Press Conference

President of JST

September, 2012

Green Innovation Initiatives

Issues and New Trends in the Green Sector

独立行政法人 科学技術振興機構 Japan Science and Technology Agency

Issues to be resolved

- Global warming
- Unstable energy supplies
- Difficulty in obtaining resources
- Global food shortage
- Water and soil contamination

Societal demands
～Post-disaster reconstruction, recovery, and growth～

Expansion in utilization of renewable energy

○Increase the percentage of renewable energy from 10% (2010) to 25% – 35% (2030)*

Green Growth Strategy (from "Strategies to Revitalize Japan"**)

- ○ Priority measures: accumulators, EMS, green materials, etc.
- ○ Goal up till 2020
  - ✓ Batteries: Increase share of the global market (worth 20 trillion yen) from 18% to 50%
  - ✓ EMS: Expand scale of market to 19.7 trillion yen, and establish Japan's position as a infrastructural power

Science and technology policies
～From sector-based to target driven-based～

3rd Science and Technology Basic Plan (2005-2010)

- ○ Four priority fields to be promoted: Life sciences, information and telecommunications, environment, nanotechnology/materials)
- ○ Four fields to be promoted: Energy, MONOZUKURI technology, social infrastructure, frontiers

4th Science and Technology Basic Plan (2011-2016)

- ○ Realization of post-disaster recovery and reconstruction
- ○ Promotion of green innovation
- ○ Promotion of life innovation

*From the three scenarios in "Options for Energy and Environment" (approved by the Energy and Environment Council on 29 June 2012). Conversion to from quantity of electricity generated

**From "Strategies to Revitalize Japan" (approved by the Cabinet on 31 July 2012)

International Trends in the Green Sector

独立行政法人 科学技術振興機構 Japan Science and Technology Agency

Alongside efforts to expand renewable energy in each country, active efforts are also being made in the research and development of related technologies

Europe, Germany, United Kingdom

【Goals】

- Germany: Aim to introduce large quantities of natural gas and renewable energy and reduce dependence on coal and nuclear power (Energy supply expansion for Germany, 2010)
- United Kingdom: The promotion of CCS, renewable energy, and nuclear power generation toward the elimination of carbon in power generation by 2050 (UK Coal Plan、2011)
- France: Currently reviewing the stance on energy mix for 2050

【Initiatives】

- Under the Seventh Framework Programme (FP7), 10 projects were selected for the theme of engineering/energy, including distributed energy, offshore renewable energy, solar cells, and concentrated solar energy.
- Under the energy sector in the European Strategy Forum on Research Infrastructure, solar energy, wind energy, CO2 stabilization and storage, etc. were raised as examples for research infrastructure.

United States

【Goals】

- Aim to achieve 80% green energy ** (proportion in electricity) by 2035 (State of the Union speech, 2011)

【Initiatives】

- DOE-led green innovation with advanced research infrastructure
- Three research initiatives (above $2 billion over five years)
  (1) Fundamental research (Energy Frontier Research Center) 46 areas
  (2) Applied research (Advanced Research Projects Agency-Energy)
  (3) From fundamental research to application (Energy Innovation Hub) 3 areas

Korea

【Goals】

- Aim to achieve 11% renewable energy (proportion in primary energy) by 2030 (First National Energy Basic Plan, 2008)

【Initiatives】

- Enactment of "Framework Act on Low Carbon, Green Growth" (2010), which will be prioritized over other laws to be applied
- Establishment of inter-ministerial comprehensive measures for green technology research and development, and selection of 27 priority technologies to be cultivated, including next-generation energy sources and Green City.

China

【Goals】

- Aim to achieve 11.4% non-fossil energy (including nuclear power) (proportion of primary energy) by 2015 (12th Five-Year Plan 2011)

【Initiatives】

- Promotion of new energy, energy conservation and environmental conservation, and new energy cars as part of the policies for strategic emerging industries,
- In the area of new energy, promotion of material development, establishment of research centers, and model projects, In the fields such as nuclear power, wind power, solar cells and thermal energy, biomass, and Smart Grid.

*Established by EU member countries and European Commission in 2002. The mission is to provide support for the formulation of vision, strategy, and related measures for research infrastructure for the whole of Europe.
**Wind power, solar power, nuclear power, green coal, and natural gas.
Drawn up based on the 9th target values for each country under the Committee on Basic Issues of the Advisory Committee for Natural Resources and Energy, Agency for Natural Resources and Energy, as well as materials from the JST-CRDS (Center for Research and Development Strategy)

JST Initiatives Toward Green Innovation

独立行政法人 科学技術振興機構 Japan Science and Technology Agency

Vision that we aim for

(1) Demand and supply system for stable and low-carbon energy sources
(2) Sustainable use of resources
(3) Sustainable coexistence with the natural environment

Creation of game changing technology

Taking off from existing technologies and creating new technologies using academic knowledge
→ Solving issues from their technological basis in the green sector

Energy management system
Smart Grid
Distributed cooperative energy
Secondary batteries
Energy carrier

Renewable energy
Solar cells

strategic materials, recycling

Reduction in environment burden
Materials that place low burden on the environment

Cross-sectional implementation in all programs/projects

CREST, さきがけ PRESTO, A-STEP, Advanced measurements, RISTEX, SICORP
ERATO, ALCA, S-イノベ S-INNOVATION, Industry and academia co-creation, SATREPS, SICP

CRDS JST
Proposal of research and development strategies

Strategy proposal

Phase interface science for highly efficient energy utilization, secondary batteries, electricity storage devices…

International comparison

LCS
Formulation of comprehensive strategy scenario

Social system design

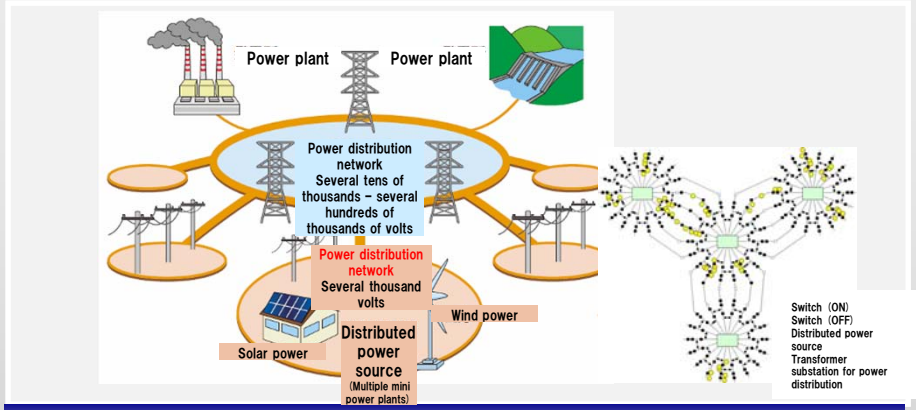
system to alarm and encourage saving electricity

Communication network for the prevention of power outages

Examples of Key Initiatives
～Challenge of Energy Management Systems (EMS) (1) ～

独立行政法人 科学技術振興機構 Japan Science and Technology Agency

Application of ultra high-speed algorithms in Smart Grid infrastructure technologies



According to distribution switch combination: $2^{468}(=10^{140})$
Massive calculation quantities → Reliant on the intuition of experts

Ultra high-speed compression algorithm method ZDD*

Finds optimal distribution route which reduces power loss by 3% in 30 minutes
Power save equivalent to 0.1 thermal power plant, at zero cost

ERATO "Minato Discrete Structure Manipulation System Project"
Research Director: Shinichi Minato (Professor, Hokkaido University)

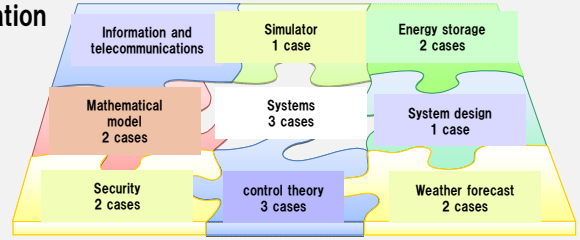
Launch of research projects that elevate theoretical/mathematical models to electricity control technology

Increase in distributed electricity sources → Instability in power supply system

Launch of new projects
16 teams commenced research

Creation of theories, mathematical models, and infrastructural technologies for the optimization of control of energy supply and demand

◆Examples of research themes
・General analysis on the dynamic properties of multi-energy systems
・Ultra large-scale optimal control of electricity distribution that allows for uncertainties in the prediction of solar power generation



Stable introduction of distributed electricity sources into the system through optimal control
Enables introduction of large quantities of renewable energy

CREST "Theories on the development of cooperative distributed energy management systems, and the creation and combination of infrastructural technologies"
Research Director: Masayuki Fujita (Professor, Tokyo Institute of Technology)

* ZDD (Zero-Suppressed Binary Decision Diagram): Method of structuring data to show, in a simple way, the massive numbers of combination sets

Examples of Key Initiatives
～Challenge of Energy Management Systems (EMS) (2) ～

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METI MEXT

Review of theme through joint study group comprising METI and MEXT

1. Next-generation battery

Cost reduction, rise in energy density

2. Energy storage and transportation

Utilization of chemical substances as media for the storage and transportation of energy

3. Unused thermal energy

Minimizing and effective utilization of unused thermal energy

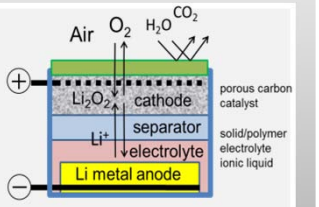
4. Innovative structural materials

Contribution to development of next-generation, lightweight aircraft and vehicles through technologies that combine different types of materials

Comprehensive research by an All-Japan dream team
～ From the fundamentals, to system optimization aimed at product commercialization ～

・Fundamental research through the combination of different fields, such as physical properties, aimed at the development of new batteries

・Other than the development of elemental technologies, the actual assembly of batteries is also taken into consideration

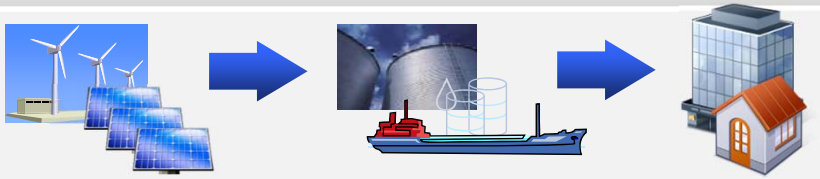


Schematic diagram of metal-air accumulator batteries

Aiming for 10 times the energy density of existing lithium-ion batteries at 1/10 the cost

Launch of new research and development projects

Establishment of new applications for renewable energy through the development of energy carriers



In regions that have rich sources of renewable energy, energy is converted into chemical substances (ammonia, organic hydrides, etc.), transported, and used.

Leading the world with post-lithium ion batteries

Eliminating the time/space unevenness in distribution of renewable energies

Introduction of large quantities of renewable energy

Examples of Key Initiatives
～Focusing on solar cells research at virtual networks and centers ～

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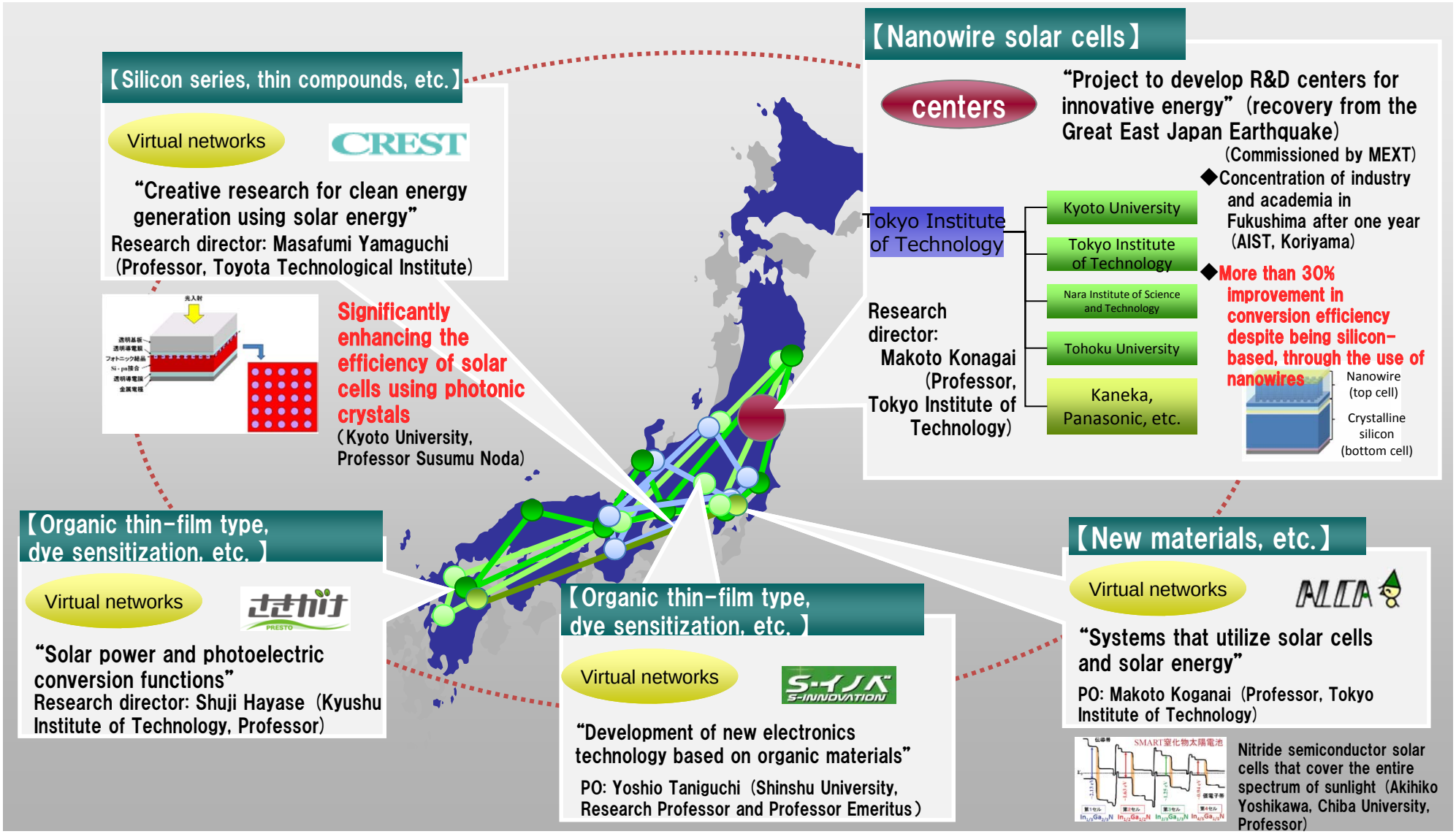


Examples of Key Initiatives
～environmentally-friendly metal materials with international competitiveness～

Lead elution into water
→Brain damage in infants
Tightening of regulations
→Global standards on lead elution

Need for lead-free brass alloys

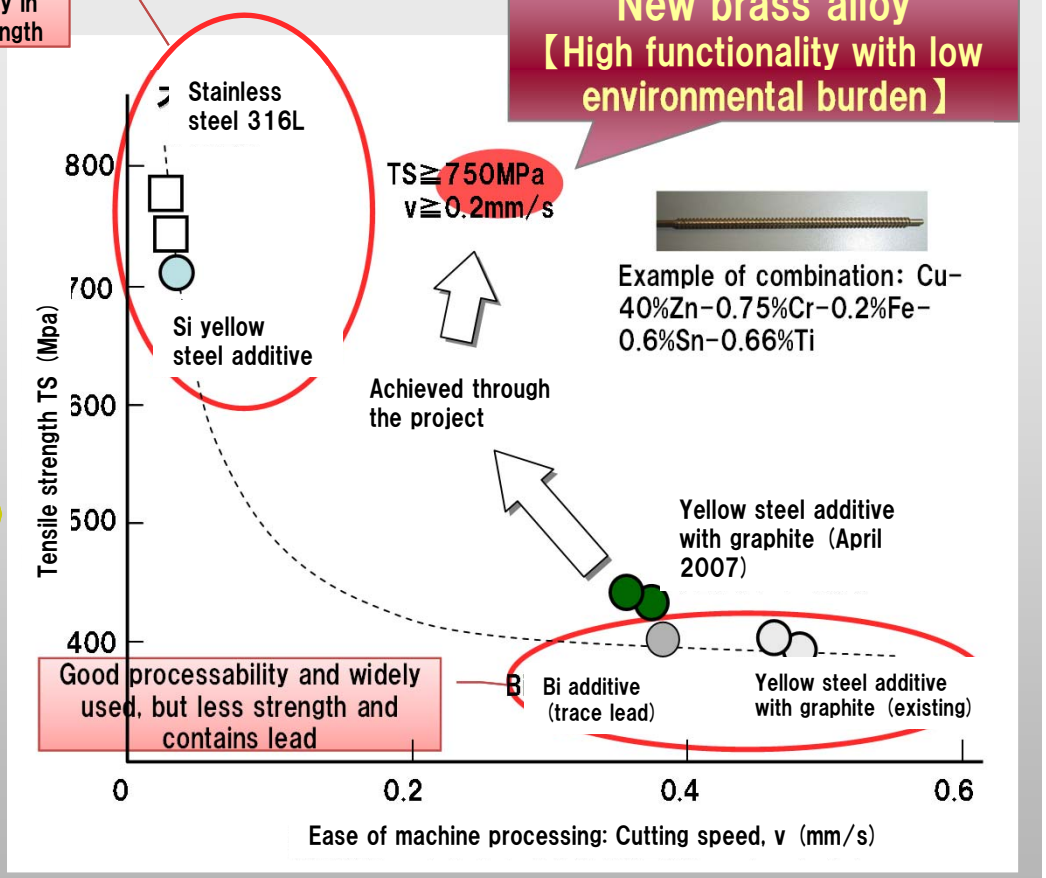
Smaller and lightweight parts
→Reduction in quantity of materials used
Developing new markets
→Replacement of high-class stainless steel material

Need to enhance strength

Addition of graphite, Cr, Fe, Sn, etc.
Application of powder metallurgy process

sacrifice processability in pursuing strength

New brass alloy
【High functionality with low environmental burden】



Success in developing world's strongest, easy-to-cut, lead-free, new brass alloy

Application in a wide range of fields, such as lightweight cooling systems for cars, is anticipated

Promoting research results
A-STEP (former project: "Japan Regional Innovation Strategy program by the Excellence")
Program to Promote the Important Aspects of Regional Research and Development
Development research (2007-2010)
Utilization of R&D resources (2009-2012)

Katsuyoshi Kondo
(Osaka University, Professor)
San' etsu Metal Co., Ltd.
Nippon Atomized Metal Powders Corporation

Strategic Program Package for Green Innovation

Opening up frontiers for natural energy

(1) Demand and supply system for stable and low-carbon energy sources
(2) Sustainable use of resources
(3) Sustainable coexistence with the natural environment

Global warming
Unstable energy supplies
Difficulty in obtaining resources
Global food shortage
Water and soil contamination

Needs

Strategic program package

Creation of game changing technology

Demand and supply system for stable and low-carbon energy sources

Energy management system
Green ICT, batteries, chemical processes for energy conservation, transportation, and storage, use of thermal energy

Sustainable use of resources

Sustainable coexistence with natural environment

Expanding use of renewable energy
Solar cells, chemical processes for energy creation, biomass

Resource recycling system, strategic materials, and recycling
toward stable supply of rare resources

Environmental adaptation and reduction in environmental burden in food production and water use systems
ICT agriculture, breeding, water use systems

(Reference)
Strategic Program Package
(Details)

Energy Management Systems
(Green ICT, batteries, chemical processes for energy conservation, transportation, and storage, use of thermal energy)

独立行政法人 科学技術振興機構 Japan Science and Technology Agency

Future vision

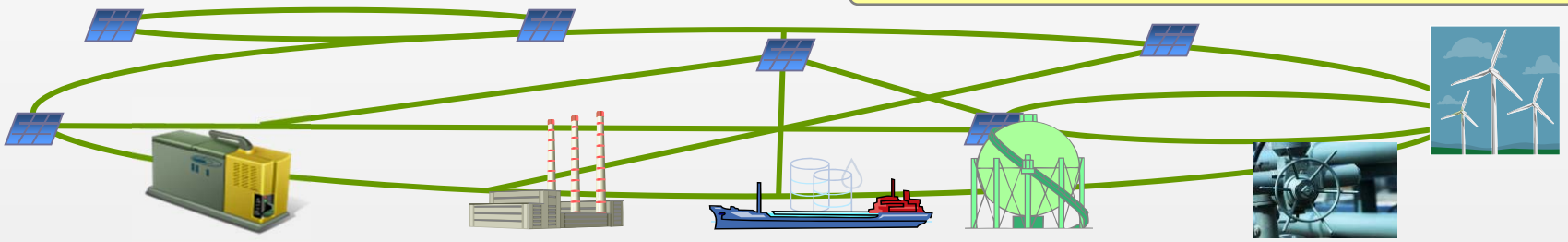
Establishment of a highly energy efficient society that can control energy supplies for cities, local communities, and industries in a consolidated and optimal manner

Overview of research and key implementation programs

Green ICT

➢Optimal control for the development of city infrastructure through the dynamics evaluation, prediction, and efficient management of service functions

Key existing PJ: "EMS" (CREST), "Minato Discrete Structure" (ERATO)



Batteries

➢Development of batteries based on new principles, such as completely solid Li battery, multivalent ion battery, air battery, etc.

➢Development of fuel cells that do not use rare metals

Key existing PJ: "Batteries" (ALCA), "CO2 suppression" (CREST), "Energy phase interface" (CREST & PRESTO), "Molecular technologies" (partial) (CREST), "Power flow phenomenon analysis" (Advanced Measurement)

Chemical processes for energy conservation, transportation, and storage

➢Development of industrial processes with low energy consumption levels

➢Development of energy carriers aimed at eliminating time and space unevenness in distribution

Key existing PJ: "Nano phase interface" (partial) (CREST), "Chemical processes for energy conservation and creation" (ALCA), "Leading conversion of substances" (ACT-C), "Kanei catalyst" (partial)(ERATO)

Use of thermal energy

➢Development of systems that make use of medium/low temperature sources (heat pumps, etc.)

➢Development of thermoelectric materials/devices

Key existing PJ: "Heat-resistant materials, iron and steel recycling" (ALCA), "CO2 suppression" (CREST), "Energy phase interface" (partial) (CREST), "Energy in China" (partial)(SICORP)

Expansion of Use of Renewable Energy
(Solar cells, chemical processes for energy creation, biomass)

Future vision

Expansion in the supply of clean energy without depending upon fossil fuels

Conversion efficiency 20% and life of 20 years with organic solar cells
Conversion efficiency 50% with new solar cells
Conversion efficiency 30% with hydrogen production process

Overview of research and key implementation programs

Solar cells

➢Development of ultra high-efficiency and long-lasting solar cells made from silicon, compound semiconductors or organic materials

➢Development of ultra high-efficiency solar cells using new materials and new principles, such as nano 3D structures and quantum dot carbon nanotubes, etc.

Key existing PJ: "Sunlight" (CREST & PRESTO), "Power flow phenomenon analysis" (Advanced Measurement), "Solar energy" (ALCA), "Organic electricity" (S-Innovation)

Chemical processes for energy creation

➢**Hydrogen generation through photo-reduction of water**

➢**Production of carbohydrates through reduction of CO2**

Key existing PJ: "Leading conversion of substances" (ACT-C), "Conversion of light energy substances" (PRESTO), "Solar energy" (ALCA), "Energy in China" (partial)(SICORP)

Biomass

➢**Production of biomass fuels from algae**

➢**Use of woody biomass**

Key existing PJ: "Biotechnology"(ALCA), "CO2 suppression" (CREST), "Algae biomass" (CREST, PRESTO), "Recycling CO2" (CREST, PRESTO), "U.S. Metabolon" (SICORP), "Environment and energy (low carbon)" (SATREPS)

Resource Recycling System Toward stable supply of rare resources

(strategic materials, recycling)

■Future vision

◇Achieving a recycling system that responds to supply risks for rare elements
◇Strengthening industrial competitiveness for Japan, which does not have resources, through the development of alternative materials

■Overview of research and key implementation programs

strategic materials

➢Toward the development of innovative alternative materials to rare elements:
➢Development of magnetic materials
➢Development of structural materials
➢Development of catalysts and battery materials
➢Development of electronic materials

Key existing PJ: "Element strategy" (CREST & PRESTO), "High performance magnets" (Co-creation)

Two-pronged approach

Recycling

➢Development of high-efficiency recovery and separation methods from scrap and waste materials

Key related PJ: METI "Rare metal recovery technologies", "Recovery technologies for rare metals, etc." MEXT "Leading PJ for material technologies from Tohoku," Ministry of Environment "General promotional expenses for environmental research"

Collaboration

MEXT
Element strategy PJ
＜Establishment of research bases＞

METI
Alternatives for rare metals PJ, etc.

Environmental Adaptation and Reduction in Environmental Burden in Food Production and Water Use Systems

(ICT agriculture, breeding, water use systems)

独立行政法人 科学技術振興機構 Japan Science and Technology Agency

Future vision

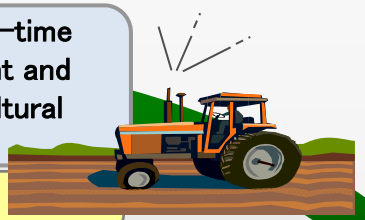
Establishment of production systems for agricultural and marine products that utilize water and resources in a sustainable and efficient manner

Overview of research and key implementation programs

ICT agriculture

➢Through non-invasive, non-destructive, real-time sensing, obtain information on the environment and cultivation, and develop highly efficient agricultural technologies using that information

Key existing PJ: "Advanced integrated sensing" (CREST)



Breeding

➢Enhanced photosynthesis functions

➢Development of low environmental burden fertilizers and pesticides

➢Production of high-stress tolerance, high-yielding varieties

Key existing PJ: "Converting CO2 into a resource" (CREST, PRESTO), "Biotechnology" (ALCA), "CO2 suppression" (partial)(CREST)

Water use systems

➢Development of water use systems for environmentally adaptable and low environmental burden food production systems

➢Recovery of nitrogen and phosphorous from waste water

Key existing PJ: "Use of water" (CREST), "Departure from global warming, society that coexists with the environment" (RISTEX)

Topics

FY 2013 Budget (REQUEST)
Initiatives Through Strategies for Priority Fields

独立行政法人 科学技術振興機構 Japan Science and Technology Agency

Green innovation	FY 2013: 34.5 billion yen (REQUEST)	FY 2012: 22.6 billion yen (ESTIMATES)	+11.9 billion yen

◆Under the advanced low carbon technology Research and Development (12 billion yen), technologies for utilizing next-generation energy (MEXT and METI collaboration)
◆Research for creating new technology seeds such as Energy Management Systems [Expansion] (16.6 billion yen)
◆International joint research with China "Enhancing high-efficiency nature of energy use" [New] (0.2 billion yen)

Life innovation	FY 2013: 37.4 billion yen (REQUEST)	FY 2012: 32.0 billion yen (ESTIMATES)	+5.4 billion yen

◆Research for creating new technology seeds aimed at medical technologies, such as for lifestyle diseases, etc. [Expansion] (21.9 billion yen)
◆Development of systems and technology for advanced measurement such as diagnostic technology through non-invasive measurements [New] (0.6 billion yen)

Nanotechnology/Materials	FY 2013: 15.2 billion yen (REQUEST)	FY 2012: 14.7 billion yen (ESTIMATES)	+0.5 billion yen

◆Research for creating new technology seeds for Japan, such as element strategy, molecular technology, etc. (11.4 billion yen)

Information and telecommunications	FY 2013: 14.8 billion yen (REQUEST)	FY 2012: 14.8 billion yen (ESTIMATES)	±0 billion yen

◆Research for creating new technology seeds such as technology to handle large-scale data, next-generation devices, etc. (8.2 billion yen)
◆Development of information infrastructure through information recycling [Expansion] (3.8 billion yen)
Of these, development of infrastructural technology and infrastructure for the use of big data [New] (0.6 billion yen)

Science and Technology for Society and infrastructure	FY 2013: 22.6 billion yen (REQUEST)	FY 2012: 22.6 billion yen (ESTIMATES)	±0 billion yen

◆International science and technology cooperation through cooperation with ODA [Expansion] (2.5 billion yen)
◆Research and development for Science and Technology for Society, and promotion and expansion of social implementation [Expansion] (1.7 billion yen)
◆Science Challenge Support (human resource development for next-generation) [Expansion] (1.4 billion yen)
◆Comprehensive promotion of risk communication [New] (60 million yen)

COI program will be carried out, considering given strategies for priority fields [New] (5.2 billion yen)

※Note: The amounts described above include duplicates for estimations for operating grants and the total for each field

Publication of a Science Article on the Relations Between Politics and Science in Policy Making and Implementation

1. Background

JST's Center for Research and Development Strategy (CRDS) have conducted reviews in the past few years on the roles and responsibilities that science and the government should take on in the policy making and implementation process.

・In March this year, a strategic proposal "Toward the Establishment of Principles Regarding the Roles and Responsibilities of Science and Government in Policy Making" was published (CRDS-FY2011-SP-09).

・The paper written by Tateo Arimoto, Professor at the National Graduate Institute for Policy Studies and Deputy Head of CRDS, and Yasushi Sato, CRDS Fellow, on the issues that Japan and the international community should tackle in the future, based on the abovementioned review, was accepted on peer review by a U.S. journal *Science*, and published in the 7 September 2012 issue.*

*** Tateo Arimoto and Yasushi Sato, "Rebuilding Public Trust in Science for Policy-Making," Science 337 (7 September 2012), pp.1176-1177. DOI No.:10. 1126/science. 1224004**

JST Press Release

Sep. 7, 2012
Japan Science and Technology Agency (JST)
5-3, Yonbancho, Chiyoda-ku, Tokyo 102-8666

JST (President: Michiharu Nakamura)'s Center for Research and Development Strategy (CRDS, Director: Hiroyuki Yoshikawa) has looked into problems regarding the roles and responsibilities of science and the government in policy making and implementation in the last few years. CRDS issued a strategic proposal on this issue in March this year; an article by Tateo Arimoto, Professor of the National Graduate Institute for Policy Studies and Deputy-Director General of CRDS, and Yasushi Sato, Fellow of CRDS, discussing how Japan should take action on this issue is published on Science (7 September 2012). *
*Tateo Arimoto and Yasushi Sato, "Rebuilding Public Trust in Science for Policy-Making," Science 337 (7 September 2012), pp.1176-1177. DOI:10.1126/science.1224004.
This article first mentions that, after the great earthquake, tsunami, and nuclear accident in March 2011, the public trust in science and technology was damaged and the relations between science and the government has been discussed extensively. The article calls for Japan's efforts to install a robust framework to link science and policy making, such as the establishment of principles regarding the relations between science and the government in policy making and implementation.
The article then introduces recent trends from international perspectives. In the United States, President Obama has promoted scientific integrity in government since he came into office. In the United Kingdom, principles regarding the relations between the government and scientific advisers were established in 2010. More recently, the U.S. National Science Foundation has hosted the "Global Summit on Merit Review" in May this year, with the aim of enhancing international discussion on scientific merit review and scientific integrity. In the Summit, the Global Research Council was established. Meanwhile, the InterAcademy Council is carrying out a project on "research integrity and scientific responsibility," in which educational materials for the global scientific community is being developed.
The article finally emphasizes the need for international as well as domestic efforts to create mechanisms to utilize scientific/technical expertise effectively and to maintain mutual trust between the government and the scientific community, as the world has entered an era of intense, intricate interaction between science, technology, and the globalized society.

References
CRDS, "Toward the Establishment of Principles Regarding the Roles and Responsibilities of Science and Government in Policy Making" (CRDS-FY2011-SP-09), March 2012.
http://crds.jst.go.jp/singh2/wp-content/uploads/11sp09.pdf

CRDS (Center for Research and Development Strategy)
CRDS was founded in July 2003 in order to strengthen the strategic planning capability of Japan Science and Technology Agency (JST). It strives persistently to advance science and technology toward the fulfillment of societal needs and realization of our vision of future society.

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Publication of a Science Article on the Relations Between Politics and Science in Policy Making and Implementation

2. Contents of the paper

○Since the Great East Japan Earthquake and TEPCO Fukushima Daiichi incident, there have been growing discussions on the roles and responsibilities of the government and the scientific community.
○Public trust in science and technology has declined.

○In Japan, it is clear that a system that effectively connects the scientific community and the government is needed.
○In particular, there is a need to establish behavioral norms for science and the government in policy making and implementation.

○In other countries, there has also been an acceleration in the related initiatives in recent years.

○There have also been various movements in Japan since the great earthquake.

○ As we enter a global age of uncertainty, there is a need for global efforts toward establishing relationships of trust and continued dialogue between governments and scientific communities.

・In the United States, there has been a strong push by President Obama to ensure the soundness of science in the government.
・In the United Kingdom, comprehensive principles on the relationship between the government and science advisors were formulated in 2010.
・In May this year, the Global Reach Council was established in the Merit Review Summit.
・The InterAcademy Council (IAC) developed a project on fairness in research and responsibility of science.

・In March this year, CRDS formulated draft principles on the roles and responsibilities of science and government in policy making.
(1) Positioning of scientific advice in policy making
(2) Obtaining accurate scientific advice at an appropriate timing
(3) Ensuring the independence of scientific advisers
(4) Awareness of scientific advisers toward their responsibilities
(5) Ensuring a broad perspective and balance
(6) Securing quality of advice and consolidating views
(7) Appropriate handling of uncertainty and diversity
(8) Free expression of scientific knowledge
(9) Fair treatment of scientific advice by the government
(10) Ensuring transparency in the processes of scientific advice

Innovation Japan 2012 - College Fair

(Overview of Event)

Date and time: Sep 27 (Thu) 09:30 - 17:30
Sep 28 (Fri) 10:00 ~ 17:00
Venue: Tokyo International Forum (Yurakucho, Tokyo)

Image of the fair held this year

- **300 cases of results selected by JST and more, gathered under one roof (161 institutions)**
- **More than 120 “JST Short Presentations” that showcase the contents of technologies on exhibit in about 5 minutes**
- **Exhibition and demonstration of actual “Microbubble generation device,” the result of collaboration at the college fair last year, at the JST booth (Kochi National College of Technology, Hata-sensei)**

Matching rate of above 20% based on results of past eight fairs held!

Four Awards for JST Projects, Including the Prime Minister's Award
～Merit Awards for Industry-Academia-Government Collaboration 2012 ～

独立行政法人 科学技術振興機構 Japan Science and Technology Agency

11th Conference for the Promotion of Industry-Academia-Government Collaboration
Held concurrently with Innovation Japan <Sep 28 (Fri)>

The Merit Awards for Industry–Academia–Government Collaboration are conferred on projects that have obtained significant achievements through industry–academia–government collaboration activities conducted in universities, public research institutions, or corporations, and contributed to the promotion of industry–academia–government collaboration. The awards ceremony will be held at the Tokyo International Forum on Sep 28 (Fri).

【Prime Minister's Award】

Development of implantable left ventricular assist system "EVAHEART"

Shunichi Yamazaki, President and CEO of Sun Medical Technology Research Corporation

Kenji Yamazaki, MD, Professor, Department of Cardiovascular Surgery, Tokyo Women's Medical University

【Minister of Education, Culture, Sports, Science and Technology Award】

Development of electronic compass and motion sensor using magneto-impedance element (MI sensor)

Kaneo Mohri, Professor Emeritus, Nagoya University

Yoshinobu Honkura, Engineer, Aichi Steel Corporation

【Minister of Education, Culture, Sports, Science and Technology Award】

Development of rapid fabrication technology for monoclonal antibodies (ADLib®system)

Masaaki Fujiwara, CEO, Chiome Bioscience Inc.

Kunihiro Ohta, Exective Director, Chiome Bioscience Inc., Professor, Department of Life Sciences of the Graduate School of Arts and Sciences, University of Tokyo

【Minister of Economy, Trade and Industry Award】

Development of pivoting jet ozone wastewater treatment system that reduces the volume of sludge generated to 1/10 of the volume generated by conventional systems

Manabu Iguchi, Professor Emeritus, Hokkaido University

Moriyoshi Shitara, CEO of HUENS Co., Ltd.