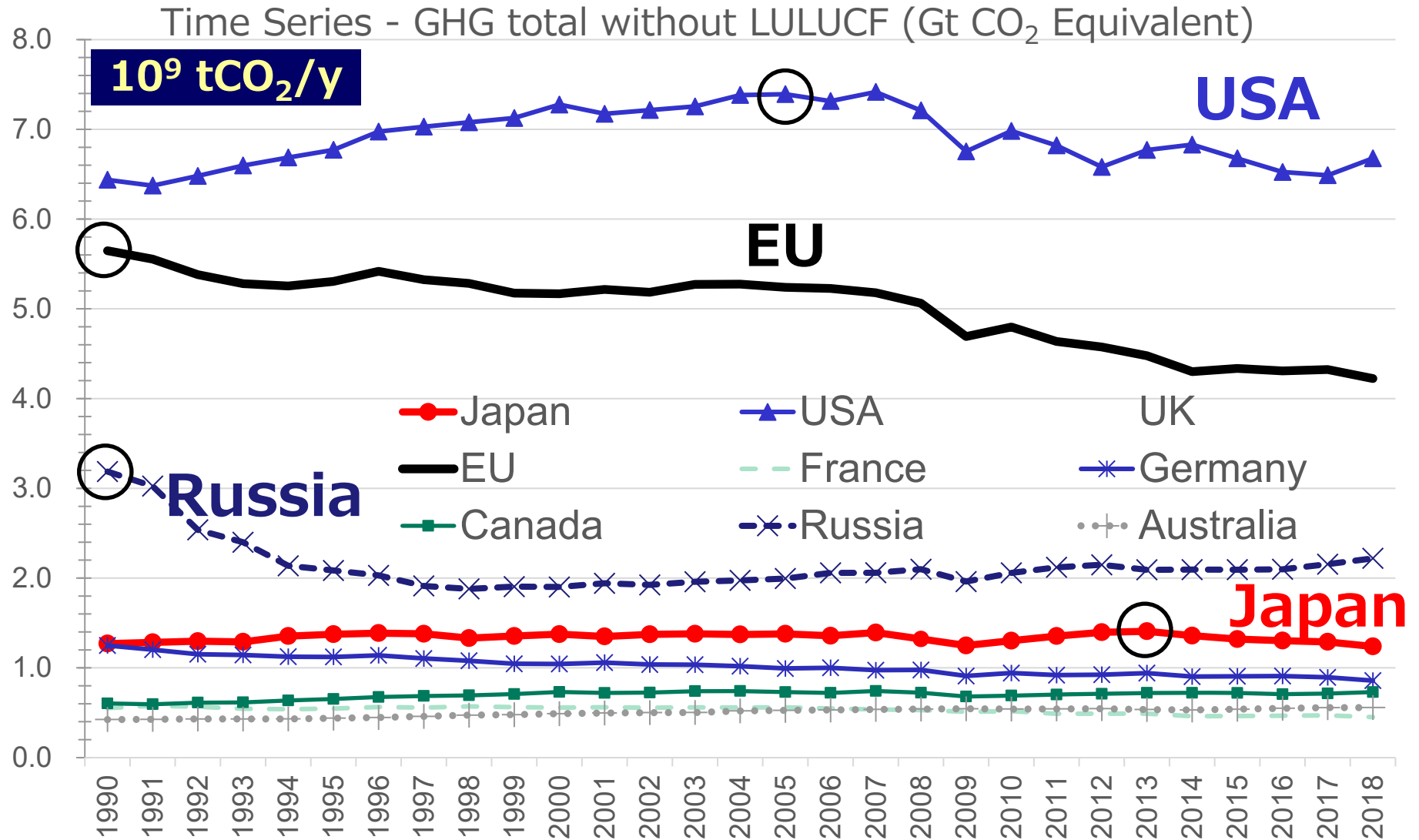
Reduction Targets

	Target in 2030	In 2018	
	(LULUCF: land us, land use change, and forestry)	w/o LULUCF	w LULUCF
Japan	-26%→-46% to 2013	-12.0%	-12.0%
USA	-26~-28%→-50~-52% to 2005	-9.7%	-10.2%
UK	-53%→-68% (-78% in 2035) to 1990	-41.6%	-42.9%
EU	-40%→-55% to 1990	-25.2%	-26.7%
	France	-18.0%	-19.4%
	Germany	-31.3%	-31.9%
Canada	-30→-32~-40% to 2005	-0.1%	-0.1%
Russia	-25~-30% to 1990	-30.3%	-47.6%
China	Peak out total emission until 2030 -60~-65% of GHG/GDP to 2005		
India	-33~-35% of GHG/GDP to 2005		

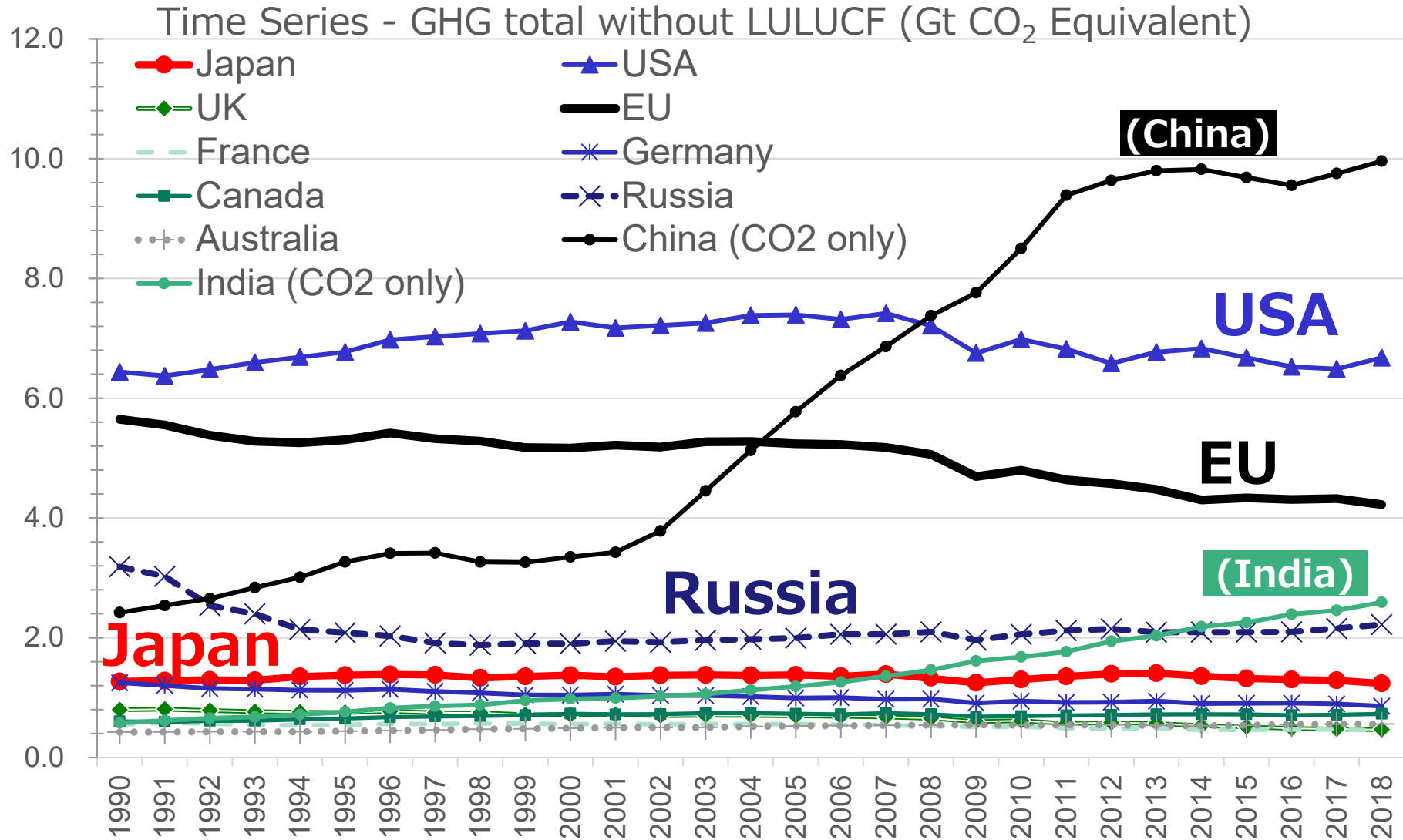
- Build on the reduction targets submitted in the draft NDCs for the U.S.-hosted online summit on climate change (April 22-23, 2021).



GHG emission in major states



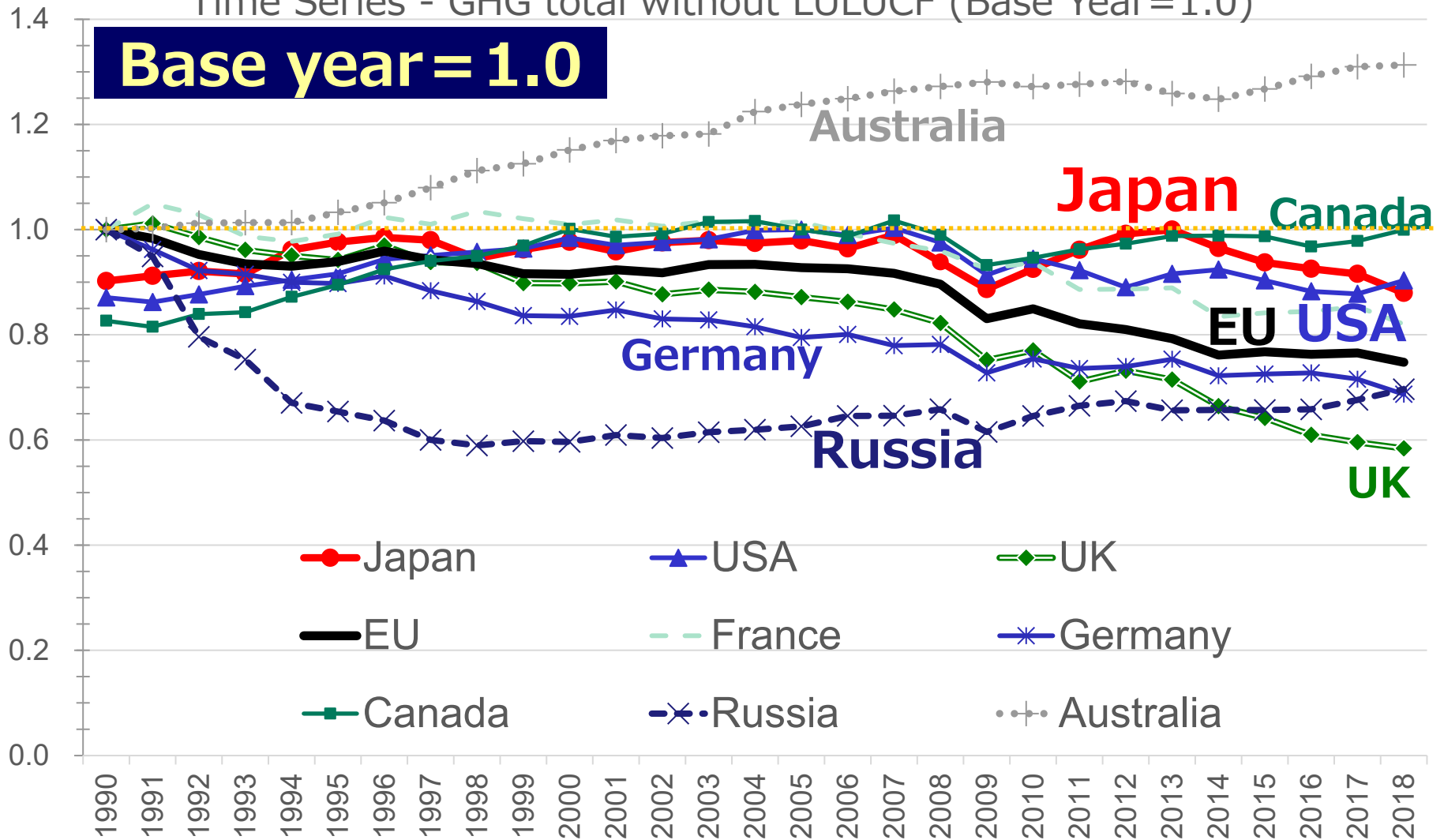
GHG emission in major states



10⁹ tCO₂/y

GHG emission in major states

Time Series - GHG total without LULUCF (Base Year=1.0)



Reduction in 2018

Japan
-14%
in 2019

	to 1990	to 2005	to 2013	to 2030
Japan	-2.5 %	-10.2 %	-12.0 %	-46 %
USA	3.7 %	-9.7 %	-1.4 %	-50 %
UK	-41.6 %	-33.0 %	-18.3 %	-68 %
EU	-25.2 %	-19.4 %	-5.6 %	-55 %
France	-18.0 %	-19.2 %	-7.8 %	
Germany	-31.3 %	-13.6 %	-8.8 %	
Canada	20.9 %	-0.1 %	1.2 %	-32 %
Russia	-30.3 %	11.3 %	6.1 %	-25 %
Australia	31.3 %	6.1 %	4.3 %	-26 %
China (CO ₂ only)	311.3%	72.5%	1.6%	
India (CO ₂ only)	347.8%	118.5%	27.4%	

Idea and basic policy of EAJ

Engineering the Future for Human security and well-being

- ◆ Disseminate policy recommendations that serve as a compass
- ◆ Build a track record of leading international activities
- ◆ Foster the next generation of leaders
- ◆ Develop the ability of citizens to utilize science and technology
- ◆ Expand co-creation beyond all barriers



Policy briefs of EAJ

- As the only non-governmental engineering academy in Japan, EAJ will make policy proposals and disseminate them to all relevant parties.
- Demonstrate visionary and creative ways to solve problems by integrating different disciplines and utilizing a wide range of networks.



Courtesy visit to Minister of MEXT, Mr. M. Shibayama on May 2019.



Date	Title
2017.05.11	Urgent Proposal - To Stop the Decline of Japan's Engineering and power of science and technology
2018.03.16	Integration and Cooperation for Further Development of Materials Research in Japan
2018.03.22	Toward a balance between the advancement of medical science and the sustainability of the healthcare system
2018.04.19	Proposals for Realizing New Ways of Working, Living, and Being in Society: Toward Social Implementation of Telegistics
2018.11.25	AEPM Kyoto Declaration Statement of the Academies of Engineering Presidents' Meeting (AEPM) at the 15th STS forum 2018
2019.04.08	2019 Urgent Recommendations to Halt the Decline of Japan's Engineering and Science and Technology Capabilities
2020.02.11	AEPM Kyoto Statement 2019 Research and Development Aiming for Continual Emergence of Innovation toward Human Security and Well-Being

1st Dialogue between Politicians and Scientists

Topic : S&T and Innovation Policy after the corona pandemic



- **Representative Participation :**
Five members (Lower House) , One member (Upper House)
- **Presentation :** Prof. Yuko Harayama, Vice President EAJ
- **Date :** December 9, 2020, 10 am ~11 am
- **Venue :** House of Representatives
- **Organization :** EAJ

2nd Dialogue between Politicians and Scientist

Topic : Co-Creation with young researchers who will hold future Japan



- Date : March 18, 2021
- Venue :
House of Representatives
- Representative Participation :
Four members (Lower House)
One member (Upper House)

[From the right]
Mr. Sakuma (Bachelor Student, Osaka Univ.)
Ms. Akiyama (PhD Researcher, Tokyo Univ.)
Mr. Kamo (Bachelor Student, Temporary
withdrawal, Tokyo Univ. CEO, POL Inc.)
Ms. Tamaki (Associate Prof. Waseda Univ.
CEO, H2L Inc.)
MC: Nagano



mini-Symposium with Upper House



- 💧 With Research Division at House of Councilors on 23/Aug./2021
- 💧 Legislative Response Group, Policy Co-Creation Promotion Committee of EAJ under a theme of “SDGs and Technology”
 - ❄ Disclosure of enterprises on water and climate risks by T. Oki
 - ❄ Next generation disaster reduction by T. Arikawa
 - ❄ Next generation medical AI, DX, and data sharing by Y. Nakajima
- 💧 Perception of diet members on SDGs
 - ❄ 90% recognize SDGs > 40 % of population
 - ❄ Focus on poverty, health, education, energy, gap, climate change
 - ❄ Systematic institutional measure should be established in terms of SDGs



STI2050 committee



supervised by
Dr. M. Nakamura
a member of the 10-
member group of
ECOSOC

Established in November 2019 under
The Engineering Academy of Japan (EAJ)

❄ Mission:

- To draw a roadmap for "science, technology, and innovation" to realize the necessary technologies and the future vision to be achieved in 2050, based on an understanding of the current situation, including an inventory of technologies for 2050.

❄ Target:

- To define the desired future vision for 2050 and/or 2100,
- to identify the key or niche technologies that will facilitate the structural transformation of society necessary to realize that vision,
- to draw a roadmap for social innovation supported by those technologies, and
- to propose an action plan for realizing a sustainable society in the 22nd century.



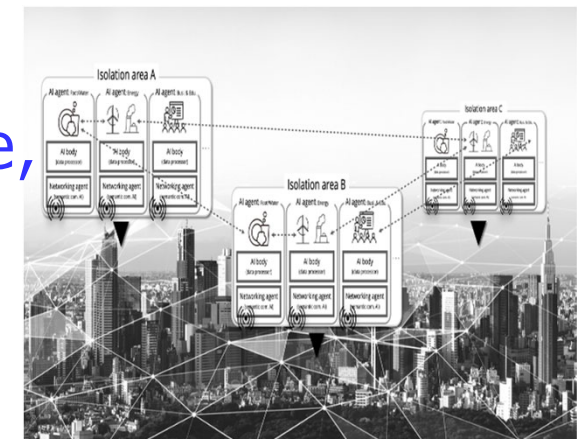
Discussions, Ideas, and Concepts from STI2050 committee

💧 Major topics the roadmaps will be developed:

1. Realization of **governance** based on visualized evidence and tolerance of diverse values
2. Realization of sustainable and inclusive access to water, food, and **energy** (nexus)
3. Realization of smart **cities** and comfortable and resilient human settlements by multi-AI network

💧 Pre-COVID-19 the keywords:

❄️ Peace, decarbonization, 100-year life, food security, resilient and sustainable society, QOL, innovation in finance, increase of well-being, ...



Technology Roadmap (draft) for Carbon Neutrality and Energy Sufficiency

Carbon Neutrality + Energy sufficiency Technology Roadmap						
Year		2021-2030	2031-2040	2041-2050	2051-2060	2061 -
Global Carbon Neutrality	Developed	-%		Net Zero	Negative Emission	
	Developing/ Emerging				Net Zero	(P)
1. Renewable Energy + Grid Enhancement	Wind (land+ocean)/Solar		Scale-up & Cost down	Large scale exploitation	Expand globally	
	Geothermal					
	Biomass					
	Enhance domestic grid	Connect regionally	Connect intra-continentially	Connect inter-continentially		
2. Fuel Conversion	Promote R&D + Tech demonstration (H ₂ /NH ₃ /MCH/HCOOH)	Scale-up & Cost down	Large scale deployment + Connect regional network	Connect intra/inter-continentially		
3. CCS/CCVS + Carbon Fixation	Promote R&D + Tech demonstration	Scale-up & Cost down	Large scale deployment	Expand globally		
4. Process Innovation for Carbon-intensive Industries	Enhance R&D for Iron/steel, chemical, cement industries, etc.	Scale-up and Cost down	Large scale deployment	Expand globally		
5. Energy Conservation + Social Reform	Home/factory energy conservation = promote R&D	Promote Deployment	Build “low-energy (zero-carbon)” city	Large scale deployment		
	Mobility = promote electrification + decarbonation	Promote Deployment				
	City infrastructure = (TBD)	(TBD)				
Energy sufficiency	Promote international cooperation for the “least-energy-sufficient” countries (G+B)	Promote triangular cooperation for the “least-energy-sufficient” people in rural areas (G+B)	Achieve 100% energy sufficiency (or, earlier)			

Challenges and way forward

- 💧 Members of former governmental officers worked for policy making in the field of science, technology, and innovation play relevant and significant roles bridging EAJ and political entities.
- 💧 “Research Group on Science and Technology Innovation Policy”
 - ❄️ established in Aug. 2021 and will collaborate with “Parliamentarians for Science and Technology Crisis in Japan”
 - ❄️ Follow up “Sixth Basic Plan of Science, Technology, and Innovation”
 - Climate change, DX, medical science and health, circular economy, economic security
 - 1. Strengthening research universities, which should be at the core of the development of science, technology, and academia
 - 2. Reforming systems for science and technology innovation; and
 - 3. Social issues that require science and technology innovation.
- 💧 Cross-cutting committee for carbon-neutral at SCJ
 - ❄️ Share the vice-president Dr. Hishida of EAJ with Science Council of J.
- 💧 Compared to the past, Diet members nowadays are less likely to have a long-term perspective. (personal view)

