UZBEK-JAPAN SYMPOSIUM ON ECOTECHNOLOGIES

Innovation for Sustainability-Harmonizing Science, Technology and Economic Development with Human and Natural Environment

Tashkent, May 14, 2016

COMMITTEE FOR COORDINATION SCIENCE AND TECHNOLOGY DEVELOPMENT

ECOTECH

公益財団法人 本田財団
HONDA FOUNDATION

Contents

For Publication

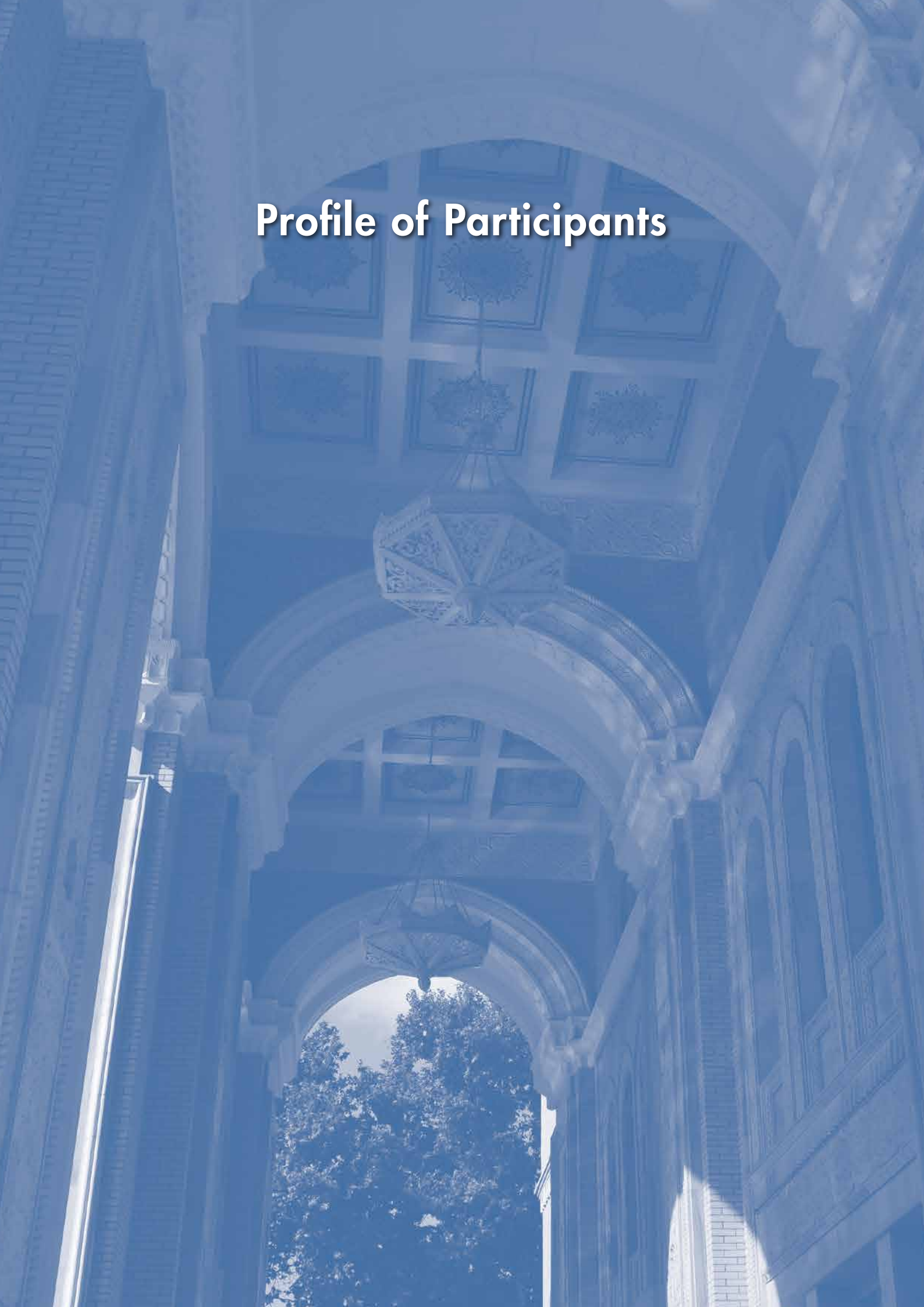
The present report is an account of the remarks and speeches from the international symposium entitled "Innovation for Sustainability—Harmonizing science, technology and economic development with human and natural environment" held on May 14th 2016 in Tashkent, Uzbekistan. The symposium was jointly organized by Committee for Coordination of Science and Technology Development (CCSTD) under the Cabinet of Ministers of Uzbekistan and Honda Foundation. Established in 2006, CCSTD has the major objectives of contributing to science and technology development in Uzbekistan through various activities, including establishing priority areas of science and technology development; coordinating activities of research institutes and agencies, universities of ministries and the Academy of Sciences; developing international scientific and technical cooperation and so on.

The goal of the symposium was to discuss how we should promote innovation to support sustainable development of science and technology in harmony with the human and natural environment, focusing on the lessons of Japan in its rapid economic development period and beyond. Speakers with varied expertise from diverse fields including academia, research institutes and industry and governmental organizations provided insightful observations and opinions, to an audience of widely varying backgrounds. The symposium started with an overview of the Japanese experience in the period of rapid economic growth and the current status of science and technology development in Uzbekistan, provided by the keynote speeches. Following was the first session which reviewed the legal framework and social system required for promoting economic development and environmental protection or restoration. Then the second session discussed success stories in the sphere of ecotechnology, looking at examples both in Japan and Uzbekistan. The third session looked into the future of advanced environmental technologies, with a focus on introduction of technological innovation including infrastructural changes. And, finally, the last session wrapped-up the entire program, discussing how to harmonize the science, technology and economic development with the human and natural environment.

This was our first symposium in Central Asia. We hope this activity had made some contribution to sharing the value of ecotechnology among the participants and strengthening the relationship between the region and Japan in the field of science and technology.

At Honda Foundation, its founding prospectus states that our mission is to contribute to "creating a truly humane civilization." It is our strong hope that the discussions and friendships cultivated through this symposium will contribute to the realization of a truly humane society in the future.

Masataka YAMAMOTO
Managing Director, Honda Foundation



Profile of Participants

*The information is at the time of the Symposium unless otherwise noted.

Dr. Shavkat SALIKHOV

President, Academy of Sciences of Uzbekistan,
Chairman of Committee for Coordination of Science and Technology Development

Dr. Shavkat Salikhov is an Academician of Uzbekistan.
In 2006 he was elected as the President of Academy of Sciences in Uzbekistan for the first time; in 2011 he was reelected as the President. He is at the same time the Chairman of the Committee for Coordination of Science and Technologies Development under the Cabinet Ministry of the Republic of Uzbekistan.

Work experience

1967–1971 - Lab researcher of Tashkent State University
1971–1973 - Junior researcher of Tashkent State University
1973–1981 - Senior researcher of Academy of Sciences
1981–1993 - Head of Lab Department of Academy of Sciences
1993–2006 - Director of Bioorganic Chemist Institute
2006–2011 - President of Academy of Sciences
2006–now - Chairman of the Committee for Coordination of Science and Technologies Development under the Cabinet Ministry of the Republic of Uzbekistan
2011–now - President of Academy of Sciences

State awards:

1998 "Respected Scientist" Honorable award
2008 "Respected by the people and the Homeland" Honorable medal
2014 "For honorable labour" Honorable medal

H.E. Fumihiko KATO

Ambassador Extraordinary and Plenipotentiary of Japan to
the Republic of Uzbekistan

NATIONALITY: Japanese
EDUCATION: 1976, Graduated from The University of Tokyo, Faculty of Economics; 1983, Stanford University

PROFESSIONAL CAREER:

Apr 1976 Joined Ministry of International Trade and Industry (MITI)
Jun 1988 Deputy Director of General Coordination Division, Japan Patent Office, MITI
Sep 1989 Deputy Director of General Coordination Division, Small and Medium Enterprise Agency, MITI
Jun 1990 Director, Financial Affairs Office, EID/MITI (External Trade Insurance Division)
May 1991 Chief Representative, EID, Paris Office, Japan External Trade Organization (JETRO)
Jul 1994 Director for Diet Relations, MITI
Jun 1995 Director, Petroleum Distribution Division, Petroleum Department, Agency of Natural Resources and Energy, MITI
Jul 1997 Director, EID, MITI
Jan 2001 Director, Policy Planning Division, Small and Medium Enterprise Agency, METI
Jul 2002 Director-General, Planning Department, JETRO
Jul 2004 Counselor, Cabinet Office of Japanese Government
Jul 2006 Senior Director, Nippon Export and Investment Insurance (NEXI)
Oct 2006 Director-General for Small and Medium Enterprise Policy, Small and Medium Enterprise Agency, METI
Jul 2007 Vice-Chairman, NEXI
Feb 2013 Ambassador Extraordinary and Plenipotentiary of Japan to the Republic of Uzbekistan

Ms. Yoriko KAWAGUCHI

Former Foreign/Environment Minister of Japan,
Professor of Meiji Institute for Global Affairs, Meiji University

Prof. Yoriko Kawaguchi is a former Member of the House of Councilors for the Liberal Democratic Party from 2005 to 2013. She was Special Adviser to the Prime Minister of Japan on foreign affairs from 2004 to 2005; Minister for Foreign Affairs from 2002 to 2004 and Minister of the Environment from 2000 to 2002. She also served as Co-chair of the International Commission on Nuclear Non-Proliferation and Disarmament from 2008 to 2010; Prior to this, Prof. Kawaguchi was a Managing Director of Suntory, Ltd., Director General of Global Environmental Affairs at the Ministry of International Trade and Industry, and Minister at the Embassy of Japan to the United States. Prof. Kawaguchi holds an M.Phil. in Economics from Yale University and a B.A. in International Relations from The University of Tokyo. Recently she holds a professorship at Meiji Institute for Global Affairs.

[Recent Activities]
- Member of the Board of Trustees, International Crisis Group
- Distinguished Fellow, Asia Society Policy Institute
- Member, the Asia Pacific Leadership Network
- Commissioner, Policy Commission on Asia-Pacific Regional Architecture
- Member of the Board of Trustees, United States-Japan Foundation
- Executive Adviser, the Sasakawa Peace Foundation
- Commissioner, the Great Britain Sasakawa Foundation
- Distinguished Fellow, Tokyo Foundation
- Member of the Board of Trustees, the Toshiba International Foundation
- Outside Director, Toyota Tsusho Corporation
- Outside Director, Japan Petroleum Exploration Co., Ltd.

[Honors & Awards]
- Anniversary Medal for a major contribution to global security promotion and non-proliferation regime by K. Kadyrzhanov, Director General, Notional Nuclear Center (Oct. 2011)
- "Wilbur Cross Medal" by Yale University (Oct. 2008)
- Award "Star of Jerusalem" by Mahmoud Abbas, President of the Palestinian National Authority, (Oct. 2010)
- Anniversary Medal by Foreign Policy Associate (Sept. 2005)
- Certificate of Doctor Honoris Causa by the authority of the Academic Council of the National University of Mongolia (Sept. 2004)
- "GRAN CRUZ EXTRAORDINARIA" (National testimonial Medal) by The Republic of Paraguay (Mar. 2004)
- "Aguila Azteca Medal" by Vicente Fox, President of the United Mexican States (Dec. 2003)
- Anniversary Medal for established in honor 300 anniversary of Sankt-Peterburg by mayor of Sankt-Peterburg

Mr. Hiroto ISHIDA

President, Honda Foundation

Born: Sept. 16, 1941, Tokyo, Japan

Education:

1970	M.A. in Political Science at the University of Illinois
Mar. 1964	Faculty of Engineering, Department of Nuclear Engineering, The University of Tokyo (Univ. Tokyo)
Mar. 1960	Kanazawa University High School

Works:

Apr. 2010	President Emeritus of Kanazawa Gakuin University
Jul. 2005	General Manager of National Museum of Emerging Science and Innovation
Apr. 2004	President of Kanazawa Gakuin University
Apr. 2003	Visiting Professor, Institute of Industrial Science, Univ. Tokyo
Nov. 1999–Feb. 2003	Ambassador of Japan to the Czech Republic
Jun. 1995–Jun. 1998	Vice Minister of Science & Technology Agency (STA)
Jul. 1994	Science Councilor, STA
Jun. 1991	Director General of the Nuclear Energy Bureau, STA
Jan. 1982–Apr. 1985	Counselor (Science), Embassy of Japan to the USA
Apr. 1964	Join STA

Public Services:
- President (2011), Director (2006) of Honda Foundation
- Chairman, Nuclear Safety Technology Center
- President, Maeda Ikutoku Foundation
- Chair of Association for Traditional Performing Arts of Japan
- Member of Management Council, National Graduate Institute for Policy Studies

Research Areas:
Science and Technology Policy, Nuclear Engineering

Books:
- Komatsu Children's Kabuki 'Meitouishikiri Hotokanoonmae' (2007, Jishosha Shinsho)
- From the Streets of Prague and Kanazawa (2008, Jishosha Shinsho)
- New Nabucco Story from Opera (2016, Hokkoku Shimbun)

Mr. Nobuhiko SHIMA

Chairman, Japan-Uzbekistan Association

1967	After graduating from the Keio University Faculty of Economics, entered Mainichi Newspapers.
1971	Department of Economic, Mainichi Newspapers. Correspondent team for the Lockheed bribery scandal.
1981	A special correspondent in Washington, D.C. Reported international conference (ex. Summit, IMF, etc.).
1983	Chosen as the city of Flint, Michigan, U.S.A. of first honorary citizen.
1987	Resign from Mainichi Newspapers. Become freelance journalist.
Until 1997	Regular commentator on "BROAD CASTER" (TBS) for 7 years.
Until 2005	Regular commentator on "ASAZUBA" (TBS).
Until 2015	Host for "GLOBAL NAVI FRONT" (BS-TBS) for 15 years.
Current	Regular commentator on "BIZ STREET" (BS-TBS).
	Regular interviewer on "The Interview" (BS-Asahi).
	Host for "Nobuhiko Shima Jinsei Hyakkei" (TBS Radio).
	Regular commentator on "Takero Morimoto Stand-by" (TBS Radio).
	Serialization: "Zaikai (magazine)," "Denki Shinbun (newspaper)," "Japan In-depth (web)."
	Director of the Society for Testing News Proficiency.
	Chairman of the Japan-Uzbekistan Association.
	Over 30 times reported summit.

Official position Board of Audit of Japan "Audit committee"
Ministry of Internal Affairs and Communications
"Study Group on strengthening international information dissemination," etc.

Official Site http://www.nobuhiko-shima.com/ (Japanese Only)

Bibliography

"Nihonhei horyo ha Silk Road ni opera house wo tateta" (Kadokawa)
"Nihonjin no Kakugo - seijyuku keizai wo koeru" (Jitsugyo no Nihon Sha)
"Shuno gaiko - sennsihnnkoku summit no rimennshi" (Bungeishunju)
"Shima Nobuhiko no ippitsu nyukonn" (ZAIKAI)
"Nihon no sekaishouhin ryoku" (Shueisha) and more

Invited presentations

In 2012, to commemorate the 20th anniversary of establishing diplomatic relations between Japan and Uzbekistan, Shima was asked to give lectures in Tashkent (November 26, 2012) and Samarkand (November 24, 2012) on the theme of "Japan's Third Crisis," in which he described the path taken by Japan after the Great East Japan Earthquake.

Dr. Odilkhuja PARPIEV

Executive Director, Committee for Coordination of Science and Technology Development

He is currently working as the Executive Director (Vice-Chairman) of the Committee for Coordination of Science and Technology Development under the Cabinet of Ministers of the Republic of Uzbekistan.
He was a student of the Tashkent State University, Uzbekistan on the Physics Faculty (1983–1990).

Professional experience

Date from –Date to	LOCATION	COMPANY	POSITION	DESCRIPTION
Sept. 2010– present	Tashkent	Committee for Coordination of Science and Technology Development under the Cabinet of Ministers of the Republic of Uzbekistan	Executive Director	S&T policy and management including Innovation activity. Coordinating and monitoring of performance of the state S&T and Innovation programs. Coordinate International S&T cooperation. Coordinating of activi-ty of the territorial centers for Innovation activity and Technology transfer. Analyze S&T information. Development of S&T Information network. Select and organizing S&T Information Flows for Business.
Sept. 2006– Sept. 2010	Tashkent	Science and Technologies Center under Coordinating Council for Science and Technological Development under the Cabinet of Ministers of the Republic of Uzbekistan	Head of Department	Innovation policy and management. The organization and realization of competitions of innovation projects. Development of new technologies in the industry. Monitoring of performance of the state innovation programs. Financing and coordination of scientific development in the field of aviation technologies.
Apr. 2002– Aug. 2006	Tashkent	Science and Technologies Center under Coordinating Council for Science and Technological Development under the Cabinet of Ministers of the Republic of Uzbekistan	Head of Department	Innovation policy and management. The organization and realization of competitions of innovation projects. Development of new technologies in the industry. Monitoring of performance of the state innovation programs. Financing and coordination of scientific development in the field of aviation technologies.

Date from –Date to	LOCATION	COMPANY	POSITION	DESCRIPTION
Aug. 1998– Apr. 2002	Tashkent	State Committee of the Republic of Uzbekistan for Science and Technology	Head of Department	Innovation policy and management. Formation and realization of the state innovation programs.
Jan. 1998– Aug. 1998	Tashkent	Uzbek-Indian Center for Promotion of S&T Cooperation	Deputy Director	Scientific collaboration with India, foreign institutions and international organizations in the sphere of R&D.
Jan. 1990– Dec. 1997	Tashkent	Heat Physics Department of Uzbek Academy of Science, Uzbekistan	Researcher	Conducting research on specific fields.

Mr. Akira KOJIMA

Director, Honda Foundation
Advisor of Japan Center for Economic Research

Trustee and visiting Professor of GRIPS (National Graduate Institute for Policy Studies) and
Advisor of JCER (Japan Center for Economic Research)

Year of Birth: 1942
Place of Birth: Yokohama, Japan
Education: 1965, Graduated from Waseda University (Econs)
1969–70, British Council Scholar at Manchester University (UK)

Other Present Positions and Activity:
Member of the Trilateral Commission
Member of the Board of Trustees of Japan Productivity Center
Chairman of WTC (World Trade Center) Tokyo
Vice Chairman of Japan-German Center (Berlin)
Councilor of Aspen Institute, Japan
Director of Honda Foundation (Chairman of International Committee)
Councilor of IIMA (Institute for International Monetary Affairs)
Director of IIPS (Institute for International Policy Studies)
Member of the Advisory Committee of JETRO (Japan External Trade Organization)
Visiting Professor of Ritsumeikan University (Graduate School of Management)

Professional Experiences:
1997–2000 Chief Editorialist and Senior Managing Director of NIKKEI (The Nihon Keizai Shimbun Newspaper)
1999–2008 Professor of Keio University (Graduate School of Department of Commerce)
2004–2008 Chairman of JCER (Japan Center for Economic Research)
2004–2007 Professor of Harbin Institute of Technology (China)
2002–2007 Advisory Committee member of Graduate School of Public Policy of Tokyo University (GRaSPP)

Publications:
A New Development Model for Japan: Selected Essays 2000–2008 (The Japan Journal Press, 2008)
Choices for Japan (NTT Press, 2008, Chinese language edition was published in 2010)

January 2016

Mr. Tateo ARIMOTO

Executive Director, Honda Foundation
Professor at the National Graduate Institute for Policy Studies (GRIPS)
Principal Fellow, Center for Research and Development Strategy (CRDS) at Japan Science and Technology Agency (JST)

Tateo Arimoto is currently Professor at the National Graduate Institute for Policy Studies (GRIPS) and also Principal Fellow, Center for Research and Development Strategy (CRDS) at Japan Science and Technology Agency (JST).

He previously served as Deputy Director-General (Science and Technology Policy) at the Cabinet Office and Executive Research Fellow in the Economic and Social Research Institute of the Cabinet office. He also held the position of Director General of Science & Technology Policy Bureau of the Ministry of Education and Science, Government of Japan.
He has played an active role in public policy making and implementation in the area of science, technology and innovation in Japan. In his current roles, Mr. Arimoto is a major promoter of science and innovation policy in Japan and is overseeing ambitious efforts to foster innovation to address socio-economic challenges with multidisciplinary approach. He has been a co-chair person of the OECD study project on scientific advice.
He has published several books and numerous papers in quality journals and given many invited lectures/seminars on science, technology and innovation in national and international conferences such as OECD, APEC, EU, WSF, STS Forum and AAAS: "Science and Technology Policy" (by T. Arimoto, in Have Japanese Firms Changed, Palgrave Macmillan, 2011), "Rebuilding Public Trust in Science for Policy Making" (by T. Arimoto and Y. Sato, Science, vol. 337, pp. 1176–1177, 2012), "Crisis, renewal and the prospects for science advice in Japan" (by T. Arimoto and Y. Sato, The Guardian, 28 August 2014). "UNESCO Science Report—Towards 2030," Japan Chapter (by Y. Sato, and T. Arimoto, November 2015).

Mr. Boriy ALIKHANOV

Deputy Speaker—Chairman of the Deputy Group of the Ecological Movement
Chairman of the Committee on Ecology and Environment Protection of the Legislative Chamber

Boriy Alikhanov was educated at Tashkent Polytechnical Institute on the specialty of Mechanical Engineering and Master of Public Administration, and entered State Academy and Public Construction at the President of the Republic of Uzbekistan in 1996. He speaks fluently Russian and English languages.

He was Master, Senior master of skilled and mechanical plant of Tekhnolog, Scientific and Production Association (1983–1988). He worked as a Deputy Chief, Acting Chief and Head of the Department of the Design-technology enterprise for mechanization and automation of Tekhnolog Scientific and Production Association (1988). He was selected as the First category expert, chief specialist of the State Committee of the Republic of Uzbekistan on environment conservation (1988–1990). He was appointed as Vice-chairman, first Deputy Chairman of the Tashkent city committee on environment conservation (1990–1993) and during 1993–1999 he worked as a Head of Department of Scientific and Technical Progress and Promotion, Head of Department of Economy and Organization of Environmental Management of the State Committee of the Republic of Uzbekistan for Nature Protection. He was appointed as the Advisor, the leading Advisor of National Security Council at the President of the Republic of Uzbekistan (1996–2001). He was elected as the First Deputy Chairman, Chairman of the State Committee of the Republic of Uzbekistan on Nature Protection (2001–2005). He has been working as a Deputy Speaker, Head of Deputy Group Ecoactivity, Chairman of the Committee of Legislative Chamber of the Parliament of the Republic of Uzbekistan on environmental issues and environmental protections since 2010.

Dr. Akira GOTO

Executive Director, Honda Foundation
Professor Emeritus of The University of Tokyo

Professor Emeritus, The University of Tokyo
Former Commissioner, Japan Fair Trade Commission of the Government of Japan,
Director, Honda Foundation

Professor Goto's expertise covers economics of competition policy and economics of innovation. His major works include "Business Groups in a Market Economy," European Economic Review, Vol. 19, No. 1, September 1982, "R&D Capital, Rate of Return on R&D Investment and Spillover of R&D in Japanese Manufacturing Industries," Review of Economics and Statistics, Vol. 71, No. 4, 1989, (with Kazuyuki Suzuki), Competition Policy in a Global Economy, (ed. with W. Comanor and L. Waverman), Routledge, 1996, Innovation in Japan, (ed. with H. Odagiri), Oxford University Press, 1997, "Japan's National Innovation System: Current Status and Problems," Oxford Review of Economic Policy, Vol. 16, No. 2, Summer 2000, "Construction of a Japanese Patent Database and a first look at Japanese patenting activities" (with Kazuyuki Motohashi), Research Policy, Vol. 36, Issue 9, 2007, and "Innovation and Competition Policy," Japanese Economic Review Vol. 60, No. 1 March 2009, "Patent statistics as innovation indicators" with Sadao Nagaoka and Kazuyuki Motohashi, in Handbook of Economics of Innovation (eds.) Bronwyn Hall and Nathan Rosenberg.
He was commended by the Minister of Economy, Trade and Industry and Minister of Education. He received the Order of the Sacred Treasure.

April, 2016

Dr. Abdulhashim TURGUNOV

Project Manager, "ATMOSPHERE" Scientific Research Institute

Abdulhashim Turgunov is a Doctor of Technical Sciences. He was chosen as a student in Andijan Cotton Breeding Institute, faculty of Mechanization in 1990 on the specialty of Farm mechanization. He has got his Master's diploma in Central Asian Institute of Mechanization and Electrification of agriculture. He is an inventor and made 6 inventions, wrote 8 scientific articles. He speaks Russian, English, German languages.
He was a student at the Andijan Institute of the Cotton breeding (1983–1990). Specialty is "Mechanization of agriculture."

He researched at the Central Asian Institute of Mechanization and Electrification of rural farms (1990–1998). He finished Graduate study (1992–1995). He worked as a Deputy Director in the Company RAP, Ltd (1999–2002). He worked in OSC PAXTAGIN KB. Deputy Director on General Issues, Chief Constructor (2003–2006). The consultant on Mechanized works in OSYO MAXSUS TEXSANOAT, Ltd (2006–2009).
He was the senior researcher at the "Atmosphere" Scientific Research Institute, State Committee of the Republic of Uzbekistan for Nature Protection (2009–2015).
Project Manager at the "Atmosphere" Scientific Research Institute (2015–currently).

Mr. Alisher ALIMBAEV

Coordinator of Component "Development of Energy Efficiency (EE) Capacity"
Project Coordination Unit (PCU) under Ministry of Economy of the Republic of Uzbekistan

EDUCATION:

09/2002–05/2006 Tashkent State Economic University, B.A. Diploma, Economist
09/1994–06/1999 Tashkent State Technical University named by A. R. Beruniy, Engineer of electrical supply

WORK EXPRIENCES:

05/2012– present **Coordinator of Component** "Development of Energy Efficiency (EE) Capacity"
Project Coordination Unit (PCU) under Ministry of Economy of the Republic of Uzbekistan
Project "Energy Efficiency Facility for Industry Enterprises" (UZEEF) with the participation of IDA (International Development Association)

The total and daily coordination of the project on capacity building on energy efficiency, including the coordination of training sessions on energy efficiency, evaluation and monitoring of energy savings, etc. Organization of short-term training for PCU, depending on needs, in areas such as planning and development of organizational skills, English language training, organization of procurement by the rules of the World Bank, as well as on procedures for the development of World Bank loans, and other matters as required.

06/2009–05/2012 **Junior researcher/Senior researcher** of the project of structural reformation and diversification of economy, attraction of investments
Institute of Forecasting and Macroeconomic Researches under Cabinet of Ministers of the Republic of Uzbekistan

Research of problems in electro power branch at a macroeconomic level. In particular, questions of modernization of branch, optimum decisions of financing for realization of the above-stated purposes, to familiarize with directions on increase energy efficiency and developments of alternative energy sources in other countries Entering of offers and recommendations under the decision of problems in development of electro power branch.

10/2008–06/2009 **Chief Marketing specialist**
Subsidiary enterprise "Komplekt energy"

The study of measures to improve calculation of electrical energy with consumers. Analysis of the state of consumption and sale of electricity to consumers. Submission of proposals and recommendations to improve the level of income from consumers and to reduce of electricity losses.

05/2006–10/2008 **Deputy chief**
"Energosotish" branch of Joint Stock Company "Uzbekenergo"
Realization of purchase at stations of electric energy, its transportation to regions, sale to the regional enterprises of electric networks.
Besides the organization of work on realization of monitoring of work of the regional enterprises of electric networks on consumption of electric energy by consumers, the analysis of calculations with consumers, to studying of measures on decrease of losses of electric energy. Perfection and development of the normative documents concerning using of electric energy.

10/2004–05/2006 **Deputy chief of department**
Department of Energy selling analysis and its accounting monitoring, "Energosotish" branch of Joint Stock Company "Uzbekenergo"

The organization of work on carrying out of the analysis of a condition of sale of electric energy to consumers as a whole on republic and in the regions. Development of offers and recommendations on perfection of calculations with consumers in regions.

08/1999–09/2001 **Engineer of first category**
Energy marketing department of "Uzenergonadzor" production enterprise (Power energy Ministry)

The analysis of a condition of consumption and sale of electric energy to consumers on separate regions of republic, rendering of assistance in elimination of lacks regarding sale of electric energy with departure regions.

ADDITIONAL INFORMATION:

Certificate of JICA (Japan International Cooperation Agency) (Training course "**Management of Electric Company,**" February 2014)
Certificate of JVI (Join Vienna Institute) Training course sponsored by IMF (International Monetary Fund (Course "**Macroeconomic Management and Natural Resource Management,**" April 2012)
Certificate of JICA (Japan International Cooperation Agency) (Training course "**Energy Policy,**" June 2011)

09/2010–12/2012 National consultant of the project "Welfare Improvement Strategy 2012-2014" (WIS-2) Thematic Working Group No. 5, "Intensification of the Development of Production and Communal Infrastructure"

06/2011–12/2011 Local Consultant KSP (Knowledge Sharing Program) between Uzbekistan and South Korea. Topic: "Creation and promotion of regional innovation system in Uzbekistan"

Dr. Shinichiro OHGAKI

President, Japan Water Research Center
Professor Emeritus of The University of Tokyo

1947:	Born in Tokyo, Japan
1969:	Bachelor from The University of Tokyo (UT), School of Engineering, Tokyo, Japan
1974:	PhD in the field of environmental engineering from UT
1974–1976:	Research Assistant of School of Engineering, Tohoku University, Sendai, Japan
1977–1982:	Associate Professor of Department of Urban Engineering, UT
1983–1985:	Associate Professor of Environmental Engineering Division, Asian Institute of Technology (AIT), Bangkok, Thailand
1986–1988:	Associate Professor of Department of Urban Engineering, UT
1989–2008:	Professor of Department of Urban Engineering, UT
2009–2012:	President of National Institute for Environmental Studies (NIES), Tsukuba, Japan
2013–present:	President of Japan Water Research Center (JWRC), Tokyo, Japan

He directed and managed the School of Engineering, UT, as a dean from 2002 to 2004. He served also as the vice-president to Science Council of Japan (SCJ) two times from 2005 to 2006 and from 2008 to 2011.
He was one of the Vice Presidents of International Water Association (IWA) from 2006 to 2008, and received IWA-Outstanding Service Award 2012.

He directs currently a Japan's Core Research for Evolutionary Science and Technology (CREST) Program related to sustainable water use under support of Japan Science and Technology Agency (JST) as the Research Supervisor from 2009 to present.

(as of 2016/02/29)

Dr. Anvar ANARBAEV

Chief of Laboratory, Institute of Energy and Automatization Academy of Sciences of Uzbekistan

Name of Firm: Institute of Power Engineering and Automation, Tashkent, Uzbekistan

Education:

Ph.D.	1997	Institute of Power Engineering and Automation, Tashkent, Uzbekistan
Energy engineer	1988	Graduated from Tashkent Institute of Engineers of Irrigation and Mechanization of Agriculture

Membership of Professional Associations:

Member of working commission on low carbon development of Uzbekistan

Other Training:

Programming on computers by ICAAP, 8 January–23 March of 1996, New Delhi, India
Energy Management by JICA (Japan), 4–17 June of 2002, Ankara, Turkey
Forming policy in field of power engineering by JICA (Japan), 23 June–13 July of 2013, Tokyo, Japan

Employment Record:

Term: 1998–p.t.
Employer: Institute of Power Engineering and Automation, Tashkent, Uzbekistan
Positions held: Senior research employee

Term: 1996–1998
Employer: Institute of Power Engineering and Automation, Tashkent, Uzbekistan
Positions held: Research employee

Term: 1993–1995
Employer: Institute of Power Engineering and Automation, Tashkent, Uzbekistan
Position Held: Post graduator

Term: 1991–1992
Employer: Institute of Power Engineering and Automation, Tashkent, Uzbekistan
Positions held: Junior research employee

Term: 1989–1990
Employer: Institute of Power Engineering and Automation, Tashkent, Uzbekistan
Positions held: Engineer

Term: 1983–1988
Employer: Institute of Engineers of Irrigation and Mechanization of Agriculture, Tashkent, Uzbekistan
Position Held: Student

Mr. Kunio NAKAJIMA

Vice President, Honda Foundation
Adviser of Japan Bioindustry Association

Year of Birth: 1941

Education
1965 B.S. Department of Science and Engineering, Tokyo Institute of Technology
1968 Tokyo Institute of Technology, Master Course

Experienced Positions:

1968–1999	Director-General for Technology Policy Coordination, Ministry of Economy, Trade and Industry
1999–2000	Managing Director, Japan Chemical Innovation and Inspection Institute
2000–2004	Professor, Tokyo Institute of Technology
2004–2007	Professor, National Graduate Institute for Policy Studies
2007–2012	President, Japan Chemical Innovation and Inspection Institute
2011–Present	Adviser, Japan Bioindustry Association
2012–Present	Adviser, Japan Chemical Innovation and Inspection Institute

Research Areas
Policy for Industrial Technology

As of February 29, 2016

Dr. Kazuko MATSUMOTO

Executive Director, Honda Foundation
Senior Director, R&D, Vision Development Co., Ltd.

Birth Date October 27, 1949
Affiliation Vision Development Co., Ltd.
Senior Director, R&D

Education
B.S., Department of Chemistry, The University of Tokyo 1972
M.S., Department of Chemistry, The University of Tokyo 1974
Ph.D., Department of Chemistry, The University of Tokyo 1977

Academic Career
Visiting Scholar, Sophia University, Japan, 2013–present
Professor, Department of Chemistry, Waseda University, Japan, 1989–2006
Associate Professor, Department of Chemistry, Waseda University, Japan, 1984–1989
Research Associate, Department of Chemistry, University of Tokyo, Japan, 1977–1984
IUPAC (International Union of Pure and Applied Chemistry) Vice President, 2006
Visiting Professor, Institute for Molecular Science, Japan, 1990–1992
Visiting Scholar, Massachusetts Institute of Technology, USA, 1993
Adjunct Professor, Institute of Molecular Science, Japan, 1998–2001
Invited Professor, Department of Chemistry, Nagoya University, Japan, 2004–2006
Visiting Professor at more than 10 national universities and Governmental Research Institute of Japan

Japanese Government Members and Advisors
The Member of The Council of Science and Technology Policy (Cabinet Office of Japanese Government), 2002–2005

In addition, advisory members of several meetings for Ministries of Industry and Science.

Career in Industry
Technical Advisor, Tokyo Chemical Industry, Co., Ltd. 2007–2010
Senior Director, Vision Development. Co., Ltd. 2011–present

Members of Foundations
Director, Honda foundation, 2012-present
Director, Japan-Turkmenistan Association for Science & Technology Cooperation 2014–present

Honors
Japan Society for Analytical Chemistry Award for Young Researchers, 1984
Japan Chemical Society Division Award, 1990
Ichimura Award, 2000
Japan Society for Analytical Chemistry Award, 2005

Members of Academic Societies
Japan Chemical Society
American Chemical Society
Royal Chemistry Society
Japan Analytical Chemistry Society
Society for Japan Coordination Chemistry
Japan Rare Earth Society

Advisory Board Members for International Scientific Journals
Bulletin of the Chemical Society of Japan, 2000–2006
European Journal of Inorganic Chemistry, 2000–2006
Journal of Organometallic Chemistry, 2002–2006
Journal of Biological Inorganic Chemistry, 2001–2006
Inorganic Chimica Acta, 2000–2010

Research Interests
Inorganic Chemistry, Metal Coordination Chemistry, Material Science (Nanodiamond), Biotechnology and Imaging Using Lanthanide Luminescence
1. Nanodiamond IT, Electro Devices, and Automobiles: Development of new nanocarbon materials by incorporation of surface-modified nanodiamonds with superhardness, high refractivity, high dispersion, and low friction coefficient into polymers, films, alloys, rubbers, and many others.
2. Luminescent Materials Composed of Nanodiamond and Lanthanide for Bionanotechnology and Bioimaging.
3. Luminescent Lanthanide Compounds for Time-Resolved Imaging

Research Publications
More than 230 papers in major scientific journals

Dr. Sirojiddin MIRZAEV

Chief of Unit, Institute of Ion-Plasma and Laser Technologies

Affiliation and official address

Ion-plasma and laser technologies institute
Academy of Sciences of Uzbekistan,
33, Dormon yuli str., 100125, Tashkent
Republic of Uzbekistan

Scientific grade:

2004 Doctor of physical and mathematical sciences degree (Habilitation) at the Heat Physics Department Uzbekistan Academy of Sciences (Uzbek AS).
1996 Ph.D. degree in physics at the Heat Physics Department Uzbek Academy of Sciences.
1990 Diploma Physicist with honours, Termez State University, Uzbekistan

Career/Employment:

2012–present Head of laboratory at the Ion-Plasma and Laser Technologies Institute, Uzbekistan Academy of Sciences.
2008–2012 Leading scientist at the Heat Physics Department Uzbekistan Academy of Sciences, head of thermal physics of multicomponent systems laboratory.
2006–2008 Alexander von Humboldt Foundation research fellowships at the Third Physics Institute, Göttingen University, Göttingen, Germany.
1998–2006 Senior scientist at the Heat Physics Department, Uzbek AS. Group leader—phase transition in multicomponent systems.
1996–1998 Visiting researcher at the Göttingen University, Göttingen, Germany.
1991–1996 Ph.D. student and junior scientist at the Heat Physics Department Uzbekistan Academy of Sciences in the thermal physics of phase transition group.

Fields of Specialisation: Physics: thermal physics and soft condensed matter physics.

Honours, Awards, Fellowships:

- Ambassador scientists Alexander von Humboldt Foundation (Bonn, Germany, 2016);
- "Senior scientist," highest attestation committee of Uzbekistan (2010, Tashkent, Uzbekistan);
- Alexander von Humboldt Foundation research fellowships (Bonn, Germany, 2006);
- NATO scientific division research fellowships (Brussels, Belgium, 2004);
- INTAS experienced postdoctoral young scientist fellowships (Brussels, Belgium, grant No. YSF-0039, 2000);
- Grant of Volkswagen foundation (Hannover, Germany, grant No. I/78276, 2001);
- URSI young scientist award (1999, Toronto, Canada);
- Grant of Volkswagen foundation (Hannover, Germany, 1998);
- DAAD fellowships (Bonn, Germany, grant No. A/96/26274 and No. A/02/29105);
- Diploma of first degree for best presentation for natural sciences at the third colloquium at the state committee for science and technology and the highest attestation committee of Uzbekistan (1998, Tashkent, Uzbekistan);
- Diploma with honour at the institute (Termez, Uzbekistan);
- Gold medal for high achievement at the secondary school (Termez Uzbekistan).

Dr. Hirohisa UCHIDA

Executive Director, Honda Foundation
Professor of Tokai University

Born in 1949, Tokyo, Japan.

EDUCATION
1) Bachelor's degree in Applied Physics (1973), and
Master's degree in Materials Science (1975), Tokai University, Japan
2) Doctor's degree, Doktor rerum naturalium in Metallurgy, University of Stuttgart, Germany (Nov. 1977)

CAREER HISTORY
1) Sep. 1975–Mar. 1981: Research Assistant & Post-Doctoral Fellow
Max-Planck-Institute (MPI) for Metals Research, Stuttgart, Germany
2) Apr. 1981–present: Assistant Professor (1981), Associate Professor (1984), Professor (1990)
Department of Nuclear Engineering, School of Engineering, Tokai University (TU)
3) Oct. 1990–Mar. 1994: Leader of "UCHIDA Super-Magnetic Materials Project," Kanagawa Academy of Science & Technology (KAST), Kanagawa, Japan
4) Apr. 1997–Mar. 2003: Executive Director, Division of Research Administration (University-Industry-Government Collaboration), TU
5) Apr. 2000–Mar. 2002: Member, University-Industry-Government Collaboration Committee of UNESCO
6) Apr. 2001–Mar. 2003: Executive Director, Future Science & Technology Joint Research Center (Promotion of R&D, Incubation, Venture Support), TU
7) May/Nov.–Dec. 2002: Invited Guest Professor, University of Paris, Orsay, France.
8) Apr. 2003–Mar. 2009: Dean, School of Engineering, TU
9) Oct. 2003–Mar. 2008: Dean, School of Information & Design, TU
10) May 2006–May 2012: Member of Board of Trustees and Councilors, TU Educational System (TES)
11) Oct. 2007–Mar. 2009: Vice-Chancellor, TU
12) Apr. 2009–Mar. 2011: Executive Director, Tokai Institute of Global Education and Research (TIGER)
13) Aug. 2011–Mar. 2013: Counselor of Governor, Kanagawa Prefecture, Japan
14) Jun. 2013–present: Chief Executive Officer (CEO), Kanagawa Science Park Inc. (KSP)

MAIN RESEARCH THEMES (past and present)
Rare Earths-Hydrogen Systems / Surface Processes of Hydrogen on Metal Surfaces / Standardizations of Measurement Methods (JIS) of Characteristics of Hydrogen Absorption of Hydrogen Storage Materials / Ni-MH Rechargeable Battery (The first demonstration over 1000 charge-discharge cycles June 1988) / Long Operation of Solar-Hydrogen Storage System since 1985 / Nitro-Magnet and Phase Diagram of Sm2Fe17-NSystem (The first report in the world) / Rare Earths Based Giant-Magneto-Strictive (GMS) Thin Films (Patented) / Application of GMS Thin Films to Space Technology (NASDA Project) / Manufacturing GMSAlloys in a Micro-Gravity (NEDO Project) / Application of MH Freezer Systems to Cultivation of Hydrogen Strawberry and Fish Breeding (METI Project) / Formation of Nano-Structured Hydrogen Storage Alloy (Patented) / New MH with an Extremely High Energy Density (NEDO International Project with Norway) / Surface Modifications of Hydrogen Storage Alloys by Fluorination, Alkaline, Ion Beam Irradiation (with Japan Atomic Energy Agency) / Eco-technology and Human Security

MAIN JOB-RELATED PROJECT LEADER
The First Participation in the Le Man 24H Race as university 2009 / Tokai University Airline Pilot Training Course with University of North Dakota, ANA, MEXT and MLIT / Asian Nuclear Personnel Training Course (MEXT, METI) / Representative of Japan to the UNESCO University-Industry-Government Collaboration Committee / Venture Business Promotion etc

ACADEMIC ACHIEVEMENT & PUBLICATIONS
ACADEMIC PAPERS: 280 for Materials Science, Science & Technology, Education and for Human Security & Eco-Technology, Energy Policy
BOOKS, TRANSLATION & EDITORS: 18 / COLUMNS to NEWSPAPERS & JOURNALS: 181.
INVITED LECTURES: 53 of 205 presentations at international meetings.
Invited Lectures at Gordon Research Conference 1989, 1997 for Hydrogen Storage Alloys

AWARDS
The Minister of Education, Japan, for the R&D of a Solar-Vehicle (1992)
The Japan Rare Earth Society for Excellent Study on Rare Earth Metals and Intermetallics (1997)
International Association for Hydrogen Energy (IAHE) & Scientific Committee of Hydrogen Treatment of Materials (HTM, Ukraine) for Excellent Scientific Achievement in the World Hydrogen Movement (1998)
IAHE & UNIDO for Excellent Scientific Achievement in Hydrogen Energy (2005, 2007), and others.

PRESENT MAIN APPOINTMENTS :
1) Advisor and Chairman of Evaluation Committees, Japan Science and Technology Corporation (JST), and New Energy and Industrial Technology Development Organization (NEDO), Japan
2) Honorary Editor, JOURNAL OF ALLOYS AND COMPOUNDS (JALCOM), Elsevier
3) Editorial Board Member, INTERNATIONAL JOURNAL OF HYDROGEN ENERGY (IJHE), Elsevier
4) Vice President and Board of Director, International Association for Hydrogen Energy (IAHE).
5) Councilor, Hydrogen Energy System Society (HESS), Japan
6) Board Member, Japan Rare Earth Society, Japan
7) Managing Board Member, HONDA Foundation (HOF), Japan
8) Chairman of the Board of Trustees, Mastumae International Foundation (MIF), Japan
9) Columnist, NIKKEI Business Daily, Japan
10) International Advisor to Hydrogen & Fuel Cell Project, South Africa (HySA), South African Republic
11) Chairman, Society of Advanced Science & Shonan Association for Synergy in University-Industry-Government Collaboration (SAS), Japan
12) Board Member, German Baden-Wuerttemberg Freundeskreis (BWF), Tokyo, Japan
13) Board Member, Japan Cultural Association
14) Executive Board Member, Asia Science Park Association (ASPA)
15) Advisor and Counsellor to Kanagawa Prefectural Committees for General Policy and Smart Energy, and others.

As of March 4, 2016

Dr. Sharafitdin MIRZAAKHMEDOV

Director of Centre for High Technologies

Education

Institution and Location	Degree	Year	Field
Tashkent State University, Uzbekistan	M.Sc.	1990	Bioorganic Chemistry
Institute of Bioorganic Chemistry, Uzbekistan	Ph.D.	1996	Bioorganic Chemistry

Professional Experience

1990–1993	Engineer, Institute of Bioorganic Chemistry, Tashkent, Uzbekistan
1993–1997	Junior Research Associate, Institute of Bioorganic Chemistry, Tashkent, Uzbekistan
1997–2001	Senior Research Associate, Institute of Bioorganic Chemistry, Tashkent, Uzbekistan
2001–2003	Post Doctoral Fellowship, Institute of Bioorganic Chemistry, Tashkent, Uzbekistan
2002–2003	Visiting Research Associate, Institute of Food Research (Food Materials Division), Norwich, UK
1998–2006	Assistant Professor, National University of Uzbekistan (Department of Chemistry)
2006–now	Associate Professor, National University of Uzbekistan (Department of Chemistry)
2007–2008	Visiting Research Associate, University of Milan (DISTAM and DISMA), Milan, Italy
2008–2009	Deputy Director, Institute of Bioorganic Chemistry, Tashkent, Uzbekistan
2009	Visiting Participant during two monthly international courses which was organised in China, Beijing and Shanghai by "Application of Biotechnology in Food Industry."
2009	Visiting Research Associate, University of Milan (DISTAM and DISMA), Milan, Italy
2010–now	Leading Research Associate, Institute of Bioorganic Chemistry, Tashkent, Uzbekistan
2012–2013	Head of Chemistry Laboratory, Experimental and Educational Centre of High Technologies, Tashkent, Uzbekistan
2013–now	Director, Experimental and Educational Centre of High Technologies, Tashkent, Uzbekistan

Awards:
1999 High diploma and gold medal among young scientists Academy of Sciences of Uzbekistan.

Management for Foreign Grants:
1) UZ-01. STCU (Science and Technology Center in Ukraine), Title "Investigation of Functional Significant Proteins from Cottonseed and Development of Highly Effective Forage Technologies on the Basis of Cotton Oil Cake."

2) INTAS FOOD CALL 2000-0681, Title: "Evaluation of the role of plant cell wall degrading enzymes on yield and quality of oil produced by cold pressing of low-oil-producing crops."

3) INTAS Collaborative Call with Uzbekistan Ref. Nr 04-82-7146, Title: "Identification of new inhibitors of HCV and HIV-1 replication."

4) INTAS Collaborative Call with Uzbekistan Ref. Nr 04-82-7253, Title: "Isolation of high levels of native gossypol from cotton seeds and synthesis of new water-soluble supramolecular gossypol complexes having high interferon inducing activity."

5) INTAS Hydrogen Technology and Biomass Conversion for Energy Generation 2005-Research Project Ref. Nr 05-1000005-7662, Title: "Specific Lipase Catalyzed Production of Biodiesel."

Mr. Takashi MORIYA

Senior Chief Engineer, Honda R&D Co., Ltd.

Term	Personal History
Now	Honda Automobile R&D Center In charge of Fuel Cell Power-train development
2011–	Promoted to Senior Chief Engineer
2009–	Honda Automobile R&D Center Operation Officer Fuel Cell Power-train development division
2006–	Honda Automobile R&D Center Senior Manager Fuel Cell Power-train development division
2001–	Honda Automobile R&D Center Fuel Cell Development Division Manager
1995–	Promoted to Chief Engineer
1981–	Joined Honda Motor Co., Ltd. Moved to Automobile R&D Center Vehicle engine design division

Dr. Taizo YAKUSHIJI

Director, Honda Foundation
Research Counselor of Institute for International Policy Studies

Visiting Professor, National Graduate Institute for Policy Studies (GRIPS)
Research Counselor and a board member, Institute for International Policy Studies (IIPS)
Professor Emeritus of Keio University

Taizo Yakushiji is a Professor of Emeritus of Keio University, Visiting Professor of National Graduate Institute for Policy Studies (GRIPS) and Research Counselor and a board member of Institute for International Policy Studies (IIPS). He was a Professor of Political Science at Keio University (1991–March 2010), formerly full-time Executive Member of the Council for Science and Technology Policy of the Cabinet Office and Vice President for Academic and International Affairs at Keio University. He was educated at Keio University (B.A. in Electrical Engineering), University of Tokyo (B.A. in History and Philosophy of Science) and the Massachusetts Institute of Technology (Ph.D. in Political Science). He was also a Fulbright Scholar and Ford Foundation Fellow (1970–75). He was Professor of Technology and International Relations at the Graduate Institute of Political Science at Saitama University and Visiting Senior Research Associate at both the Berkeley Roundtable on International Economy and the Department of Political Science of the University of California at Berkeley (1994–85). He was selected as one of the "1988 Young Leaders of Asia" by the US-Asia Institute in Washington, D.C. and was at the Ushiba Memorial Foundation (1991–92) at the German Society for Foreign Affairs and the French Institute of International Relations.

2016/3/3

Opening Remarks

Dr. Shavkat SALIKHOV

President, Academy of Sciences of Uzbekistan,
Chairman of Committee for Coordination of Science and Technology Development

H.E. Fumihiko KATO

Ambassador Extraordinary and Plenipotentiary of Japan to the Republic of Uzbekistan

Ms. Yoriko KAWAGUCHI

Former Foreign/Environment Minister of Japan,
Professor of Meiji Institute for Global Affairs, Meiji University

Dr. Shavkat SALIKHOV

President, Academy of Sciences of Uzbekistan
Chairman of Committee for Coordination of Science and Technology Development

Opening Remarks

Dear Ladies and Gentlemen!

You are very welcome to our first jointly organized Uzbek-Japan Symposium on Ecotechnologies.

First of all, I would like to show my gratitude to the President of Honda Foundation, Mr. Hiroto Ishida, and the rest of our Japanese delegation for their kindest support on organizing such an event.

Shortly, I would like to give information about the current situation of the STI policy of Uzbekistan.

The world's experience convincingly proves that innovative technologies have become the most important and effective means and a pre-condition for the development of modern production and the economic potential of the state. They combine cutting-edge scientific achievements, the possibility of advanced engineering solutions and modernization of production enforcement, development of new products, mass dissemination and market sales. Examples of successful organization of production and management principles based on innovation and new technologies in all advanced countries of the world demonstrate the perspectives of innovative ways of development.

The main objective of the innovation economy is to creat a non-breakable chain that would unite all the stages of the innovation process from the creation and development of inventions, up to its commercialization and production of the final product. Acceleration of the innovation cycle provides additional advantages in the competition for markets. At present, all the developed countries take into account this factor and use it to strengthen their economic and political position in the world.

The slogan "The winner is the one who runs the innovation before others!" is fully justified by the example of the innovative progress of the leading countries of the world.

Development of an innovative economy is based on the legislative, organizational, structural, financial and economic, logistics, informational provision, and flexible personnel policy. Moreover, technical personnel for innovative activity in the majority of countries is prepared, including in college.

The main mechanism for the organization of innovative economic development is integration of education (mainly universities), science (universities, research and innovation centers, technology parks, "Start-Up" (spin-off) companies, cities of science, and other concepts) and production (industrial laboratories, pilot and test management systems, cross-industry associations, special economic zones, etc.).

There is no coincidence that in the sovereign Uzbekistan since its first days of independence, great attention is paid to the development of national science and leading scientific schools and innovative research, regulated at the legislative level. This can be seen in a number of decrees and resolutions of the President of Uzbekistan Islam Karimov and relevant resolutions that the government of the Republic of Uzbekistan adopted in the field of innovative development.

Immediately after the country's independence was proclaimed, the Decree of the President of the Republic of Uzbekistan Islam Karimov "On state support of science and innovation development" dated July 8, 1992, No. DP-438, and on implementation of this Decree and the

corresponding resolution of the Cabinet of Ministers "On measures of state support for science development and innovative activity" dated July 21, 1992, No. 337, were issued. As a result of these policy instruments in the field of science and innovation, the following measures have been undertaken:

- the list of priority directions for development of science, technology and national scientific and technical programs has been approved;
- scientific researchers—research institutions and universities have been exempted from taxation;
- training programs for highly qualified scientists, including leading foreign scientific centers have been approved;
- The Institute of Genetics of the Academy of Sciences in charge of the new tasks has been founded;
- substantial foreign currency funds have been allocated to the Institute of Genetics and Plant Chemistry of the Academy of Sciences of Uzbekistan for modern equipment of foreign manufacture.

The Decree of President of Uzbekistan Islam Karimov "On additional measures to stimulate innovative projects and technologies in production" (dated 15.07.2008., No. DP-916) appeared to be the most important one for further development of innovative activity.
In implementation of this decree, the following measures have been carried out:

- new mechanisms to stimulate development and implementation of scientific and applied research and innovations in the process of modernization, technical and technological renovation of production, to ensure closer links between science and industry have been created;
- funds of modernization, new technologies and structural units of innovative development of the enterprises have been formed;
- since 2008, an annual Republican fair of innovative ideas, technologies and projects with active participation of institutions of science, education and production organizations has been held.

Innovative products must be in demand and meet a ready sale, both within the country and in the international market, that is, it should be import-substituting and export-oriented.
The Republican fair of innovative ideas, technologies and projects has become a new practical mechanism, which is supposed to provide actual establishment of cooperative ties between science and industry, manufacturers of innovative products and their customers, accelerating introduction of advanced technologies in the economic field, as well as problem solving, while fostering and promoting innovation.
In the past seven Republican Innovation Fairs:

- more than 300 projects and exhibits were demonstrated each year;
- more than 2.3 thousand contracts totaling 86.8 billion soums between developers and organizations were signed;
- mass production of 23 new species of innovative products not previously produced in the Republic which cost more than $1 trillion soums were assimilated;
- innovative, scientific and industrial centers and other innovation-oriented units at 30 industrial enterprises have been created;
- implementation of new innovations on more than 100 projects in areas such as chemical and petrochemical industry, health care and pharmaceuticals, agriculture, information technology, and education were started.

In order to enhance the innovation process, based on in-depth fundamental and applied research in the institutes of the Academy of Sciences, a range of ready-to-use high technologies has been developed. Here are just a few of the most typical examples.
The scientists of the Academy of Sciences of Uzbekistan using gene knockout technology created a new cotton growth. It has unique characteristics such as fast ripening, drought resistance, high quality fibers, yielding according to reputable foreign experts only comparable to fine-staple Egyptian varieties. Production technology is protected by international patent, held jointly (share 70%) by Uzbekistan and the USA, and is patented in more than 140 countries worldwide.
This growth is replicated in a series of "Porlock" four

species 1 - 4. In recent years, a necessary seed fund was worked out and enough harvest for processing high-quality cotton was gathered.

The most important task is the early introduction of the resulting cotton fiber in the textile industry as well as export to foreign countries of the finished product. We are sure that this project will be a "brand" of light industry of the republic.

Another example is creation of over 50 new domestic original pharmaceutical medicines such as VFS, ragosin, gozalidon, ecdysten, rutan, medamin, gossitan and others. Production of most of these drugs has already been developed by industry, and they are sold through the network of pharmacies of the country.

An innovative economy equals essentially a knowledge of economy. Therefore, education and professional training in universities in the field of science, engineering and technology are crucial for success in the innovative development of the country.

The most important role of the state is organization of the learning process, training and development of employees in the following categories:

- scientific personnel;
- engineering and technical personnel;
- economists in the field of management, business projects and technology commercialization;
- business consultants;
- marketing;
- lawyers;
- patent engineers in relation to a wide range of problems of innovation.

Key actors and major figures behind innovation in manufacturing, industrial development and promotion of innovation are highly-qualified engineers.

In the course of research training for innovation, an important role belongs to developing mechanisms for rational use and the realization of the potential of talented youth. It is necessary to provide an introduction of specialized departments, optional classes, new training courses in universities and colleges, and improve curricula in higher education in relation to meeting the challenges of innovation.

It is also necessary to increase engineering training and attract professionals from leading foreign centers for their training. State support for the process is required for extensive organization of scientific and educational centers, industrial parks, high-tech centers, and other similar structures.

In the structure of skills development of an innovative profile, it is necessary to create systems of training for specialists in large and small businesses, private entrepreneurship, as well as scientists and manufacturers, including direction school and courses in advanced countries. The government should implement personnel support to innovation, training of innovative managers, creating and funding innovative training and consulting centers, organizing training abroad, organizing publication of educational and reference books and manuals on innovation.

It is necessary to create effective legislative, organizational, economic, financial, tax infrastructure, logistics, information conditions, and to implement flexible personnel policy in order to ensure implementation of state significant innovation priorities.

Of great importance in modern production is timely and qualitative rendering of legal, mediation, consulting, and other services to participants of innovative activities, including advocacy organizations and development of intellectual property, subject to licensing, sale of licenses and export of domestic innovative products to foreign countries. Therefore, organization of training of lawyers specializing in the field of innovation should be provided.

Thus, it is obvious that a series of effective measures should be undertaken in the country to foster innovation.

The first thing to come out of this is to use the existing innovation potential, clearly define the place of domestic science in the innovation process, and to find production niches for priority implementation of completed major domestic developments. It is important to consistently expand the existing cross-sectoral cooperation between scientists and industrialists of the country.

For development of a mutually beneficial dialogue, it is very meaningful to form a "bank" of national

importance of innovative research proposals based on their needs motivated, and direct the activities of scientists towards the development of advanced technologies, necessary to solve pressing problems of production themselves.

To ensure effective transfer of domestic technology innovation, it is of primary importance to organize close cooperation in the chain "education - science - production" and to develop mechanisms for implementation and promotion of full support of the most significant innovations of scientists.

In order to implement these necessary measures, substantial organizational efforts and financial costs are required. This is the problem of producers who are interested in innovations of industries and firms. For this purpose not only the working environment should be created, but also effective mechanisms should be developed to promote innovation and technology transfer with the broad participation of infrastructure organizations and private capital.

It is necessary to create real conditions and mechanisms in order to make investments profitable for representatives of business as well as the production workers, both at the level of individual enterprises and the cross-sectoral level. The state should encourage such investment by reducing tax rates or the introduction of other benefits and preferences for companies, enterprises and firms that are actively involved in supporting innovation activity.

To intensify the process of technology transfer, it is necessary to eliminate the obstacles that occur.

A number of promising local innovations require their completion in the form of pilot testing, registration of normative documents, business plans, etc., to be financed either from the state budget, or for the most part, from interested basic industries and major enterprises.

We must create highly mobile intermediary organizations that promote innovation, including small brokerage firms, which are flexible and focused on the needs of production structures that would solve many problems of innovative development of the industry by promoting domestic innovations, created by scientists.

The significant brake of the promotion of innovation is also a lack of qualified specialists: economists, managers, and lawyers, with experience in the innovative development of the economy. In most of the technical universities of the country, little time is devoted to studying the organization of the innovation process in the context of differentiated industries, sectors and generally in the country. Also, there are no courses and programs of retraining and training of managers and leading specialists of enterprises. Hence, they have a lack of knowledge in the organization of the innovation process, they do not see it and cannot take advantage of it.

No more than 10 percent of the technologies exhibited at innovative fairs and other new products are actually used in practice. That is, there is a small demand on the part of the country in the production of new domestic technologies and products that often do not fit into the existing production cycle. Another reason for this situation is unsustainable funding for research: R & D in the country are financed mainly through the budget, and up to 40% of the allocated budgetary funds account for basic research, about 50% on applied programs, and only 10–12% on innovative research and development. At the same time, the experience of the financing of science in developed countries shows that funds are allocated to it under the following scheme: 20% on fundamental research, 20–25% on applied programs and almost 60% on innovation, and government funding is no more than 20–30% and the rest is financed by departments, companies and firms interested in new products.

Moreover, only innovations are funded, but the stages of pre-production and production testing of new domestic developments, in most cases, must also be funded by the interested industries and enterprises. Therefore at the level of completion of the application of state science and technology projects, it is necessary to provide real direct involvement of industries interested in these works.

As it was already noted, the important results of our scientists are genetically modified varieties of cotton and medicines, which are protected by patents, so we should set up production of these finished products on the relevant, including the newly established factories. We would like to draw attention to a number of promising projects that are proven and have received practical application:

- a series of complex chemical fertilizers produced from local raw materials, the use of which has increased crop yields;
- low-toxic defoliants, the use of which ("green chemistry") essentially revolutionized the creation of environmentally safe conditions in the cotton fields of the country, as well as providing, since 2013, the Republic's independence from foreign imported defoliants;
- effective plant growth stimulants, pheromone preparations against pests affecting cotton and other crops.

These chemical and biological products for many years have been produced at chemical plants of the Republic and significant volumes are exported.
That is, there is a wide range of local innovations of scientists which can be more widely replicated and implemented in the basic sectors of the economy.
The solution to this problem is an essential rapid provision of information to all participants in the innovation process.
Today, the Republican Information Infrastructure of Innovations includes resources of scientific and technical information (patents, publications, results of innovation, information booklets, etc.), as well as information about the need for manufacturing for innovations.
This information infrastructure is aimed mainly at supporting science and education, but it is currently not enough because it does not meet the goals and objectives of transfer and commercialization of domestic technology for industrial applications.
We believe that in the structure of the national innovation system interactive electronic information services, such as exchange of technologies or an innovative Virtual Fair, should be created. Their aim is to establish operational "on-line" communication between developers, manufacturers, implementers and users of new domestic technologies and other innovative products, as well as representatives of interested investors, donors, banks, and businesses to ensure the use of innovative products on a commercial basis.
To ensure a successful competition and commercialization of innovative domestic products in the global and national market, the work of patent and license departments and services of the ministries, departments and enterprises of the Republic should be organized in a new way. It is necessary to involve the most qualified professionals who have already had experience in the creation of inventions in their departments. In this organizational work, the representatives of private enterprises and small business should not remain on the sidelines.
It is necessary to create a network of innovative infrastructure in the form of promotional, marketing, consulting and sales departments and specialized organizations of intermediary firms.
Therefore, in the country, along with the ministries, departments, and companies funds for the modernization and new technologies, it is high time to create new and ancillary infrastructures. They need to make technical tasks, business plans, passports, technical documentation to promote patenting, licensing, marketing and others, i.e., to develop the steps necessary to promote and adopt new technology and products.
Copyright institutions should be developed as widely as possible. Authors of inventions and innovations should be encouraged financially. It is necessary to enforce the actual privatization and transfer developers' funds obtained through the introduction of innovative products, protected by patents.
With the development of the innovation economy, the following tasks are to the fore:

- establishment and consistent implementation of the state strategy in the innovative development of the economy;
- making out effective mechanisms for the development of an innovative economy;
- improvement of legislation and economic measures to stimulate innovators;
- integration of the efforts of the government, industries, large enterprises, small and private businesses, banks, academics and university staff into innovation;
- wide integration of innovative potential in the chain "education - science - production - transfer and commercialization of innovative products and services;"
- training specialists for the field of innovation (scientists, highly qualified engineers and technical

workers, economists, managers, lawyers, patent specialists, and others);
- creation and implementation of major cross-industry breakthrough innovation projects;
- financing of innovation on the part of industries, on the condition of preferential taxation, as well as banks and investors;
- creation of competitive export-oriented and import-substituting domestic innovative products;
- protection of intellectual property created by scientists of research institutions and universities, as well as in the sectors and experts in the enterprises of the country;
- commercialization and licensing of domestic innovative products, protected by patents;
- development of broad international cooperation in the sphere of innovation.

Thus, the successful implementation of activities in the field of innovation is only possible through the integration of efforts and ensuring of synergies of state industries, large enterprises, small and private businesses, as well as scientists and university staff. We believe that the experience of international and domestic innovation created by integrating the joint potential of educational and scientific institutions, and industrial organizations of the Republic would solve many of the above mentioned organizational and technical issues in order to actively support the development of the innovative complex of the Republic.

Here, I have to emphasize that all the above-mentioned policies and recommendations should be based on the safe and sustainable technologies. The ecotechnologies should be stated as the priority of Uzbek STI development for the future.

As it was named as the logo of the symposium, innovation needs to serve sustainability—science, technology and economic development should be harmonized with human and natural environment. Earlier in my speech I mentioned the slogan "the winner is the one who runs the innovation before others" and I need to add one point, "the winner is the one who runs the innovation which is based on sustainability."

This, in turn, will provide a solution to urgent problems of sustainable development of an innovative economy and allow the country to join the ranks of countries with high innovation potential.

And, I hope for the future beneficial partnership with Japan, as well as with Honda Foundation on sustainable technologies development.

I wish good luck with the work of symposium.

Thank you for your attention!

H.E. Fumihiko KATO

Ambassador Extraordinary and Plenipotentiary of Japan to the Republic of Uzbekistan

Opening Remarks

Dr. SALIKHOV, President of Academy of Science and Chairman of Committee for Coordination of Science and Technology Development, Mr. ISHIDA, President of Honda Foundation, Distinguished guests, Ladies and Gentlemen,

I am delighted to be here today to speak at the Uzbek-Japan Symposium on Ecotechnologies. First of all, I would like to express my sincere appreciation to those who helped make this symposium happen. I would also like to extend my heartfelt welcome to the delegation of Honda Foundation to Tashkent.
Honda Foundation was established by Soichiro HONDA, the founder of Honda Motor and a Japanese legendary inventor. Honda Motor is well known for its unique products, including many types of automobiles, motorcycles, and aircraft as well as the famous humanoid robot "ASIMO."
Soichiro Honda said "Technology is nothing more than a means to serve people." His vision and innovative spirit have been the driving force behind Honda Motor's production, and Honda Foundation's activities.
Honda Foundation sponsors and organizes unique symposiums all over the world to discuss ideas to resolve various issues in modern society. The theme of this year is "Innovation and Sustainability." Now I would like to imagine why Tashkent was selected for this year's symposium.
Firstly, Uzbekistan is located in the midst of ancient Silk Road which connected Eastern and Western Civilizations. In medieval period, Samarkand, the capital of Timur Empire, led by the world most advanced mathematics and astronomy.
Secondly, Uzbekistan is one of the emerging countries in Asia, and harmonization of economic growth and environment is a very timely theme to be discussed here. Government of Uzbekistan is now actively promoting an initiative of "innovation" as a new concept of economic and social development. Japan fully agrees to this idea and intends to support by collaboration with universities of both countries.
Thirdly, this symposium contributes for the further development of Japan-Uzbekistan relationship. Prime Minister Abe visited Uzbekistan last October and a lot of agreements were signed between the two countries to further deepen the political, economic and cultural ties. This symposium can't be more timely, and its agenda "Innovation for Sustainability" is very suitable for our bilateral cooperation. On this occasion, I would like to point out that Ms. Yoriko Kawaguchi, former Foreign Minister and today's main speaker, significantly contributed to the development of the diplomatic relations of our countries. Minister Kawaguchi visited Uzbekistan in 2004 and gave an epoch-making address to propose establishment of "Central Asia + Japan Dialogue." This dialogue is the pillar of Japan's policy to the region.
I am convinced that all the speakers here today are intellectuals who can contribute to the discussion on "Innovation for Sustainability." Let me conclude by saying that I do hope this symposium will be a new platform for Japan and Uzbekistan to deepen and widen the interaction and mutual understanding.
Thank you.

Opening Remarks

Ms. Yoriko KAWAGUCHI

Former Foreign/Environment Minister of Japan,
Professor of Meiji Institute for Global Affairs, Meiji University

Opening Remarks

His Excellency Ambassador Kato. Distinguished guests, Ladies and Gentlemen. Thank you for this opportunity to make an honorable work at the outset of this important symposium.

Japan and Uzbekistan have shared history for a long time as Ambassador Kato talked about. The Silk Road tied the two countries and various state of the art artifacts amazed and stimulated Japan and gave Japan an opportunity for cultural awakening.

To many high school students in Japan, names like Tashkent or Samarkand are familiar as they come to be the experts of geography and history. Today our two countries interact even more strongly. I came by Uzbekistan Airways which connects the two capitals directly and also there are increased exchanges of people, as we are doing today, and increasing trade in goods and services. We certainly hope that this is going to expand.

Ambassador Kato talked about the dialogue for central Asia plus Japan which was initiated back in 2004. As Foreign Minister of Japan at that time, I discussed this issue with then Foreign Minister of Uzbekistan, Minister Safael who, I understand, now serves as the Chairman of the Foreign Affairs Committee of the upper house of this country. And other official ministers agreed that we should have this dialogue.

So, in August 2004, my first leg of a trip to Central Asia, and this was my very first trip to countries in Central Asia, was right to this city, Tashkent. And on a very personal note, I am very happy to say that it is great to be back to this beautiful green city. At that time I made a speech at the University of World Economy and Diplomacy here and talked about my thoughts behind this dialogue to build upon the Central Asia plus Japan idea. There are two objectives: one objective, of course, is to develop the Japan-Uzbekistan bilateral relationship more firmly and more strongly.

And the importance of that to this group I don't have to explain in detail. The second objective I had was to express Japan's support for regional cooperation. As there are many issues that can be solved, that can be worked out, better if regional countries get together. Environmental issues that we will be talking about today is one such issue. There are many items for bilateral and regional cooperation. Sustainability, science, technology and economic growth. These are all part of a very important package.

So, I am very happy that today, CCSTD and also Honda Foundation are addressing exactly the matter of the environment. I also was Environment Minister before I became Foreign Minister so I am also very happy that I could be participating as one of the panelists in this discussion.

Thank you for your attention!

Introductory Session

Mr. Hiroto ISHIDA
President, Honda Foundation

Mr. Nobuhiko SHIMA
Chairman, Japan-Uzbekistan Association

Mr. Hiroto ISHIDA

President, Honda Foundation

Introductory Session

Introduction of Honda Foundation and the Concept of "Ecotechnology"

Soichiro Honda
and
Ecotechnology

Hiroto Ishida
President, Honda Foundation

HONDA FOUNDATION
公益財団法人 本田財団

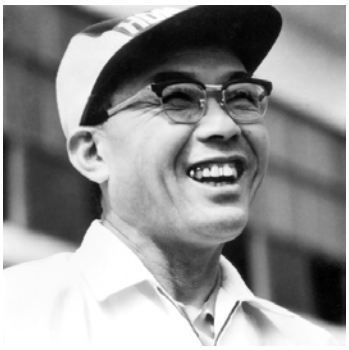
Academician Shavkat Salikhov, Former Foreign and Environment Minister Ms. Yoriko Kawaguchi, Excellencies, Ladies and Gentlemen, I would like to extend my greatest gratitude for all the participants here as the President of the one of the host organizations of this symposium. Now I have nothing to add to remarkable and heartfelt opening speeches by Academician Salikhov and Minister Kawaguchi, and all I have to do is to introduce the activities of Honda Foundation and its father Soichiro Honda.

Honda Foundation (HOF)
Established in 1977
by Soichiro Honda and
Benjiro Honda
(Soichiro's Younger Brother)

Our Honda Foundation was established by Honda brothers, Soichiro and Benjiro in 1977.

Purpose of HOF:

To promote the concept of Ecotechnology



The reason why they created the Foundation is to promote the concept of Ecotechnology.

Concept of "Ecotechnology"

Technology is not merely for efficiency or profit, but should be created and used in harmony with nature and social environment.

This concept is based upon Soichiro's very strong belief that technology is not merely for efficiency or profit, but should be created and used in harmony with nature and the social environment.

Then Ecotechnology is a very wide concept and it includes various fields of technology for human happiness.

Activities of HOF

1. To host International Symposia
2. To present the Honda Prize (since 1980)
3. To present Y-E-S Award (since 2006)
4. To host Colloquia, etc.

For this purpose, Honda Foundation is carrying out 4 activities. These are, 1: Hosting International Symposia, 2: Donating Honda Prize, 3: Presenting Y-E-S Award, and 4: Hosting Colloquia.

International Symposia

- In Europe and North America, recently in Asian Countries
- To discuss various issues by gathering wisdom, aiming at promotion of Ecotechnology

The first one is to have international symposia just like this one in various countries.

At an early stage, symposia were held in Europe and North America but now we hold them in Asian countries.

Y-E-S Award

- Honda Young Engineer and Scientist's Award
- Grants to young students
- To support future scientific leaders in Vietnam, India, Cambodia, Laos and Myanmar.

The third one is to donate a grant which is called Y-E-S Award to young Asian students who are going to be leading scientists or engineers in each country.

Honda Prize:

- Started in 1980
- To reward prominent scientists and technologists on the contribution in light of Ecotechnology
- Up to 2015: 38 persons received

The second one is to donate the Honda Prize to scientists who made remarkable contributions to the concept of Ecotechnology.

It started in 1980, and 38 great scientists and engineers have received this Prize up to last year.

Now, this Awarding system is operated in Vietnam, India, Cambodia, Laos and Myanmar. Some of the recipients are invited to Japanese universities and participate in academic meetings. Up to last year, 264 students received this Award.
Many years ago Soichiro Honda supported many promising Japanese students who studied science or engineering, and this support system had a big influence on the development of Japanese science and industry.

Colloquia:

- To invite guest lecturers quarterly for intellectual exchange of various opinions on Ecotenology

The last one is to set up Colloquia in Tokyo, inviting guest lecturers four times a year for the purpose of stimulating intellectual exchange of opinions on Ecotechnology.

Soichiro Honda

- He was a great motorcycle, power product and car producer and a man of innovation.
- He had very fine human touch with various episodes.
- He was fond of playing Shogi (Japanese Chess).

Soichiro Honda, the father of Honda Foundation is a great and very well-known producer of motorcycles, power products, and automobiles. He is regarded as one of the most innovative Japanese in 20th century. In spite of his greatness, he had a very fine human touch with various episodes which are written in his book titled “Dreams into Action.”

He loved playing shogi, Japanese chess.

We don’t know whether he was a strong player or not, but it is sure that he was good and enjoyed playing.

Painting

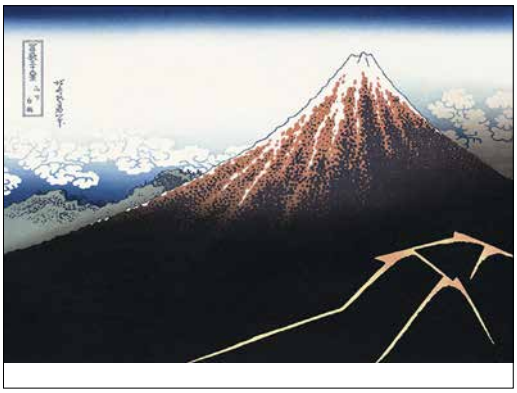
- He loved painting.
- Next picture is White Mt. Fuji painted by Soichiro Honda.

He was fond of painting. This picture is White Mt. Fuji.

Mt. Fuji

- Many Japanese Artists painted Mt. Fuji.
- Red Fuji by Hokusai Katsushika (1760~1849) is very famous.

Historically many Japanese artists painted Mt. Fuji. Most Famous Fuji-pictures are the series named "36 scenes of Mt. Fuji," which actually consists of 46 pictures, painted by Hokusai at the end of Edo Era.



Three pictures we see are from nearly 200 years ago. They are evaluated to be best of them; i.e., "Red Fuji," "Black Fiji," and "Wave and Fuji."
"Wave and Fuji" seems to be the site within Tokyo

Environmental Efforts

- Now Mt. Fuji can be seen clearly from Tokyo just as Era of Hokusai by reducing air pollution by the environmental efforts.

Bay, and now Mt. Fuji can be seen clearly from Tokyo just as the Era of Hokusai by reducing air pollution through environmental endeavors.

Honda Foundation has made efforts aiming at the

Hope of HOF

- HOF has made efforts for the success of today's symposium, and hopes that Ecotechnology will bring about and keep clean air, clean water, clean soil and clean globe.

success of today's symposium, and sincerely hopes that Ecotechnology will bring about and keep clean air, clean water, clean soil, clean globe and human happiness.

Thank you very much.

Thank you

HOF

Mr. Nobuhiko SHIMA

Chairman, Japan-Uzbekistan Association

Introductory Session

Relationship between Uzbekistan and Japan

Good day, everyone! Al-salām 'alaykum. I am Nobuhiko Shima, Chairman of the non-profit organization Japan-Uzbekistan Association. This association was established as a volunteer organization about 20 years ago, and myself lead the establishment. The main objective of this NPO is to promote interaction with foreign students from Uzbekistan as well as Uzbek residents in Japan, and one or more times every month, we hold various events, cultural exchange meetings and study groups.

I first visited Uzbekistan in 1996. The event was occasioned by the former governor of the Asian Development Bank, Tadao Chino, telling me about the "earnestness, intelligence and pro-Japanese stance" of the Uzbeks as well as his prompting me as a newspaper reporter to "advertise and disseminate more public information about Uzbekistan to Japan." Thereupon, I thought of creating a documentary featuring the Silk Road and Uzbeks since Uzbekistan is at the very center of the Silk Road and the Japanese love the Silk Road with its numerous World Heritage sites. I proposed the idea of a documentary to the Japanese TV broadcasting company TBS. Fortuitously, I was given a one-hour program slot, and together with two TBS staffs, we set off for the first time to Uzbekistan in 1996.

That time, we filmed the World Heritage sites of the Silk Road, the living conditions in Uzbekistan, where there are many handsome men and lovely women, opencast mining in gold mines, scenes of desert that stretched forever, and cities lush with greenery. At the same time, we also learned that the Navoi Theater in Tashkent was built by 457 Japanese prisoners of war together with Uzbeks right after the Second World War. During the construction, Commander Nagata took an oath with his men, urging them "Never to skimp our work even if we are prisoners of war because this theater would be used for many years afterwards, and let us build a magnificent theater that the Japanese can be proud of." I heard this story directly from Commander Nagata many years after the construction which was done in cooperation with the Uzbeks.

In fact, in 1966 when a major earthquake struck Tashkent, and most of the buildings in the city collapsed, only Navoi Theater remained standing. Apparently, this is how word of Japan's ideal of excellence has spread across Central Asia. I wrote about this in a nonfiction book entitled "Japanese Prisoners of War Built the Opera House along the Silk Road" (Kadokawa Corporation) which was published in late September last year.

Since Uzbekistan became independent from the Soviet Union in 1991, the number of foreign students from that country to Japan has exceeded 1,000. They excel in their study of the foreign languages, attend famous universities, and become good friends with the Japanese.

Uzbekistan was an important area that linked the West Europe, and the East Asia, since before the time of Christ. For this reason, cities such as Tashkent and Samarkand are well known in Japan, and the blue skies of Samarkand even came to be called "Samarkand Blue" in Japan. However, when the Age

of Navigation came in the 15th century, the overland Silk Road was gradually forgotten. But it is common knowledge that Buddhism came to Japan through the Silk Road, and the Silk Road culture and numerous cultural assets entered Japan from ancient times. In this sense, Japan is the eastern end of the Silk Road.

At the start of the 21st Century, with China launching its One Belt, One Road Plan, the Silk Road has once again come to fulfill an important role overland and in the seas. Central Asia, including Uzbekistan, is gaining worldwide attention with a continuing economic growth rate of 7 to 8%. The theme of the Honda Foundation Symposium this time is Technology and Environment. At the Fair of Innovative Ideas, Technologies and Projects held yesterday, about 100 companies and organizations related to agriculture, industry, water and food held a product exhibition, and numerous people came to the venue and contracts were exchanged. Contemplating this scene, I realized once again that Uzbekistan has increasingly become the leading country in Central Asia.

Japan places importance on the environment, and it takes pride in its environmental technology among many other achievements. Honda Motor, a car company which is closely related to Honda Foundation, is famous for its environmental excellence. Let us deepen our exchange with each other and contribute to the betterment of the world together.

Keynote Speech

Dr. Odilkhuja PARPIEV
Executive Director, Committee for Coordination of
Science and Technology Development

Mr. Akira KOJIMA
Director, Honda Foundation
Advisor of Japan Center for Economic Research

Dr. Odilkhuja PARPIEV

Executive Director, Committee for Coordination of Science and Technology Development

Keynote Speech

Organization the Ecotechnology Related Research in the Framework of the State Scientific and Technical Programs of Uzbekistan

1

Organization the Ecotechnology Related Research in the Framework of the State Scientific and Technical Programs of Uzbekistan

Odilkhuja PARPIEV, Executive Director, Committee for Coordination of Science and Technology Development (CCSTD)

Dear Ladies and Gentlemen and our dearest Guests from Japan!

First, I would like to thank all the organizers, especially Honda Foundation for their effort and choosing Uzbekistan as the place for the following year's Honda Foundation symposium. And, thank you all for your participation in this first organized Uzbek-Japan Symposium on Ecotechnologies.

Shortly in my presentation, I would like to speak about the role of ecotechnologies on our science, how it is treated, and how the Uzbek scientists are approaching to the issue.

The end of the 20 century is characterized by a significant jump in the development of scientific and technological progress, the growth of social contradictions, dramatic population explosion, and the deterioration of environment. Our planet has never before been subject to such physical overload such as it experiences within the 20–21 centuries. Mankind has never so ruthlessly exploited and levied from the nature so many tributes and has now become so vulnerable before the power which he himself created.

Many scientists now agree that the policy on the principle of "react and correct" is not so effective; however, the policy of "predict and prevent" seems the only realistic approach.

Future research will help all countries to solve the most pressing question: how to send a huge-scale circulation of natural forces and resources in a way that will better meet the needs of people and not violate the ecological processes at the same time?

The growth of the scale of human activities, the rapid development of scientific and technological revolution intensified the negative impact on the environment, and led to the disruption of the ecological balance of the planet. Consumption in the sphere of material production of natural resources increased. During the years after World War II, minerals which were used were more than all used in previous human history. Since the reserves of coal, oil, gas, iron, and other minerals are not renewable, they will be exhausted in a few decades, according to the calculations of scientists. The list of problems occurring as a result of human activities can be continued. Gradually questions of human survival and preservation of the planet come to the floor.

One of the main tasks of scientists at the present stage of development is to ensure environmental safety of all the technologies and designs used by mankind, both new and old which have already been used. Nature conservation and improvement of the environment are the priorities of responsible countries and societies. Accordingly, in the Republic of Uzbekistan, the strategy of socio-economic development and state policy in the field of ecology and environment protection are interrelated, since the health, social and environmental well-being of the population are in indissoluble unity.

An important role on this process is being implemented in the country's science and technology policy. The condition for the efficient use of the existing intellectual potential is a concentration of scientific, financial and logistical resources for the priority areas of science and technology, which refers to the main areas of research and development, the implementation of which should provide a significant contribution to the socio-economic and technological development of the country and the achievement of the expense of the national socio-economic goals.

2

Priority directions of R&D (2012-2020)

- Researching of spiritual, moral and cultural development of a democratic and legal society, formation of innovative economy
- Energy, and energy resources savings;
- Development of renewable energy resources;
- Development of informatization and information and communication technologies;
- Agriculture, biotechnology, ecology and environmental protection;
- Recognized researching in medicine and pharmacology;
- Chemical engineering and nanotechnology;
- Earth sciences (geology, geophysics, seismology) .

Committee for Coordination of Science and Technology Development under the Cabinet of Ministers approved the following priorities for the development of science and technology in the Republic of Uzbekistan for the period of 2012–2020:

1. The spiritual, moral and cultural development of the democratic state and the legal community, the formation of an innovative economy;
2. Energy, energy-resource conservation;
3. Development of renewable energy;
4. Development of information and information and communication technologies;
5. Agriculture, biotechnology, ecology and environmental protection;
6. Medicine and Pharmacology;
7. Chemical and Nanotechnologies;
8. Earth sciences (geology, geophysics, seismology).

3

Committee for Coordinating Science and Technologies Development

In general, the government of Uzbekistan is developing S&T programs under the full consideration of national S&T policies mentioned above, priorities of economic and social development of the country, world S&T trends, and the tasks and problems identified by industrial sectors. The S&T programs are made in form of government orders for research and technological development and serve as the basis for funding research and technological development. The governmental supports are not given directly to individual institutions or organization but to specific programs and projects.

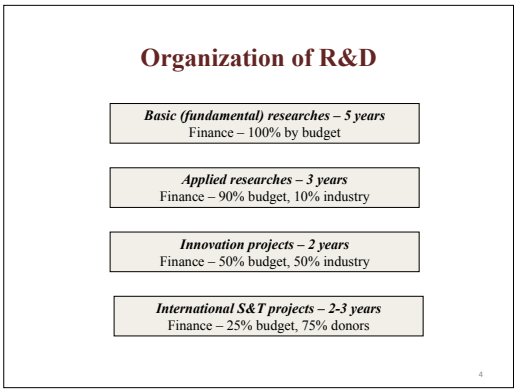
In Uzbekistan, attention is paid to the spiritual and moral upbringing of the younger generation because it contributes to the formation of moral sentiments (of conscience, duty, responsibility, citizenship, patriotism), moral character (patience, charity), a moral position (ability to discern both good and evil, readiness to overcome the trials of life), moral behavior (availability of service to people and fatherland, goodwill of the person), this is why the direction is defined as the first priority.

In addition, ecology as a science includes all complex interaction of factors—both natural and technological as well as social, moral, ethical. Furthermore, social factors are now becoming the defining, leading conscious activity of people who are actively defending their goals, and interests, often far removed from the interests of society and humanity as a whole, reaching conclusions which are sometimes at odds with those interests.

Another priority is energy and resource saving issues. On the one hand, Uzbekistan is one of the richest countries in the world for fuel and energy resources. On the other, the country inherited a heavy legacy from the former soviet regime, namely the energy- and resource-intensive, obsolete technologies, which have a negative impact on the environment. Accordingly, this scientific direction is given special attention.

The use of renewable energy sources—an extremely unfavorable ecological situation in the world, the relevant international obligations of Uzbekistan, as well as the great potential of using solar energy have predetermined the need to make this area a priority.
As shown by comparative analysis, mainly the development of national science priorities is based on the trends in the development of world science. Thus, the directions of biotechnology are presented in the 5 and 6 priority areas. 4 priority directions of Uzbekistan are aimed for the development of information technologies. The direction of materials technology (development of new materials), ecology and conservation are presented in all directions.

4



To implement the above mentioned priorities, there are established national scientific and technical programs of fundamental, applied research and innovation developments.
Scientific and technical programs of fundamental research for the period, up to five years, aimed at obtaining new knowledge about the laws of nature and society, to create the necessary theoretical framework for application development. This is primarily funded work which is directed to ensure the increase of knowledge and scientific potential with strategic importance in terms of the future use of the results.
A scientific and technical program of applied research, realized in the period up to three years based on the results of basic research and focused on the creation of new types of equipment and technologies, intends to achieve a breakthrough in a particular area. This program is an original source for the replenishment of the innovative package of proposals for their further development in the economy.
The tasks of innovative programs of scientific and technical works, which should be realized within the two years, are to improve the technological level and competitiveness of production, providing the output of innovative products to the domestic and foreign markets, import substitution and export-oriented economic structure formation.

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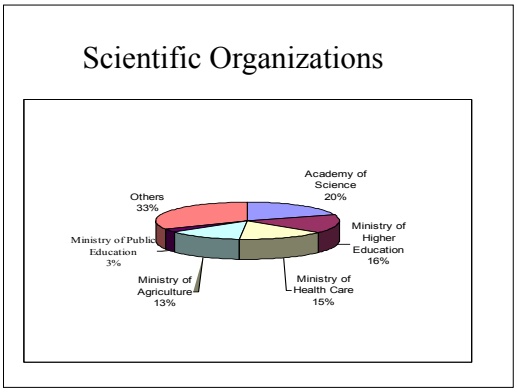
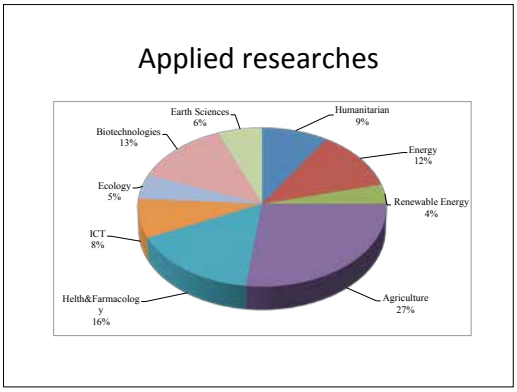


Such a mechanism of the organization of research and innovation allows concentration of the available scientific and technical potential of the country to address the priorities of socio-economic and scientific-technical problems, ensure the effective use of scientific and technological capacity, introduction to the production the latest achievements of domestic science and technology and advanced scientific technologies.

6



The largest within the state scientific-technical programs is a program of applied research, the realization of which is allocated more than 60% of the budget.

At first glance, as the slide 6 shows that for the scientific direction ecology allocated only 5% of the total. But here it should be noted that there are certain requirements for the implemented research projects. Almost all research projects must meet environmental safety requirements and include environmental protection measures. Projects that do not meet these requirements are not included in the state of scientific and technical projects. In addition, areas such as renewable energy, agriculture, health care and pharmaceuticals are directly related to the research in the direction of the environment.
Most of these research projects aim to identify possible relationships between various technologies, and especially the chemical, biochemical, agrochemical, energy, destructive or harmful effects on the natural realm to create the overall ecological safety of the environment, including chemical, biochemical, and radiation.

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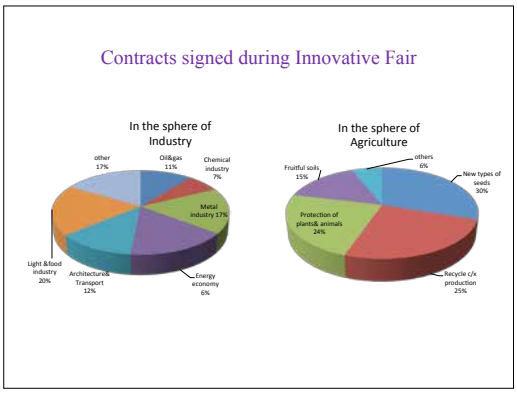

One of the effective mechanisms of organizing the transfer of domestic technologies, which are developed within the state scientific and technical programs, including environmental technologies is the annual Fair of innovative ideas, technologies and projects. The main objective of the Fair is to ensure the integration of science and production, and promote the conclusion of contracts for the implementation of presented innovative developments.
Every year, more than 500 innovative developments and ideas are demonstrated, and more than 400 contracts are signed for the implementation of development and implementation of innovative ideas. At the Fair, the developments and technologies are demonstrated in the following five areas: industry, agriculture, medicine and pharmacology, information technologies, science and education.
Based on the needs and interest of industries, companies and businesses sometimes organized additional directions. For instance, in 2014 a new direction was organized; "Energy saving technologies," in 2015 direction of "high-tech," and in 2016 taking into account the Uzbek-Japan Symposium on Ecotechnologies, it was decided to organize a new direction, "Ecotechnologies."
As part of the Fair of innovative ideas, technologies and projects, the largest number of contracts concluded were in areas of "Agriculture" (47%) and "Industry" (35%). Slide 7 is presenting the main directions of contracts for the implementation of innovation in these two areas.

As shown in the analysis of slide 7 (right), today, the main consumers in the field of agriculture, namely farmers, are interested in innovative technologies which are associated with new varieties of agricultural plants, processing of their products, protection of plants and animals, increasing soil fertility, also conservation of irrigation of waters and agricultural machinery is of great interest. Thus, we can conclude that innovation in the field of environmental technologies is the most interesting development in the intellectual property market of Uzbekistan.
Also, innovative developments for obtaining cheap electricity through micro hydro power plants, use of high water plants for sewage and use of biogas, drought and salt resistant plants are of special interest.
Consumers in the direction of "Industry" are interested in energy-saving technologies, the use of local raw materials in light industry, chemical, metallurgy and construction, mining and processing of oil and gas.

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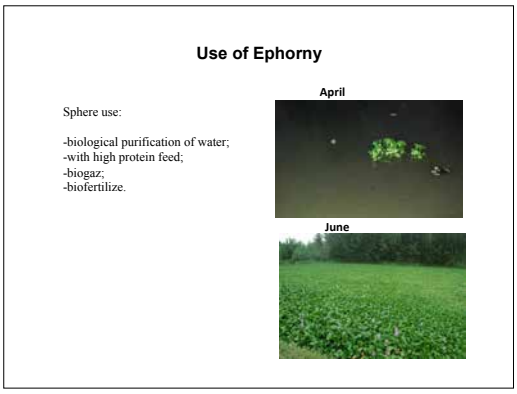

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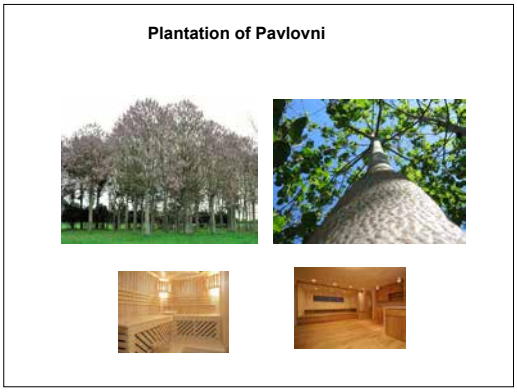

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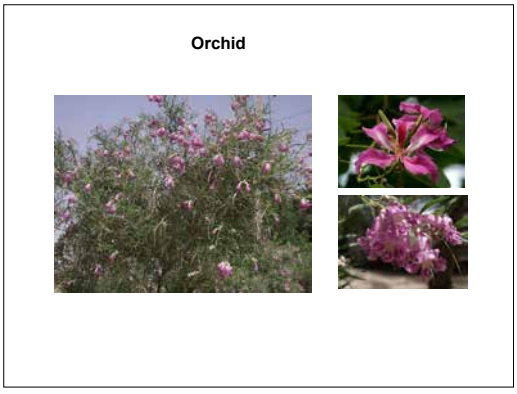

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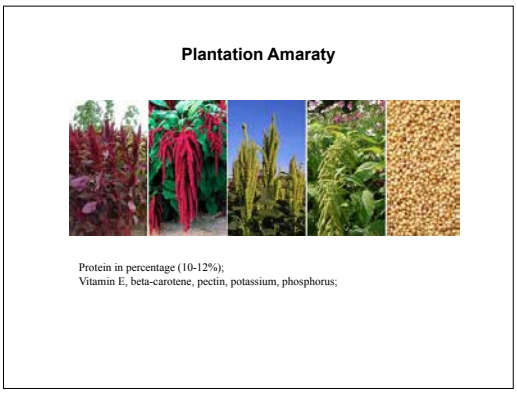


All this points to the fact, that industrial activity of humankind should gradually change their basics. We are stepping to the new era, which is naturally called ecological because it will focus on the establishment of industries that do not destroy the equilibrium state of the biosphere, and fit into its biogeochemical cycles.

To achieve this goal, it is necessary to:

Conduct constant analysis of global trends in the development of environmental technologies, status, problems and prospects of innovative technologies related to the surrounding environment;

Provide state support for the development of new methods of creating and implementing environmental, environmentally friendly, energy-saving and ecotechnologies;

Create favorable conditions for the development of international cooperation in the field of industrial safety and the environment;

Develop and strengthen the legal aspects of economic development and the environmental protection;

Develop mutually beneficial cooperation between the state, non-governmental environmental organizations and the business community.

This is, in short, about all I was going to tell you. At the end, I would like to say that this event should not be the final one, we, the Uzbek side, need to further our cooperation with you, the Japanese side, especially with Honda Foundation in future.

I hope for that we have all the necessary conditions, reason and mainly willingness to work together.

13

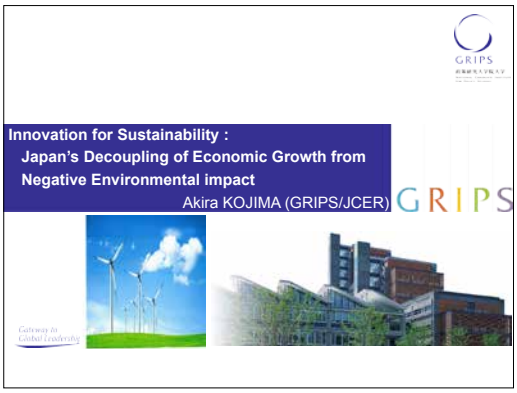
Thank you very much for your attention!

Mr. Akira KOJIMA

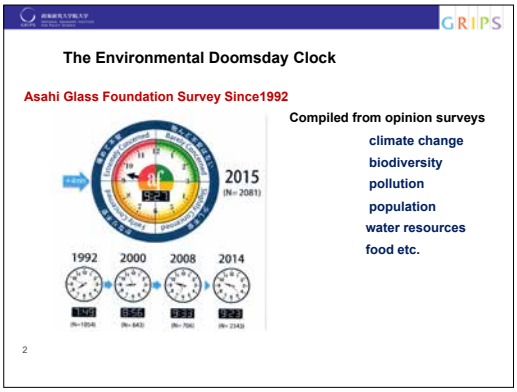
Director, Honda Foundation
Advisor of Japan Center for Economic Research

Keynote Speech

Japan's Decoupling of Economic Growth from Negative Environmental Impact

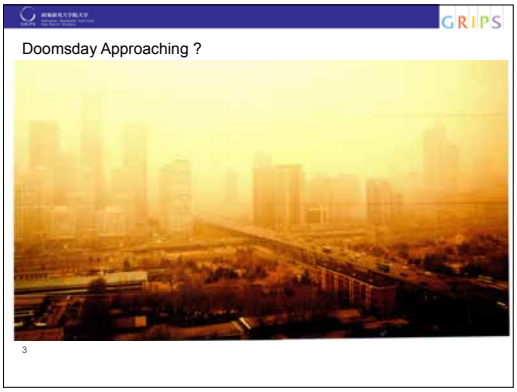


Good Morning, Ladies and Gentlemen!
Let me introduce a very unique clock. It's allowed me to wake up at 4 o'clock to wake up your attention regarding the evolution of the importance of global climate.



This clock is designed by a private company Asahi Glass. And they calculated what time it is now.

Here in 1 o'clock, 2 o'clock, in the morning, it is very safe, very healthy and normal conditions.
But now we are around here (9:27). Actually, this was compiled from the opinion surveys by hundreds of countries' scientists, specialists, professors, business people, opinion leaders and so forth. And the elements of the survey are climate change, biodiversity, pollution, population, water resources, food, etc. And, actually, this has been inaugurated since 1992, just soon after your country's independence.
So ever since this clock has been clicking, ticking, ticking, and if this reaches 12 o'clock, it brings a very miserable future for us and for the next generation.



This is exactly one city's daytime, not towards the evening. It's Beijing. Especially in winter time, you can't see a building of 5 km meters away.

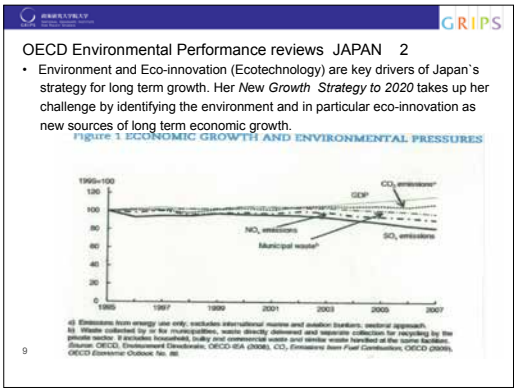
This is Tokyo! But not today! About 50 years ago.

Today, from Tokyo, we can see Mt. Fuji! It was introduced by Ishida-san. It's hundreds of kilometers away from Tokyo. It's so visible with a fine view. Look at the difference. This is Tokyo Tower, this is the diet building. What have changed between 50 years ago and today?

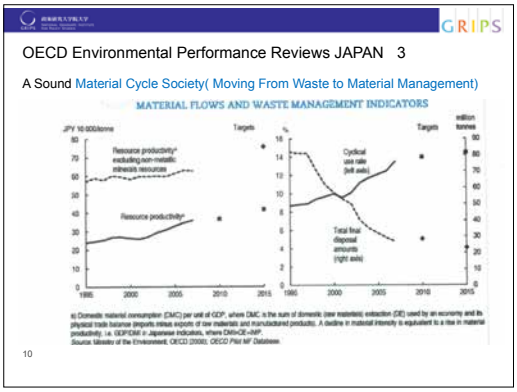
This is Kita-kyushu, the northern part of the Kyushu area, which has a high concentration of industries. This is one of the old major great industrial zones in Japan. And here there was contamination, by the industrial waste water, about 60 years ago.

But today, you can swim and fish. Tokyo 50 years ago. Tokyo's Sumida-River was black, there were no fish. It was ugly, smelly. But now people are enjoying cruising, fishing. And after the big crisis, we have sensibly created the sense of agreement about the importance of the environment. Ever since, Japan has taken this opportunity to improve its entire environmental condition.

Because of that, the OECD and other countries admire the changes which have been seen in Japan ever since.

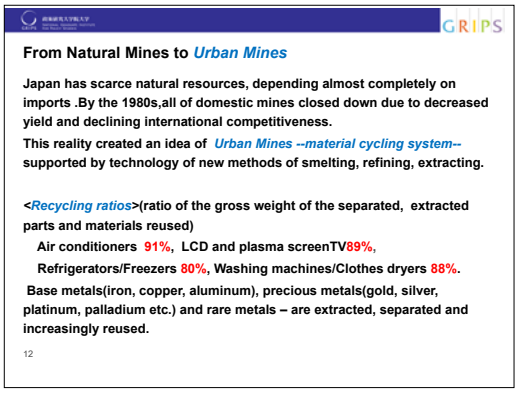


And they said Japan has made steady progress in addressing a range of traditional environmental problems, notably air emissions, water pollution and waste management. And actually, with relatively poor natural resources and densely populated, Japan has strong incentives to manage its land, energy and natural resources efficiently and particularly through innovative technologies and our efficient ecotechnology system. I'd like to show growth rate of GDP is higher than that of the initial stage. It means what I try to talk about later, "decoupling."



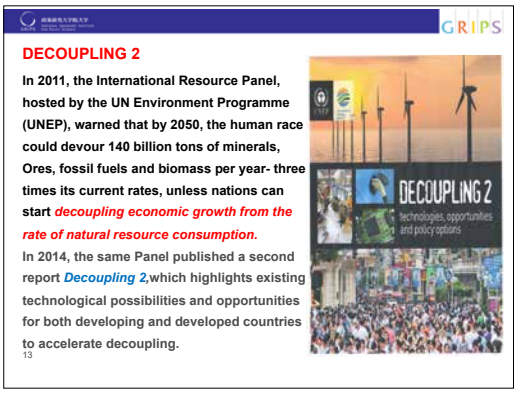
Cyclical use of materials. How much is the percentage increasing? And total final disposals are certainly on the decline.

Are you familiar with certain garbage boxes? We find this type of box in buildings, schools and so on. It is a small separation of waste by type. Our policy is 3R policy focusing on recycling and reducing final disposal. 3R means Reduce, Reuse, Recycle. The recycling system is extending to specific waste streams such as home appliances and end-of-life vehicles, and has resulted in a dramatic fall in the amount of landfilled waste. This is the box for the waste combustion or flammable waste, cans made of steel or aluminum, plastic bottles and empty glass bottles. We are doing a kind of Sound Material Cycle Society. Transforming from Mass Production, Mass Consumption, Mass Disposal to Sound Material Cycle Society. Increasingly, a number of companies are trying to introduce this kind of zero waste cycle for production and for the environment.

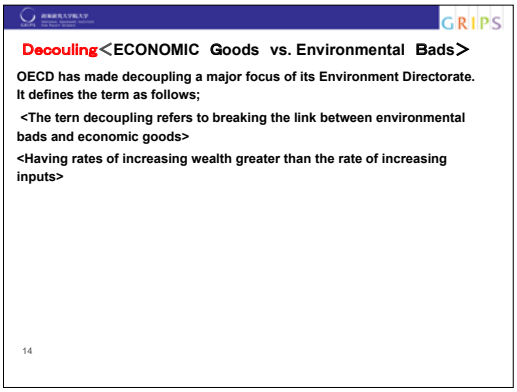


We are now dealing with the new concept of urban mines. We have this kind of idea in Japan, because we have scarce natural resources, we produce urban mines. It means a material cycling system supported by technology of new methods of smelting, refining and extracting. Actually, I can show you the recycling

ratio. This is the ratio of gross weight of the separated and extracted parts of materials reused. As for air conditioners, 91 percent is reused, recycled. Also, TV sets are 89 percent, as for refrigerators, freezers, 80%, and washing machines and clothes dryers, 88%. This is the type of the waste materials, iron, copper, uranium, precious metal gold, silver, platinum, palladium or rare metals, that are now being extracted, separated and increasingly reused.



And next, I want to stress this. Globally, we are now increasingly focusing on the concept of decoupling. In the year 2011, the international resource panel hosted by the United Nations Environment Programme (UNEP) warned that by the year 2050, the human race could devour 140 billion tons of minerals, ores, fossil fuels and biomass per year, this is three times its current rate, unless nations can start decoupling economic growth from the rate of natural resource consumption. In the year 2014, the same Panel published a second report Decoupling 2, which highlighted existing technological possibilities and opportunities for both developing and developed countries to accelerate decoupling.



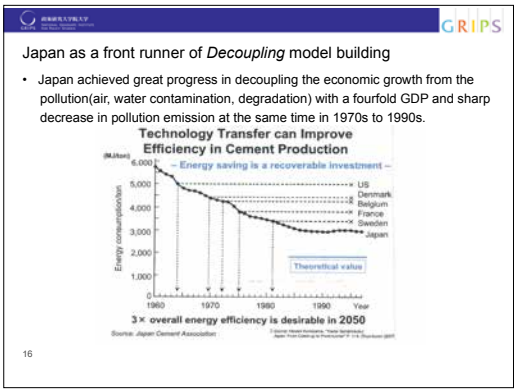
Decoupling means the tension between economic "goods" and environmental "bads." "Goods" and "bads." We want to increase the goods with fewer bads. So OECD made the definition. The term decoupling refers to breaking the link between environmental bads and economic goods, namely having rates of increasing wealth greater than the rate of increasing inputs. With the same input of energy or resources, we have more production values.

And this kind of discussion is now happening globally. This is the case of the United Nations situation, enunciation of the UN General Assembly in a resolution in 2015, September. The title of the resolution is the 2030 Agenda for Sustainable Development. This is a new UN Global Sustainable Development Goal program containing 17 Sustainable Development Goals and 169 Targets. Out of these 17 sustainable development goals, I picked out a few which may directly be related to today's issue.

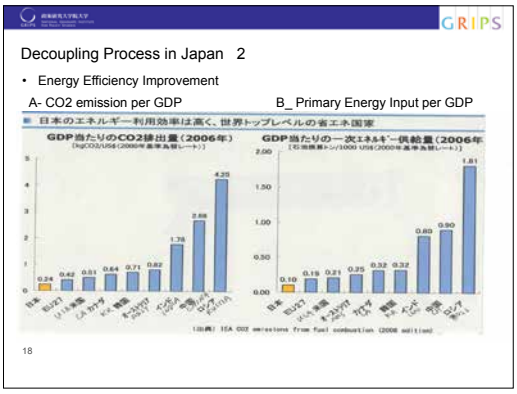
Goal 6 Ensure availability and sustainable management of water and sanitation.

Goal 7 Ensure access to affordable, reliable, sustainable and modern energy including renewable energy.
Goal 9 Build sustained, inclusive and sustainable economic growth. This is directly related to the concept of decoupling.
Goal 12 Ensure sustainable consumption and production patterns.
Goal 13 Take urgent action to combat climate change and its impact.
Goal 14 Conserve and sustainably use the oceans and marine resources.
Goal 15 Protect, restore and promote sustainable use of terrestrial ecosystems.

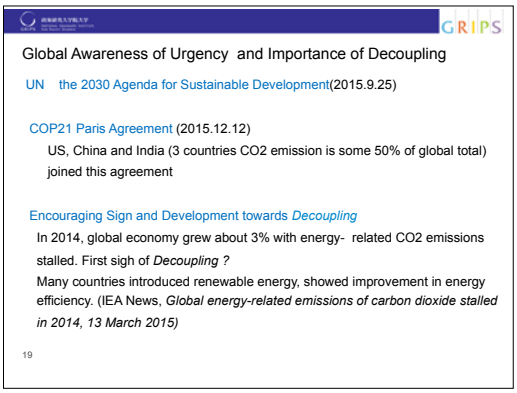
Japan can be looked at as a front runner of this decoupling model building.



As one example, Japan achieved a great progress in decoupling economic growth from pollution (air, water contamination, degradation) with a fourfold GDP and sharp decrease in pollution emissions at the same time in the years 1970s to 1990s. I think that in the case of cement production, efficiency of cement production is an example. Actually, as for cement industry, they developed a new system, they introduced new production models and technologies. And In the short period of 30 years, for cement production, the industry as a whole needs only just half of inputs of energy it once used. It's an amazing improvement of productivity. In other industries like steel and chemicals, they are now following this type of effort.

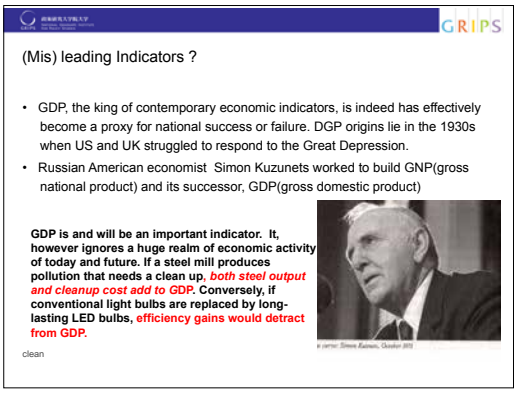


Here, and this is another aspect showing some decoupling efforts in Japan, regarding the emission of sulfur oxide per unit production from thermal power plants. It is by far more efficient than other countries.

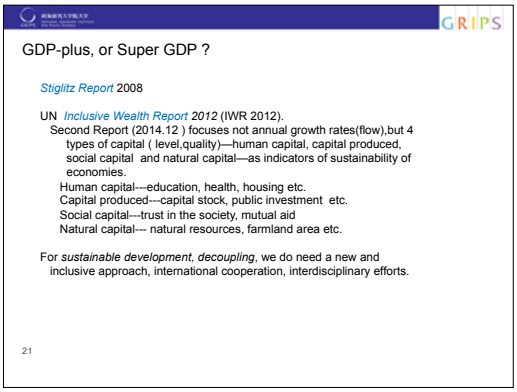


We are now detecting some global awareness of the larger importance of decoupling. For example, the United Nations in the 2030 Agenda for Sustainable Development, they introduced this kind of concept. In the COP21 Paris Agreement, China and India, and the countries whose collective CO_2 emission is somewhere near 50% of the global total, finally joined this agreement. This is a new development, an

encouraging development.
In the year 2014, the global economy grew about 3% with energy related to CO_2 emissions stalled additionally with consumption. This is the first sign of global decoupling. We must encourage this kind of trend.



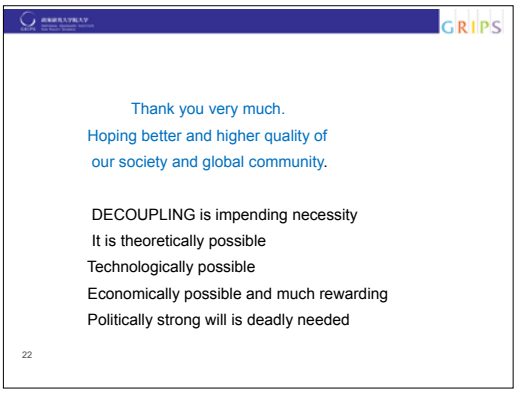
Many countries introduced renewable energy and showed improvement in energy efficiency.
Lastly, I would just like to give information about the recent discussion of very important statistics.
GDP, gross domestic product, formerly we used Gross National Product, is the king of contemporary economic indicators. Indeed, it has effectively become a proxy for national success or failure. All countries are taught the importance of the number. GDP origins lie in the year 1930s when the US and the UK were struggling to respond to the Great Depression at the time. This gentleman, Russia-born American economist Simon Kuznets told us to produce meaningful statistics. So he worked to build GDP. They are still important, and may continue to be so. But there are small changes needed as the world changes as it has some problems. It ignores a huge realm of economic activity of both today and the future. For example, if a steel mill produces pollution that needs a cleanup, both steel output and cleanup cost add to GDP. Conversely, if conventional light bulbs are replaced by long-lasting LED bulbs, efficiency gains would detract from GDP.



So I find that there is an on-going discussion about how to modify or how to create a super GDP. And Joseph Stiglitz made a report in the year 2008. United Nations made a report in the year 2012, and the title was “Inclusive Wealth Report.” A second report appeared in the year 2014 focusing not only on the annual growth ratio. Growth GDP is a concept of flow. But they reported the importance of a few types, 4 types of capital (level, quality)—human capital, capital produced, social capital, and natural capital—as indicators of sustainability of economies.

Human capital—education, housing,
Social capital—trust in society,
Natural capital—natural resources, farmland and soil.

So we must deal more with over-all capital analysis of flows of source and quality. This is part of the changing evolution relating to the recognition or awareness of the importance of the global environment.



Thank you very much. I hope for a better and higher quality of our society and global community.

Decoupling is impeding necessity, it is theoretically possible, technologically possible, economically possible plus much rewarding and challenging politics, and a politically strong will is deadly needed. Thank you very much.

Session 1

Technological Evolution and Legal Aspects for Economic Development and Environmental Protection/Restoration

Ms. Yoriko KAWAGUCHI

Former Foreign/Environment Minister of Japan,
Professor of Meiji Institute for Global Affairs, Meiji University

Mr. Boriy ALIKHANOV

Deputy Speaker—Chairman of the Deputy Group of the Ecological Movement, Chairman of the Committee on Ecology and Environment Protection of the Legislative Chamber

Mr. Akira GOTO

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Session 1

Technological Evolution and Legal Aspects for Economic Development and Environmental Protection/Restoration

Critical Keys to Reduce Pollution: A Message from Japan

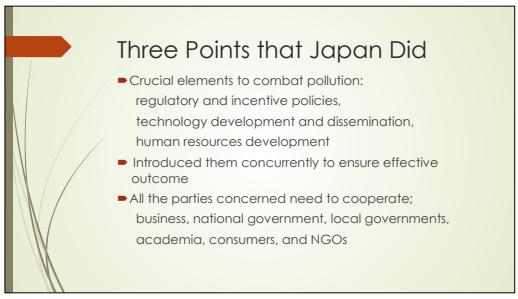
This time I will talk about critical keys to reduce pollution. And I will be talking about Japan's experience in air pollution control. You may think that that's not relevant to Uzbekistan because your air is so clean.

But my point is that, one policy framework or one method to approach a type of pollution would apply to all others. So in that spirit, I hope that you will understand and you will listen to my presentation.

We have seen this morning many pictures of Mt. Fuji. Three or four of them. And that reminded me of a story about Mt. Fuji and technology. You may know that Mt. Fuji earns a lot of our respect. It was designated as UNESCO's world natural heritage last year or two years ago. As the Environment Minister, I was pushing for that designation, because a national park comes under the jurisdiction of the environment ministry, and Mt. Fuji is a national park in Japan.

But there was one obstacle and that was the human discharge. Lots of people go up Mt. Fuji every summer. Just so many of them. And naturally there is a certain human discharge. And we were taught that that should be removed in some way. Now only technology covers it. So we were spending some time trying to come up with technology to do something about this human discharge which we were able to succeed, eventually, I was told. And so that's how the designation came about. That's one story about the connection between the environment and also technology, how important technology is.

Now, Mr. Kojima talked about the connection between our rapid economic growth, energy consumption, and how Japan's air was not clean. So I will skip all these and go right to the conclusion.



There are three major things I want you to go home with. And that is the conclusion of my presentation, and nothing else. So one is that, there are critical elements to combat pollution. And that's my first point. And there are regulatory and incentive policies.

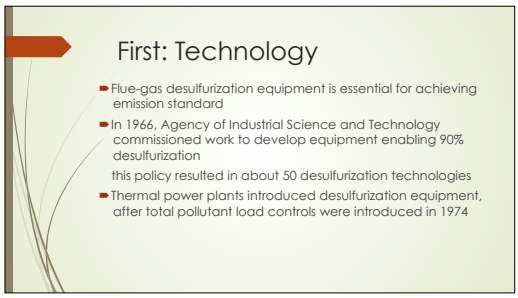
The second is also the technology development and dissemination, human resources development.

Who can deal with R & D as well as operating actual equipment that embodies the technology?

The second point is that these critical elements have to be brought into the economy or brought into the market concurrently more or less at the same time. That's the second important point.

The third point is all the parties concerned, national governments, local governments, academia, business, NGOs, consumers, all these people have a role to play in controlling environment issues, pollution or climate change. So these three points are my conclusions, and you don't really have to listen to me anymore.

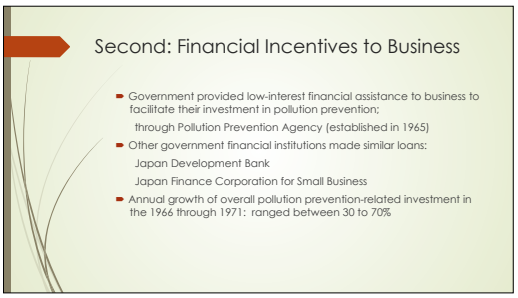
But since I have more time, and I did not look at the watch when I started, maybe I spent two minutes already, and I will go a bit further in detail.



Now, first, technology, the important point that you are interested in. In order to control air pollution, we needed to come up with technology, which was flue gas desulfurization technology and equipment used in the plant that have to be equipped with them. So, R & D technology was important and also dissemination put in place was also important. Now the R & D for this technology, desulfurization technology started about 1960s, in the first half of 1960s, for use for thermal power plants. But the problem in Japan at that time was the speed of R & D. The air was already so bad. Consumers were suing the government. Consumers were saying no to the establishment of new plants in certain cities. So the R & D needed to come quickly. There's always a question as to what extent the government contributes to R & D, to what extent the government should pay. And normally, that should be done by the private sector. But since time was an urgent matter, the government came in.

In 1966, the Agency of Industrial Science and Technology, which was a branch of the Ministry of International Trade and Industry, now is called the Ministry of Economy, Trade and Industry, commissioned work to a group of companies to develop equipment, enabling ninety percent desulfurization. Then as a result of that, it is said we ended up having about fifty types of desulfurization technologies.

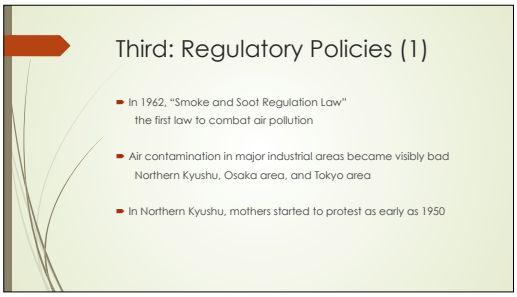
Some of power plants introduced desulfurization equipment, especially after total pollutant load control which was introduced as one of the regulatory policies introduced in 1974. Thus, you can see that without that regulation, and without the incentives by the government commissioning the work, desulfurization was not placed in use.



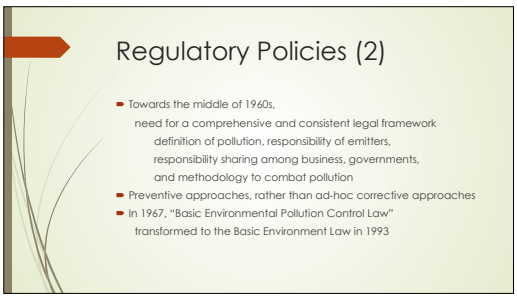
Now, the second part is financial incentives by the government. You may have the technology in place, but it is always expensive for plants to place these in

their works, and companies and businesses prefer not to do it if they can't afford it. So what did we do? So we helped with a low interest rate financial mechanism. We have created a special agency dealing with pollution control. And they helped business, especially small business, to help them with placing the equipment. Also, other existing financial institutions such as Japan Development Bank or medium-small sized enterprise financial institutions, they also had similar roles. So that way, the government came in to help.

With the low interest rate of the official governmental institutions, the business was able to lower the interest rate that they incur. Although government's subsidy, I mean, interest rate did not amount to 100 percent, city financial institutions or private financial institutions also helped that.



Now comes the third element which is regulatory policies. The first regulatory policy in air pollution came into Japan in 1962 and it was called "Smoke and Soot Regulation Law."



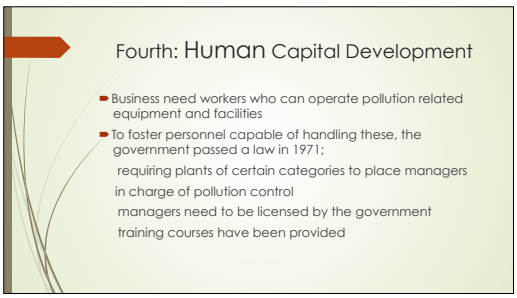
But in the meantime, it became very clear towards the middle of the 1960s, that this was not enough at all. Japan needed a comprehensive and consistent legal framework stipulating the definition of pollution, responsibility of emitters—to what extent the emitters were responsible—responsibility sharing among businesses, national government and local government—to what extent they each have to contribute in sharing their respective responsibilities, and also how we go about, Japan goes about, helping air pollution control.

And we, up until that time, Japan resorted to uphold corrective measures, but we realized that was not enough. We needed to have preventive measures and approaches.

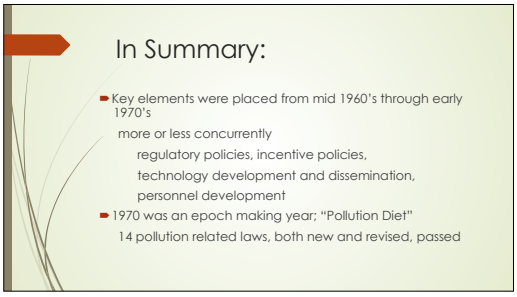
Now this led to the Basic Environmental Pollution Control Law in 1967 which was revised many times and now it's called the Basic Environment Law, which incorporates not only pollution but also global environment problems such as climate change. Now this Basic Environment Pollution Control Law, this did many things. For one thing, it designated public nuisance. We chose, I think, 9 categories such as air contamination, water contamination, soil contamination, noise, so set down altogether and 3 other pollution problems, we defined as "pollution problems" which should be covered by the government policy.

Then the government set out a standard for business and cities to meet. And we introduced polluter-pays principle. And fourth, we provided in the law the role of the government and its responsibility, it's the sharing of the responsibility with local governments.

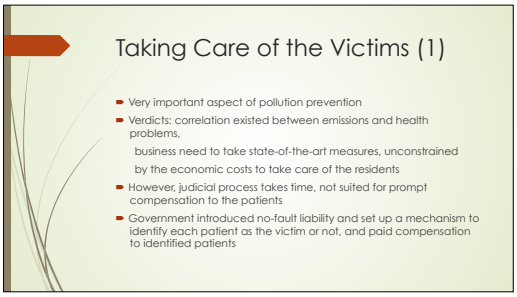
In the meantime, Japan established the Environment Agency law, Environment Protection Agency, which was changed into Environment Ministry in 2001. And I was the last Environment Protection Agency Minister, and the first Environment Ministry's Minister.



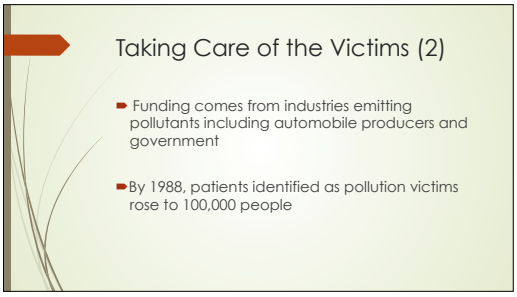
Actually, since the problems became very obvious in early 1960s, until the establishment of the Environment Protection Agency which was 1971, we spent about 10 years. And in that time, there were many people who suffered from the consequences of the environmental pollution problems.



Whether the 10 years time was short or long is up to you to see. But I think Japan needed to do and was able to do as much as we could in the 10 years time, although we did produce, unfortunately, many patients from the pollution problems. As environment minister, I was required to meet with these patients who would tell you all sorts of problems they had. And my heart really ached. So it is Japan's hope that other countries would not have to go through what Japan went through, would not have to go through what many Japanese people went through. And still, some of them suffer.



I will go on to talk about the last part of this, which is taking care of the victims. In the law, there was a provision that the government should take care of the victims. So we did, and how we did it, this is basically polluters-based principle. The people who pollute need to pay.
But there are some things which are very difficult to identify. The city's air is contaminated, and people suffer from asthma and other diseases. Can you identify each driver to say that you have to pay for the cost of the asthma patient? That's not easy.



So we asked the pollutant industries, including automobile industries, to pay part of it, and the government came in with the rest of the money. And we established a committee which was composed of experts and doctors and third parties. And they looked at the document for each patient and designated if that person should be paid by this

government scheme. So that's the way things work. There are still problems. Some people are not satisfied with the scheme or with the criteria that this mission created. So the problems still go on. But at least we have basic scheme to help the patients. Now I talked about air pollution and what we did. But introduction of the key element concurrently is the key regardless of the type of the environment problems.

We heard that environment problems are diverse as we talked about biodiversity loss, climate change—there are many issues—acid rain, acidification of the seawater. So there are many problems where you cannot really identify who caused it. For instance, climate change. We all are the people who caused it. We drive, we heat our house, and that emits CO_2 and other warming gases. So there are other types of solutions needed. Again, technology is very important for climate change after the Paris Agreement. We are in need of controlling, reducing the greenhouse gases. And we said in the Paris Agreement that we should limit the emission of greenhouse gases to basically net zero. In other words, we can spend to the extent that nature absorbs CO_2 in the second half of this century. So technology is very, very important. We will be listening to, renewable energies and other things. What this net zero increase in emission, greenhouse gases net zero increase, means is that in the second half of the 21st century, this country, we have only 3 items that we could be depending on—renewables, the second is CCS (carbon capture and storage) which is you put in CO_2 somewhere under the seabed or under the earth so we remove it from the system. The third is nuclear power generation, to which there are people who oppose.

So we know how important technology will be. It is already important. It will continue to be more important in the future. So I look forward to the rest of the discussion.

Thank you very much.

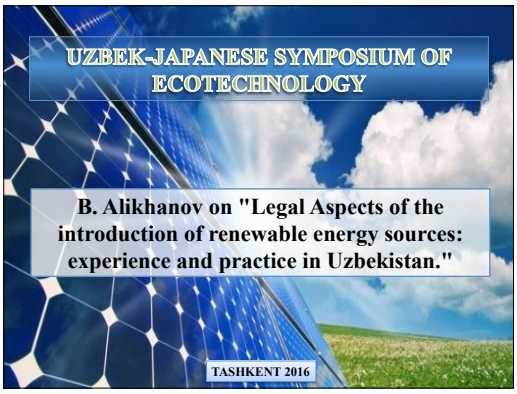
Mr. Boriy ALIKHANOV

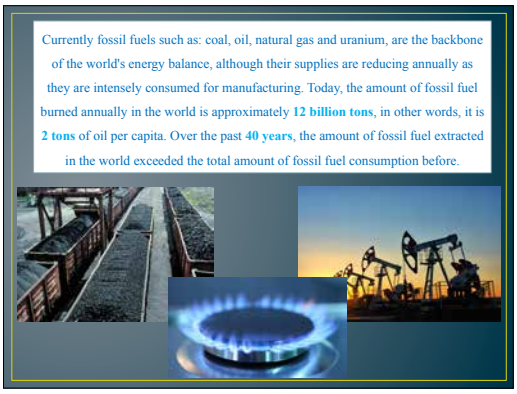
Deputy Speaker—Chairman of the Deputy Group of the Ecological Movement
Chairman of the Committee on Ecology and Environment Protection of the Legislative Chamber

Session 1

Technological Evolution and Legal Aspects for Economic Development and Environmental Protection/Restoration

Legal Aspects of the Introduction of Renewable Energy Sources: Experience and Practice of Uzbekistan





Dear participants of the symposium, colleagues, ladies and gentlemen!

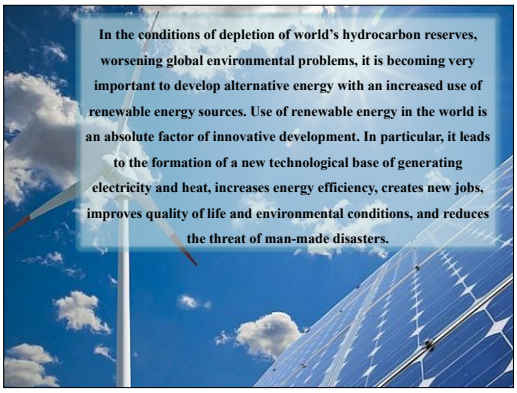
It gives me a great pleasure to take part in such a significant forum and to give a speech to such an authoritative audience. It should be noted that our dialogue and exchange of opinions will give a huge impetus to the exchange of practical experience and legal knowledge, improvement of legislation in introducing renewable energy and clean technologies.

Dear participants of the symposium, colleagues!

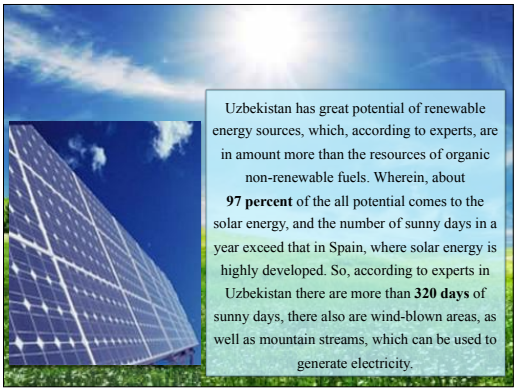
In today's world, the issue of energy security is becoming one of the major priorities of any state. Currently fossil fuels such as coal, oil, natural gas and uranium, are the backbone of the world's energy balance, although their supplies are reducing annually as they are intensely consumed for manufacturing. Today, the amount of fossil fuel burned annually in the world is approximately 12 billion tons, in other words, it is 2 tons of oil per capita. Over the past 40 years, the amount of fossil fuel extracted in the world exceeded the total amount of fossil fuel consumption before.

Despite the fact that now in the world market there is a tendency of reduction of the cost of liquid hydrocarbon, at present rates of energy

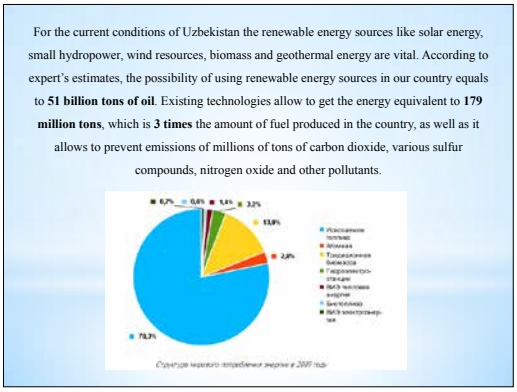
consumption, world oil reserves will last for only several decades more. Taking into account economic development, population growth and prevailing traditional ways of energy production, the global energy consumption will increase accordingly. However, in recent decades, due to the massive use of traditional hydrocarbon resources, our planet has faced global environmental problems. Among them—climate change, ozone depletion, et cetera. It is estimated that only annual industrial emissions of carbon dioxide into the atmosphere are more than 5 billion tons, and about 300 tons are of carbon monoxide. Compared to 1950s, the volume of harmful emissions, in the world, has increased 3.5 times and it has a stable upward tendency.



In the conditions of depletion of world's hydrocarbon reserves, and worsening global environmental problems, it is becoming very important to develop alternative energy with an increased use of renewable energy sources. Use of renewable energy in the world is an absolute factor of innovative development. In particular, it leads to the formation of a new technological base of generating electricity and heat, increases energy efficiency, creates new jobs, improves quality of life and environmental conditions, and reduces the threat of man-made disasters.

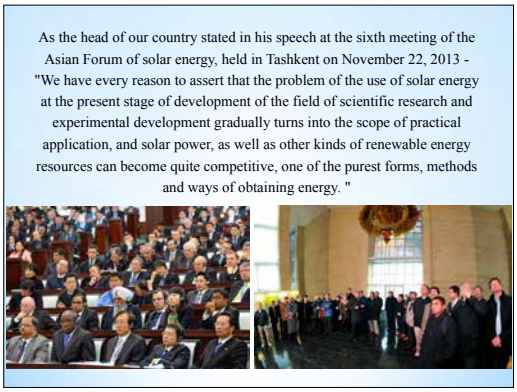


Dear colleagues!
Uzbekistan has a great potential of renewable energy sources, which, according to experts, are in amount more than the resources of organic non-renewable fuels. Wherein, about 97 percent of the all potential comes from solar energy, and the number of sunny days in a year exceeds that in Spain, where solar energy is highly developed. So, according to experts in Uzbekistan there are more than 320 days of sunny days, there also are wind-blown areas, as well as mountain streams, which can be used to generate electricity.



For the current conditions of Uzbekistan the renewable energy sources like solar energy, small hydropower, wind resources, biomass and geothermal energy are vital. According to expert's estimates, the possibility of using renewable energy sources in our country equals 51 billion tons of oil. Existing technologies allow creation of energy equivalent to 179 million tons, which is 3 times the amount of fuel produced in the country, as well as it allows prevention of emission of millions of tons of carbon dioxide, various sulfur compounds, nitrogen oxide and other pollutants.

Uzbekistan has taken steps to provide political and economic support for renewable energy development. An effective number of legal documents is regulating relations in the field of renewable energy. In particular, Article 20 of the Law "On the rational use of energy" of 25 April 1997, defines, in general terms, the legal framework for the use of renewable energy sources. In addition, the decision of the session of the Cabinet of Ministers dated February 13, 2009 on the role of the use of alternative and renewable energy sources in the program aimed at strengthening modernization of the electric power industry for 2009–2013 and to ensure energy security of the country.



As the head of our country stated in his speech at the sixth meeting of the Asian Forum of solar energy, held in Tashkent on November 22, 2013—"We have every reason to assert that the problem of the use of solar energy at the present stage of development of the field of scientific research and experimental development gradually turns into the scope of practical application, and solar power, as well as other kinds of renewable energy resources can become quite competitive, one of the purest forms, methods and ways of obtaining energy."

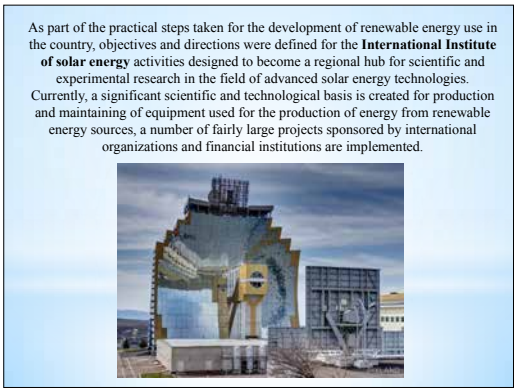
Dear participants of the symposium, colleagues!

The analysis of a number of the legislation of several countries shows that the absence of the necessary legal framework for the widespread introduction of alternative fuels, replacing traditional energy resources, oil, natural gas, hydropower, gas condensate and others, creates certain problems. In such a situation, the use of renewable energy sources in the country, even with significant scientific and technological potential, as well as other necessary resources, will be a very small fraction of the total consumption of energy potential.

At the same time, monitoring of the laws, regulations and government decisions taken in recent years have shown that the existing legislative and regulatory base of Uzbekistan in the field of renewable energy sources requires significant development, additions and improvement, preparation of specific legislation, which should reflect the legal, economic and financial, and administrative mechanisms to support the development of energy production and use of renewable energy sources. These legal documents must contain a set of incentives for the introduction of new resource-saving and environmentally friendly technologies and modern equipment, and most importantly, raise standards of energy consumption, both at work and at home.

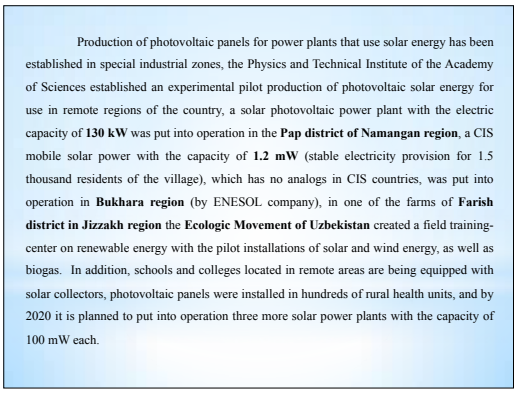
The set of selected factors and tendencies of development of alternatives, including renewable energy sources, define extensive development of this sphere in Uzbekistan.

Therefore, an important step in addressing these issues has become a "Program of measures to reduce energy consumption, introduction of energy saving technologies in sectors of the economy and social sphere in the period 2015–2019," approved by the Decree of the President of the Republic of Uzbekistan dated May 5, 2015 No. PP-2343. This program, along with the priorities of further reduction of energy consumption, introduction of energy-saving technologies in sectors of economic and social spheres stipulates accelerated development of renewable energy by introducing certified technologies of solar energy generation. Besides, establishment of the legal framework for the development and wide-scale introduction of renewable energy sources is pursued. For businesses and organizations that can produce energy, as well as specialize in the production of plants for production of renewable energy, there are privileges and preferences.

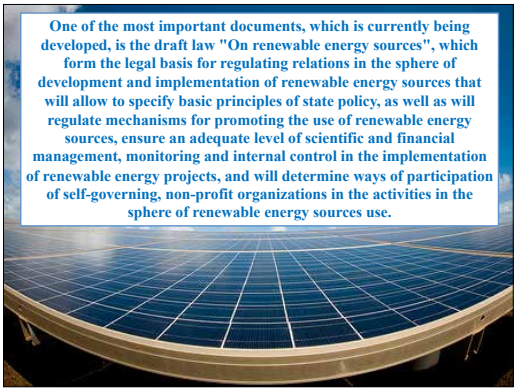


Dear colleagues!

As part of the practical steps taken for the development of renewable energy use in the country, objectives and directions were defined for the International Institute of solar energy activities designed to become a regional hub for scientific and experimental research in the field of advanced solar energy technologies. Currently, a significant scientific and technological basis is created for production and maintaining of equipment used for the production of energy from renewable energy sources, a number of fairly large projects sponsored by international organizations and financial institutions are implemented.



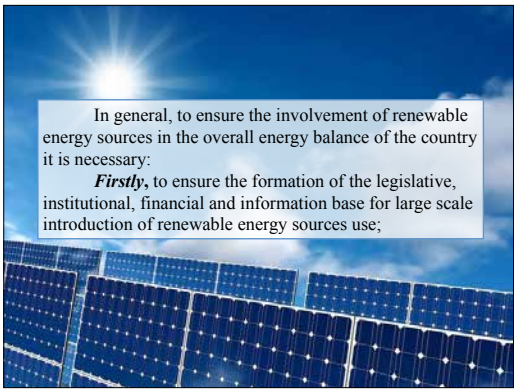
Production of photovoltaic panels for power plants that use solar energy has been established in special industrial zones, the Physics and Technical Institute of the Academy of Sciences established an experimental pilot production of photovoltaic solar energy for use in remote regions of the country, a solar photovoltaic power plant with an electric capacity of 130 kW was put into operation in the Pap district of Namangan region, a CIS mobile solar power with the capacity of 1.2 mW (stable electricity provision for 1.5 thousand residents of the village), which has no analogs in CIS countries, was put into operation in Bukhara region (by ENESOL company), in one of the farms of Farish district in Jizzakh region the Ecologic Movement of Uzbekistan created a field training-center on renewable energy with the pilot installations of solar and wind energy, as well as biogas. In addition, schools and colleges located in remote areas are being equipped with solar collectors, photovoltaic panels were installed in hundreds of rural health units, and by 2020 it is planned to put into operation three more solar power plants with the capacity of 100 mW each.



One of the most important documents, which is currently being developed, is the draft law “On renewable energy sources,” which forms the legal basis for regulating relations in the sphere of development and implementation of renewable energy sources that will allow specification of basic principles of state policy, as well as will regulate mechanisms for promoting the use of renewable energy sources, ensure an adequate level of scientific and financial management, monitoring and internal control in the implementation of renewable energy projects, and will determine ways of participation of self-governing, non-profit organizations in the activities in the sphere of renewable energy sources use.

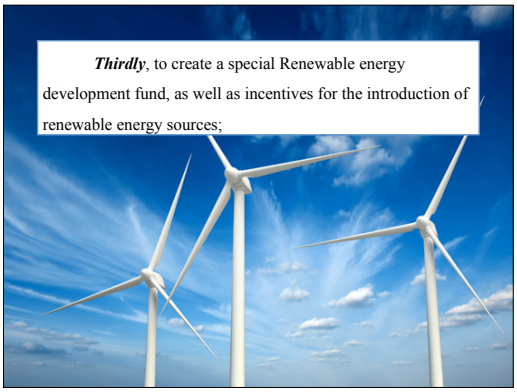
At the same time, involvement of renewable energy in the overall energy balance of the country and the legal regulation in this area will not only contribute to the reduction of harmful gas emissions, including greenhouse gas emissions that impact climate

change, to energy and heat supply improvement, especially in rural and remote areas, but will also ensure energy security and stable development of our country. The development of renewable energy, according to experts, will allow, by 2050, provision of a reduction of up to 50% of the share of hydrocarbons in total energy production.



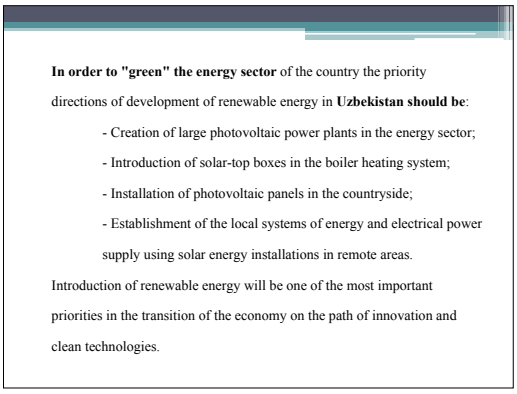
Dear participants of the symposium, colleagues, ladies and gentlemen!
In general, to ensure the involvement of renewable energy sources in the overall energy balance of the country it is necessary:
Firstly, to ensure the formation of the legislative, institutional, financial and information base for large scale introduction of renewable energy sources use;

Secondly, to create the infrastructure on introduction of renewable energy sources, including the scientific basis;



Thirdly, to create a special renewable energy development fund, as well as incentives for the introduction of renewable energy sources;

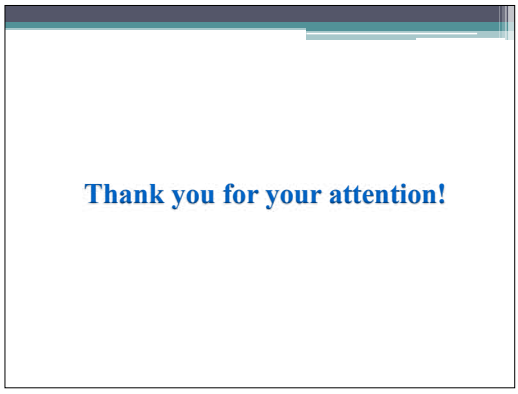
Fourthly, to carry out extensive promotion of renewable energy use and training of personnel in this sphere.



In order to “green” the energy sector of the country the priority directions of development of renewable energy in Uzbekistan should be:

- Creation of large photovoltaic power plants in the energy sector;
- Introduction of solar-top boxes in the boiler heating system;
- Installation of photovoltaic panels in the countryside;
- Establishment of the local systems of energy and electrical power supply using solar energy installations in remote areas.

Introduction of renewable energy will be one of the most important priorities in the transition of the economy on the path of innovation and clean technologies.
Implementation of these measures in Uzbekistan will ensure sustainable development of the social, economic and environmental spheres, the essence of which is the principal right of every citizen to favorable environmental conditions and meeting the needs of the current generation without compromising the needs of future generations.



Thank you for your attention!

Dr. Akira GOTO

Executive Director, Honda Foundation
Professor Emeritus of The University of Tokyo

Session 1

Technological Evolution and Legal Aspects for Economic Development and Environmental Protection/Restoration

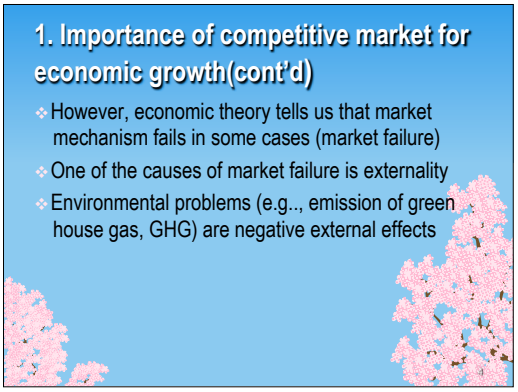
Economic Growth, Environmental Protection, and Innovation

Good morning everyone. I am very pleased and honored to be able to speak to you this morning. I was, as Mr. Arimoto mentioned, an economist by training. I taught economics at The University of Tokyo. And then, worked for the government, as a commissioner of Fair Trade Commission which is an agency that implements the Japanese anti-monopoly act, which is a Japanese competition policy.
And currently, I am also serving as an economic adviser to the Japan Patent Office. I was asked by the organizer of this symposium to talk about economic growth, environmental protection and innovation. And certainly this is a huge subject to talk about particularly in 15 minutes but at least I would try to do so.

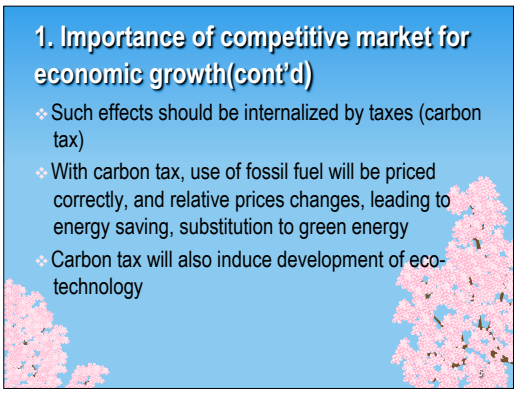
My talk is divided into 5 sections and in the first section, I'd like to emphasize the importance of market mechanism, competitive market mechanism for economic growth, environmental protection and innovation. But it is also important to use the competitive market system wisely because the market sometimes fails to achieve. Market mechanism is an excellent mechanism but it fails to achieve its goal, in certain conditions. Therefore, the government has to use the market wisely, but if you use it wisely, then it is a very excellent mechanism to promote economic growth and environmental protection and innovation.
And then in the second part, I would like to talk about Japan's experience after the oil crisis in the 1970s. In this decade, oil prices jumped from 2.5 dollars a barrel

to almost 40 dollars per barrel. And how the Japanese economy responded to the sudden jump of this important input is a very interesting story and we can draw several interesting lessons and observations, I hope.
Last 3 sections, 3, 4, 5, are about innovation policy to promote ecotechnology with references to many other menus of technology policy and so on.

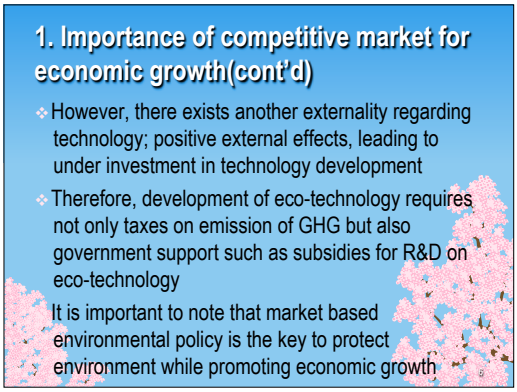
Now, the first part, the importance of competitive market for economic growth. It is needless to say that market mechanism is the most efficient way to allocate resources, very scarce resources, to where they are needed most. And the economists call this static efficiency. And, over time, the creative destruction in the market process promotes innovation which is the engine of dynamic economic development. And this is called dynamic efficiency. And competitive market mechanism achieves these two efficiencies, static efficiencies and dynamic efficiencies simultaneously in a very excellent manner.
This is proved by an economic theory and also, this is proved by history. Economic catch up of nations was achieved with competitive market and innovation. It happened in United States around the turn of the century, which is turn of the century of the previous time from the 19th century to the 20th century. And the Japanese fast catch up after the Meiji restoration and again after world war, the Second World War and Korea's remarkable catch up in 80s and China's rapid growth in 90s and India is now starting to join this game very recently.



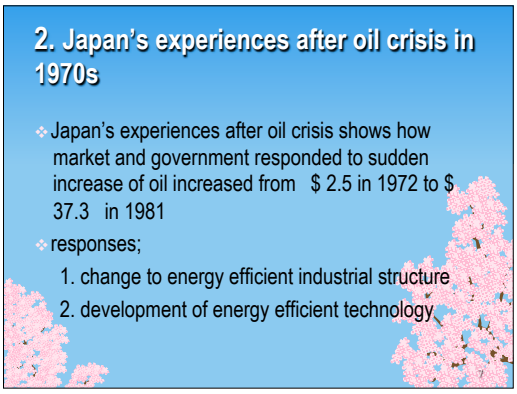
However, it is also important to note that economic theory shows that market mechanism fails in some cases. And this is called market failure. One of the causes of market failure is called externality and there are two types of externality. One is positive externality and the other one is negative externality. And negative externality means that one firm's activity causes harm to other firms or people in general, but that firm which caused harm does not have to pay the cost of this harm. Pollution is a good example or I should say a bad example and if that firm does not have to pay anything for pollution, if there are no regulations, the firm tends to overdo this kind of activity and that is a very disastrous instance of pollution.
The other type of externality is positive externality. Here, one firm's activity benefits other firms or other people. But a firm which benefits other firms does not receive any payment from others. Technology is a good example of this positive externality. Positive technology can travel very fast with very little cost and that's why the original inventor has difficulty in getting the proper reward for his technology without any institutional arrangements. So the inventor, under this no-protection regime, can't receive any compensation so that the activity will be below the optimum level.



And as for the pollution, or negative externality, this negative effect should be internalized by taxes and in the case of greenhouse gas, this tax is called a "carbon tax" in many cases. With carbon tax, the use of fossil fuel will be priced correctly and the relative price will change. This is through energy-saving activities and substitution to green energy. Carbon tax also induces development of ecotechnology as carbon emitting activity becomes expensive.

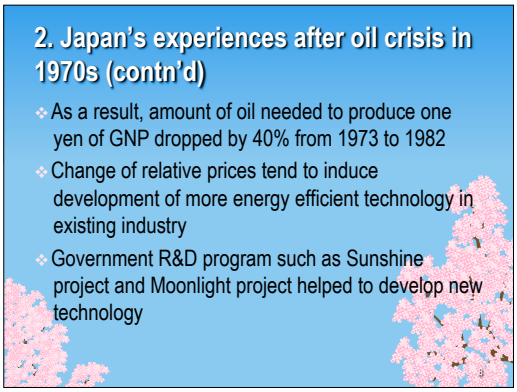


But technology development has its own problem. As I mentioned earlier, there is positive externality and the inventor will have difficulty in receiving a proper reward for his invention so the government should help firms to make firms become able to recoup their investments in R & D. It can be done by providing subsidies or providing a tax relief or other measures that I will come to talk about a little later. So here, to summarize the arguments so far, development of ecotechnology requires two kinds of government intervention. First is a tax on emission of a greenhouse gas and second intervention is to subsidize or support technological development of ecotechnology. These two kinds of government interventions should be combined to achieve the optimal outcome. It is important to note that market-based environmental policy is a key to protecting the environment while promoting economic growth. Market mechanism supplemented by appropriate government intervention can achieve this goal. These appropriate government interventions as I have mentioned earlier, are a tax on greenhouse gas and a subsidy on technology development of ecotechnology.

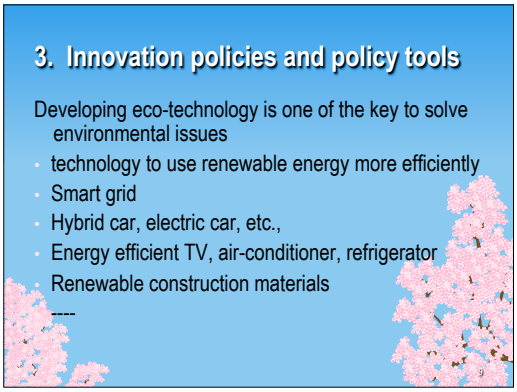


Now let me move to the second section of my talk which is Japan's experience of capital oil crisis in 70s. As I mentioned before, oil price jumped more than tenfold in 70s. And the response to this change was, I think twofold. The first response was changing to an energy-efficient industrial structure, a change to a more energy efficient structure, meaning that industries that use energy heavily should be phased out and a good example is aluminum smelting industry in Japan.

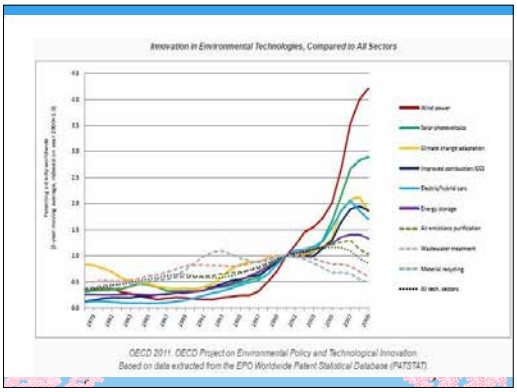
The aluminum smelting process requires a lot of electricity and electricity is generated by oil so the price of electricity also jumped in the 70s. And Japan's aluminum smelting industry was the second largest in the world before World War II and today, it does not exist anymore except one smelting plant which has hydro power plant in its backyard. It is almost completely gone. Instead, Japanese companies developed a more energy efficient technologies, and industries such as information technology or biotechnology industries started to grow. So, all the industrial structure moved to an overall energy-efficient structure. And the second response was to develop energy efficient technology.



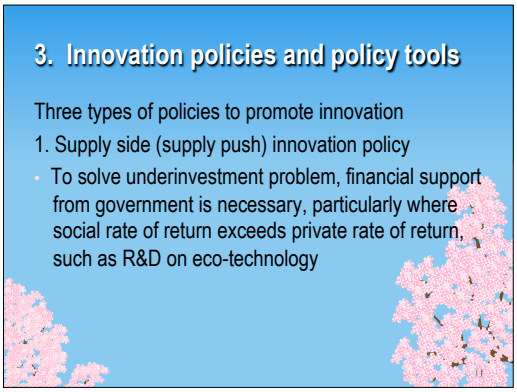
As a result of these changes, the amount of oil necessary to produce one yen of GNP dropped by 40 percent in this data. So this change or relative price tends to induce development of more energy-efficient technology in existing industries such as steel and so forth. Also the government is on the program such as the sunshine project or the moonlight project to help to develop new technologies such as renewable technology and so on.



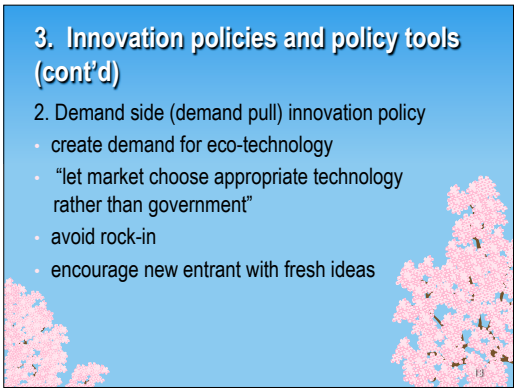
Now time is pressing so I have to move on to the innovation policies and policy tools.

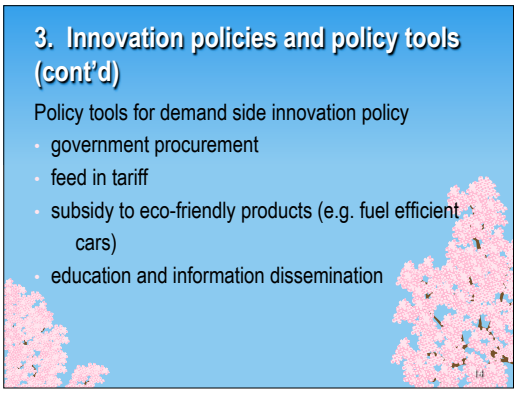


Here, this is an interesting figure taken from the OECD booklet. It's the number of patents granted related to all kinds of renewable technologies. It includes wind power patent, solar photovoltaics patent, and so on and so forth.



Let me move on to the technology policy and policy tools. With the first type of policy, there are 3 innovation policies. And one is a supply side technology policy, the second is a demand side technology policy, and third is a systemic technology innovation policy. Supply side technology is essentially giving a subsidy to firms to do research and development on ecotechnology.

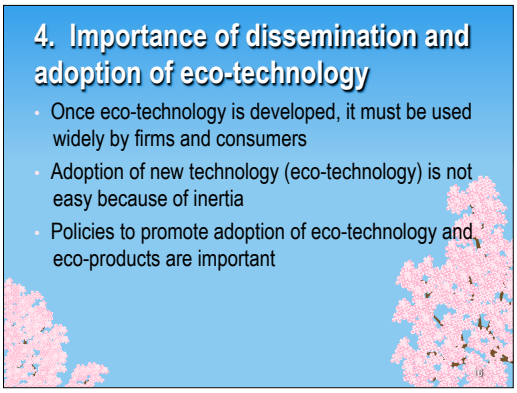




And demand side innovation policy means that the government creates a market for eco products, not ecotechnology, but eco products and let firms choose the appropriate technology to fulfill the market the government created. In this case, the technology was chosen by firms and not by government, as an advantage of inducing new entry into this field.

The third policy is systemic innovation policy. This is basically to promote interaction of players on the national innovation system such as university-industry collaboration and so on.

Before I close my talk, I would like to add 2 points which are very important.



One is dissemination and adoption of ecotechnology is very important because even if one ecotechnology is invented, if it is not used then it means nothing. And adoption of new technology is often difficult because people are used to old technologies and switching to unfamiliar new technology is often very difficult and costly so there should be a policy for government intervention to help firms and people adopt new technology.

This is very important. And last point is, governance of technology innovation policy. It is often the case that the ministry in charge of industry and the ministry in charge of economy and the ministry in charge of the environment do not get along very well. Therefore, coordination is particularly important and also technology development takes time, 10 years, 15 years so the government policy should be time-consistent.

I think that's all I have to say. Thank you very much.

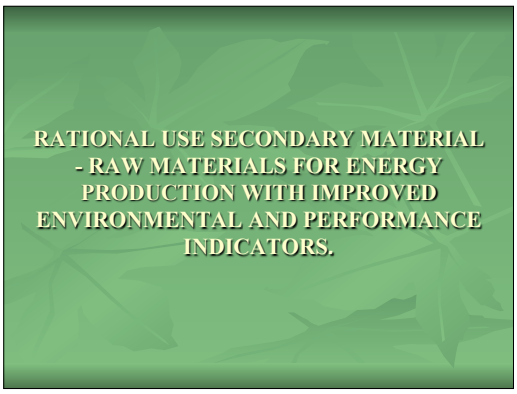
Dr. Abdulhashim TURGUNOV

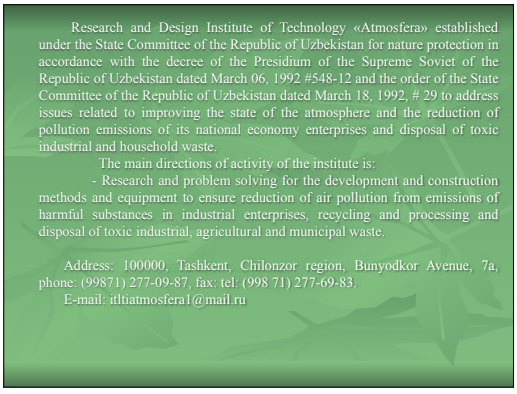
Project Manager, "ATMOSPHERE" Scientific Research Institute

Session 1

Technological Evolution and Legal Aspects for Economic Development and Environmental Protection/Restoration

Rational Use Secondary Material—Raw Materials for Energy Production with Improved Environmental and Performance Indicators





Dear Ladies and Gentlemen!

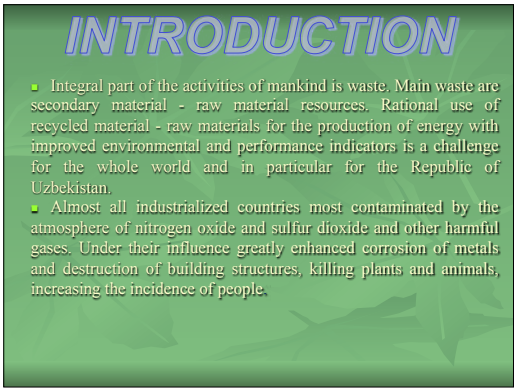
Thank you very much for your time in being here and listening to the presentations.

It is known that all chemical processes can move forward and/or backward, that detail is studied and continues to be studied under the subject of technical and chemical thermodynamics. Based on this approach at the beginning of the last century, a German and Czech scientists R. Fisher and V. Tropsh invented the catalytic synthesis of hydrocarbons and oxygenates on the basis of carbon oxides and water vapor, which in a very short period of time has been implemented on an industrial scale for energy production in Germany. In connection with the intensive development of world oil production and refining, the gas and chemical method of producing synthetic gasoline remained in the background; it is ready for a second revival due to the depletion of oil and gas reserves on the planet.

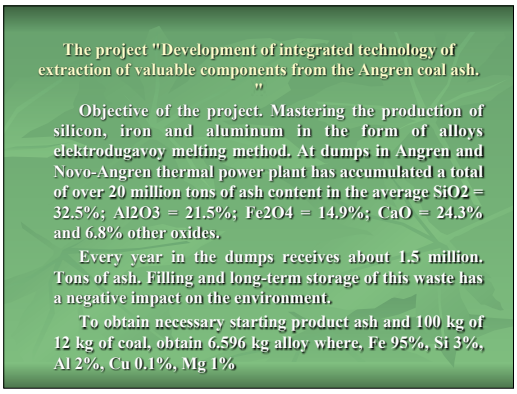
The Republic of Uzbekistan has also been implementing a joint international project on the production of synthetic fuel in the GTL-plants.

It is contemplated to use as a raw material marketable natural gas, with an annual consumption of first unit operation billion m³ of 3/year, which will start to grow within the plants II and III queue. It should be noted that regardless of the scale of natural gas in the region their potential has a certain limitation.

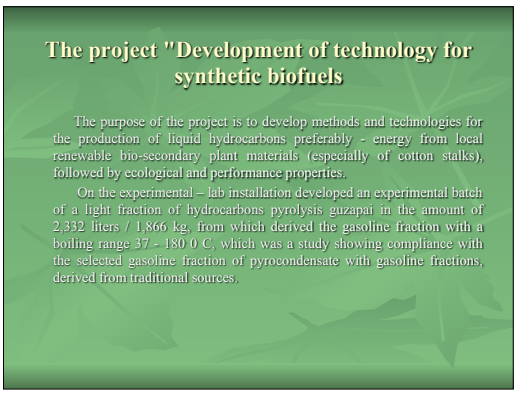
In the Republic of Uzbekistan, in terms of compliance with international obligations to reduce greenhouse gas emissions effects, comprehensive measures were developed, including the maintenance of scientific and technological research on the use of components of the emissions of stationary power plants as secondary raw material resources in the production of goods for domestic and industrial use.



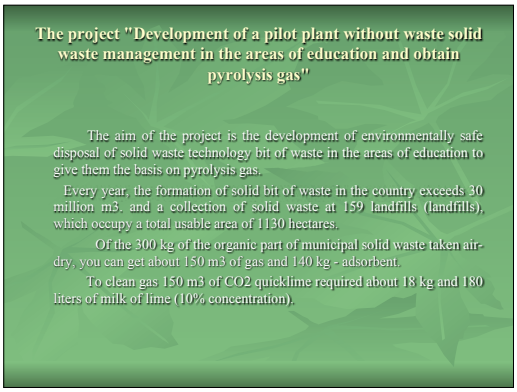
An integral part of humanity is a waste. The main waste is secondary material—natural resources. Rational use of recycled material—raw materials for the production of energy with improved environmental and performance indicators—is a challenge for the whole world and in particular for the Republic of Uzbekistan.
In this direction, in the republic and specifically NIPTI "Atmosphere" conducted a series of technological projects which are implemented into the real life.



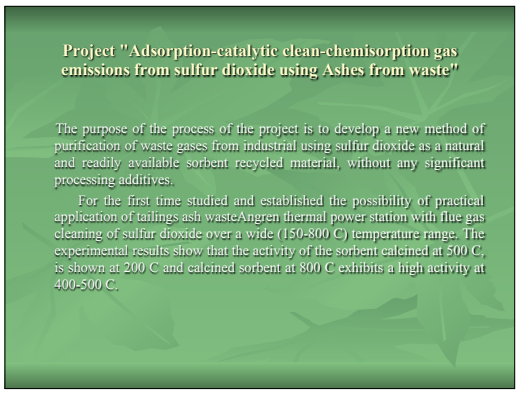
For instance, the project "Development of integrated technology of extraction of valuable components of the Angren coal ash."
Objective of the project is to develop the production of silicon, iron and aluminum in the form of alloys by arc melting. At dumps Angren and Novo-Angren thermal power plant has accumulated a total of over 20 million tons of ash content on average SiO2 = 32.5%; Al2O3 = 21.5%; Fe2O4 = 14.9%; CaO = 24.3% and 6.8% other oxides.
Every year the dumps gather about 1.5 million tons of ash. The accumulation and long-term storage of this waste has a negative impact on the environment.
According to calculations of the composition of the charge for iron must be original ash 100 kg of coal and 12 kg, 15.596 kg of the alloy where, Fe 95%, Si 3%, Al 2%, Cu 0.1%, Mg of 1%.



The project "Development of technology for the production of synthetic fuel from hydrocarbon fractions bio vegetable materials."
The purpose of the project is to develop methods and technologies for the production of liquid hydrocarbons, preferably, energy from local renewable bio-secondary plant materials (especially of cotton stalks), followed by ecological and performance properties.
In the experimental laboratory, facility developed an experimental batch of a broad fraction of light hydrocarbons, pyrolysis guzapai with access to 24% of the volume from which the gasoline fraction obtained with a boiling range 37–180 0°C. Studies have shown that a dedicated gasoline fraction of pyrocondensate corresponds to the gasoline fraction obtained from conventional sources.

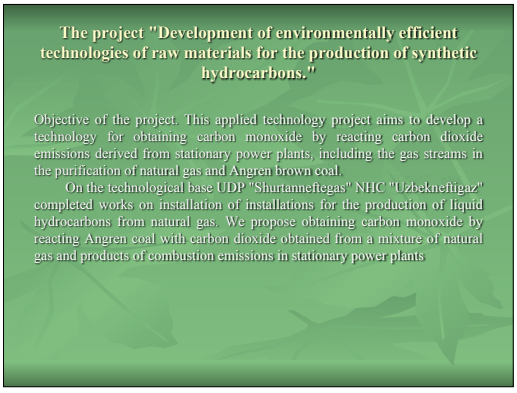


The project “Development of a pilot plant-waste recycling organic part of municipal solid waste.”
The aim of the research project is the development of environmentally safe waste-free technology recycling of municipal solid waste to produce environmentally friendly pyrolysis. This will be used in the process of obtaining automotive energy supply pyrocondensate in the processing of crude oil in the framework of primary processing in the refinery, as well as the use of pyrolytic carbon for briquetted fuel.
Every year, the formation of solid waste in the country exceeds 30 million m³, which are collected at 159 landfills (landfills), and occupy a total usable area of 1,130 hectares.



Work was carried out on the cleaning of gas emissions of stationary power plants by incomplete combustion products and other acidic components. At the same time as the catalytic sorption system for the catalytic final oxidation of incomplete combustion products and capture by chemisorption of sulfur oxides, recommended mixture polymetallic secondary origin oxides whose potential in the country amounts to several tens of millions of tons, growing annually at least 1 million tons, due to Angren TPP transition fully to local brown coal origin with an ash content of up to 36% by weight.
Thus, the product gas chemisorption emission purification process from the harmful acidic components are sent to regeneration in contrast to the numerous known processes as are used in sewage treatment as the technical content coagulate in the composition of the salt mixture (up to 13–15 wt%) Fe2 (SO4) and 3 (15–18 wt%) Al2 (SO4) 3.

At the same time, a qualified disposal of solid waste thermal energy potential was achieved, which is attained with the participation of clean gas emissions of stationary power plants with the receipt of goods to high demand, the coagulate for sewage treatment, successfully replacing imports (at a price of 400 USD/t). When this occurs, it is in a stream of oxygen, nitrogen, water vapor and carbon dioxide, which is easy to extract by publicly known technology.



The project “Development of environmentally

efficient technologies of raw materials for the production of synthetic hydrocarbons."
Objective of the project. This applied technology project aims to develop a technology for obtaining carbon monoxide by reacting carbon dioxide emissions derived from stationary power plants, including the gas streams in the purification of natural gas and Angren brown coal.
On the technological base UDP "Shurtanneftegas" and NHC "Uzbekneftegaz" completed work on setting installations for the production of liquid hydrocarbons from natural gas.
The recovered carbon dioxide reduced to carbon monoxide, pre-activated thermal vacuum manner using Angren coal, the potential for which runs into billions of tons.
The advantage of Angren brown coal, from a chemical point of view, lies in the fact that unlike many, regardless of their belonging to the categories of "stone" or "brown," the inorganic part is very rich in elements VIII-group of the periodic system. This helps show active catalytic properties in many reactions of chemical transformation of substances other than deserves special attention of the distribution of inorganic substances evenly throughout the volume of the coal particles that very effectively influence the chemical conversion of coal. Thus, the catalytic effect of metal oxides VIII group of the periodic system is a thermochemical process of catalytic reduction of carbon dioxide Angren carbon preactivated thermal vacuum method.
It is known that carbon dioxide emissions per one mesoscale permanent installation vary in the range of 10–1000 tons/year. At the same time, this product can be used successfully on a higher skilled level as a raw material for the synthesis of the products of many industries. Chemical reactions on the basis of carbon dioxide have been studied more than sufficiently in the past centuries. The only existing obstacle appeared regarding the consumption processes. Due to the successful implementation already in many countries, generating energy from alternative and renewable sources, the scheme was put forward by us and is close to realization.
The scheme for obtaining carbon dioxide from the gas mixture is carried out by a known scheme, which takes place in the industry of the Republic of Uzbekistan (former "Chirchikelektrohimprom"—now the JV "Maxam Chirchik") carbonate-bicorbonant method. The resulting trade carbon dioxide is reduced to carbon monoxide pre-activated by thermal vacuum Angren coal. The process of thermal vacuum activation geometric fractions Angren brown coal provides:

1. Cleaning of the residual moisture;
2. The increase in the porosity of pellets;
3. Conversion of the metal compounds to the oxide form, which intensifies the catalytic activity.

This temperature range may vary in the range of 300–450 0°C and a carbon dioxide transmission rate of flow through a fixed bed of activated carbon is thermal vacuum to 5 tys.chas-1. When the above conditions are met, the conversion reaches up to 78–82% and the two-stage transformations achieved the maximum result. Schemes of chemical reactions:

$C + CO_2 \rightarrow 2CO$

$CO + H_2O \rightarrow CO_2 + H_2O$

Based on the work produced in the period 2004–2015 we put forward the first version of the scheme recycling components greenhouse emissions.
This work is currently being carried out by the creative scientific and technological staff of the institute, which achieved certain results, stimulating development directions at the pilot level.
Further development in this direction stimulates the self-direction of "Alternative energy with improved environmental characteristics."
Thank you for your attention!!!

Session 2

Success Stories in Sphere of Ecotechnology Practice

Mr. Alisher ALIMBAEV

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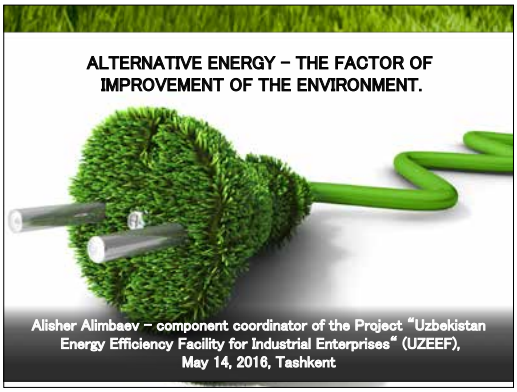
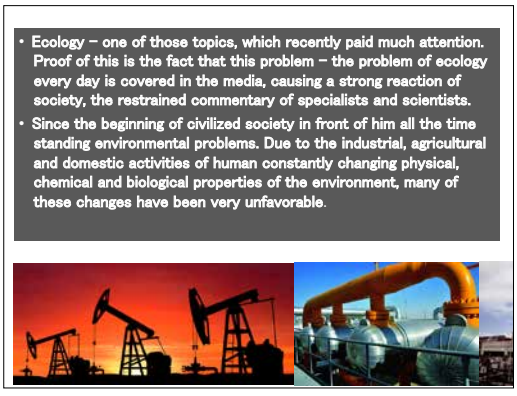
Project Coordination Unit (PCU) under Ministry of Economy of the Republic of Uzbekistan

Session 2

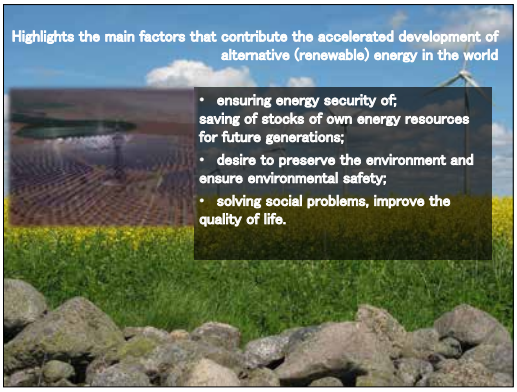
Success Stories in Sphere of Ecotechnology Practice

Alternative Energy—
The Factor of Improvement of the Environment





Ecology is one of those topics, which recently received much attention. The proof of this is the fact that this problem—the problem of ecology is covered in the media every day, causing a strong reaction from society, and the restrained comments of experts and scholars. Since the beginning of civilized society, environmental problems were present. Due to the industrial, agricultural and domestic activities of man constantly changing physical, chemical and biological properties of the environment, many of these changes have been very unfavorable.



The highlights of the main factors contributing to the accelerated development of alternative energy sources in the world are:

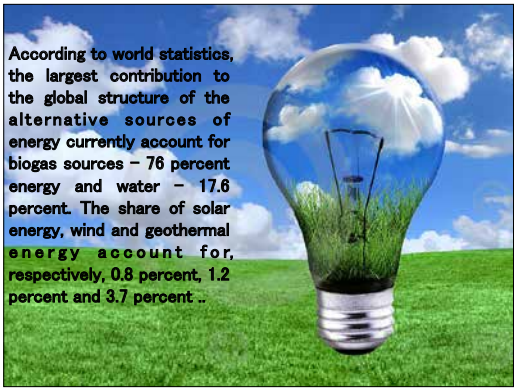
- ensuring energy security;
- conservation of stocks of own energy resources for future generations;
- commitment to preserving the environment and ensuring ecological safety;
- the solution of social problems, improving the quality of life.

Life does not stand still. Every day brings something new, and the discoveries of scientists are changing the world around us. Especially distinguished in this regard, in engineering, construction and other areas affecting the human mind, there are new and unique developments.

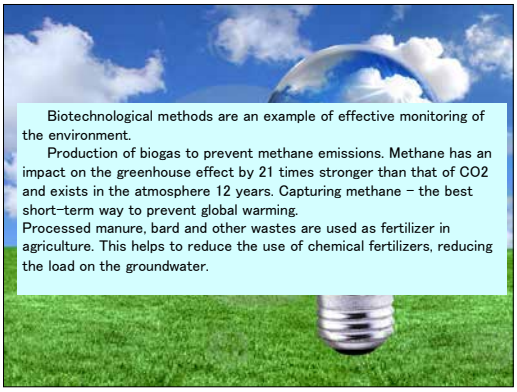
Modern technology is based on energy consumption. Moreover, resources, as we know, are not limitless. And they are consumed more and more each year. That is why the international community is actively engaged in energy saving, so that future generations do not have to suffer because of our present wastefulness.

Experts believe that the current situation can be changed by more efficient use of traditional energy sources and an increase in the use of alternative, renewable energy sources (RES).

To date, despite the obvious benefits of using alternative energy sources, which are available in almost every country, their implementation is slow enough. In addition, one of the main reasons for that is still the rather high cost of electricity obtained using renewable energy.



According to world statistics, the greatest contribution to the global structure of the alternative sources of energy currently accounts for biogas sources, 76 percent energy and 17.6 percent water. The share of solar energy, wind and geothermal energy are respectively 0.8 percent, 1.2 percent and 3.7 percent.

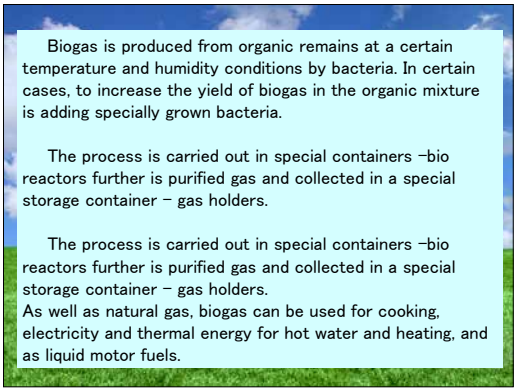


Biotechnological methods are an example of effective control over the environment.

Production of biogas to prevent methane emissions. The methane impact on the greenhouse effect is 21 times stronger than that of CO_2 in the atmosphere and is 12 years. Capturing methane is the best short-term way to prevent global warming.

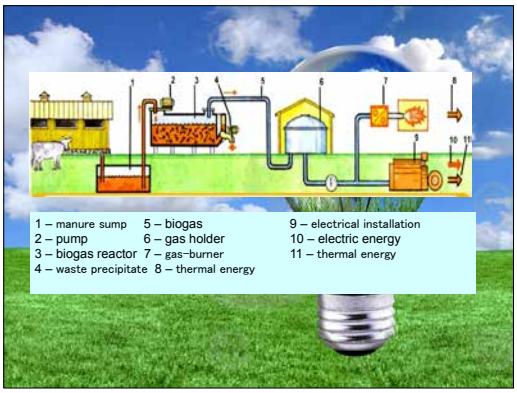
Processed manure, bard and other wastes are used as fertilizer in agriculture. This reduces the use of chemical fertilizers, reducing the load on the groundwater.

Note that biogas is quite a cheap ecological fuel derived from waste. And so this line of alternative energy, which does not require major funding, is developing intense interest. It uses wood and other vegetable and organic waste, including meat and poultry. Upon their biological conversion, the product is biogas and high-quality environmentally friendly fertilizer. Note that this area is important not only in terms of energy production. Perhaps even more value it represents from an environmental point of view, as a solution to the problem of waste disposal.



Biogas is produced from an organic matter at a particular temperature and humidity by bacteria.

In certain cases, to increase the yield of biogas, an organic mixture of specially grown bacteria is added. The process is carried out in special containers—bioreactor. Further purified gas is collected in a special storage container—gas tanks.



As with natural gas, biogas can be used for cooking, electricity and heat energy for hot water and heating, as well as liquid motor fuels.

To activate the work on the introduction of biogas technology Uzbekistan established cooperation with foreign partners. For example, it launched a project of the Global Environment Facility with the International Development Association (IDA). The project for the introduction of energy saving technologies and alternative energy sources was allocated about 12.7 million dollars.
The implementation in our country of the Global Environment Facility, aimed at the development of the national biogas market has made its positive adjustments to the job. An important role in this belongs to the Cabinet of Ministers, as stated in the law entitled "On measures to stimulate the construction of biogas plants in the livestock and poultry farms of the republic." That law says, based on the implementation during the 2008–2014 years of the pilot projects for the construction of biogas, for plants in farms testing capabilities were tested for wide-scale practical implementation of biogas plants and the use of biogas energy.
According to the document, such banks as "Hamkorbank," "Turonbank," "Qishloq Qurilish Bank," "Halk Bank," "Ipak Yuli," and "Uzpromstroybank" were recommended to provide their initiators for the construction of biogas plants loans at an interest rate not above the refinancing rate of the Central Bank, as well as being in charge of organizing the issuance of grants for the creation of biogas plants.

In general, over the past years, the country quite successfully implemented a number of projects on the use of biogas plants for independent power farms. It created a two-demonstration center where interested enterprising people can be acquainted with the possibilities and achievements of biogas plants.
The farm "Milk Agro" in Zangiota, an area of the metropolitan area, specializing in the production of milk and meat, has benefited from innovative equipment. BGP was set here when booting 5–7 tons of waste has the ability to produce 300 cubic meters of gas, 30 kW of electricity and a certain amount of bio-fertilizer per day. The generated energy is spent on the personal needs of the farm, which significantly reduces costs. It also contributes to the reduction of production costs. A similar unit is installed in the farm and "Hope" farm, located in the Syrdarya region. In general, within the framework of the aforementioned

project, it is planned to build 33 pilots of biogas plants in the Republic, including 25 small, 7 medium and 1 industrial BGP.

Government support in improving energy efficiency and developing alternative energy sources will create a system of incentives for producers and consumers, aimed at the introduction of such technology, the gradual formation of a sustainable alternative energy market, and of course have a positive impact on the environment .

The potential for renewable energy in Uzbekistan (mln.t.n.e.)

Tipes	Gross	Technical	Earned	In% regard to a technical	Not Earned
Hidroenergy	9,2	2,3	0,7	31,0	1,6
Solar Energy	50973,0	176,8			176,8
Wind Energy	2,2	0,4	0,2	50,0	0,2
Biomass		0,5			0,5
Geothermal water	0,2	0,0	0,0		
Total	**50993,8**	**182,3**	**0,7**	**0,4**	**181,6**

The state support of improving energy efficiency and developing alternative energy sources will create incentives for producers and consumers, aimed at the introduction of such technology. Thus, the gradual formation of a sustainable renewable energy market, of course, will have a positive impact on the environment.

Dr. Shinichiro OHGAKI

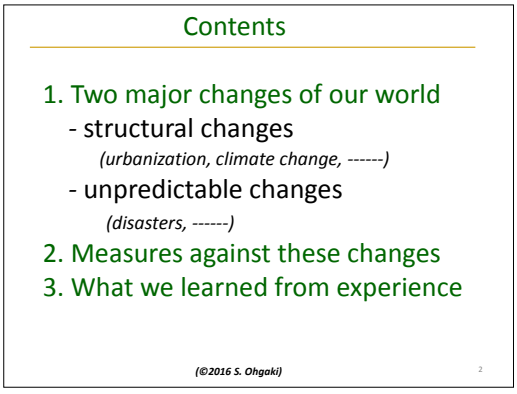
President, Japan Water Research Center
Professor Emeritus of The University of Tokyo

Session 2

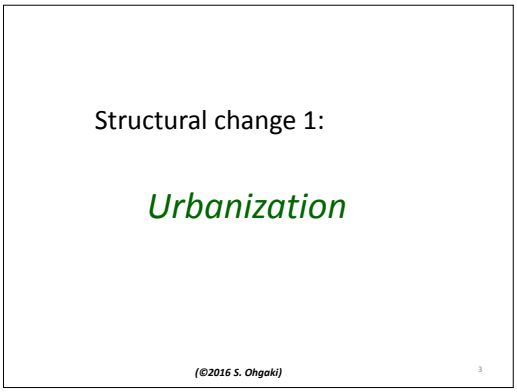
Success Stories in Sphere of Ecotechnology Practice

Ecotechnology for Water Infrastructure in Big Cities

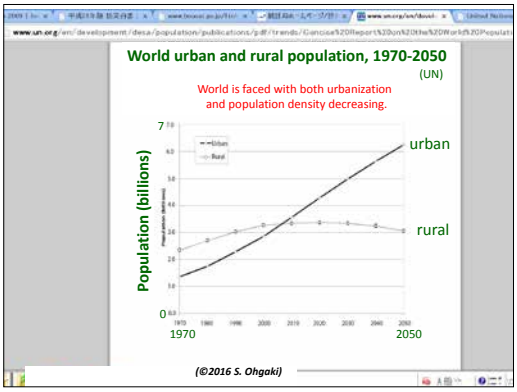
Thank you very much Mr. Arimoto and good afternoon, ladies and gentlemen. My presentation title is "Ecotechnology for water infrastructure in big cities." So it is related to water infrastructure development.



That is the content. First, we are now facing two major changes. One is a structural change, it means that it is urbanization or climate change or other factors. Another one, unpredictable changes. These are the disasters or hazards. And after that, in the second part I would like to introduce some measures against these changes. And finally, the third one is a conclusion.

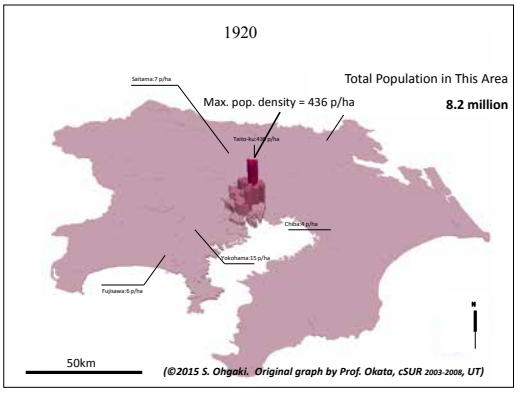


The first one is about urbanization.

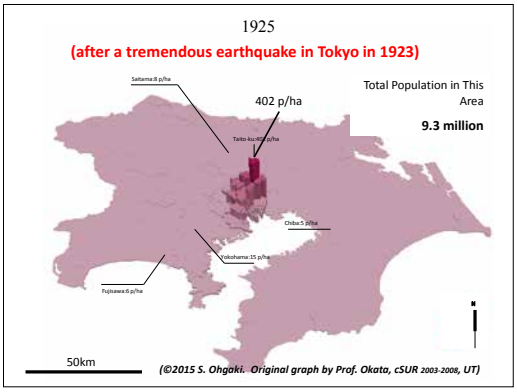


This is the data of the United Nations and World Urban and Rural Population Trend. You can easily see the urbanization of local and rural areas whose population has decreased all over the world. And I show you the history of 90 years in Tokyo.

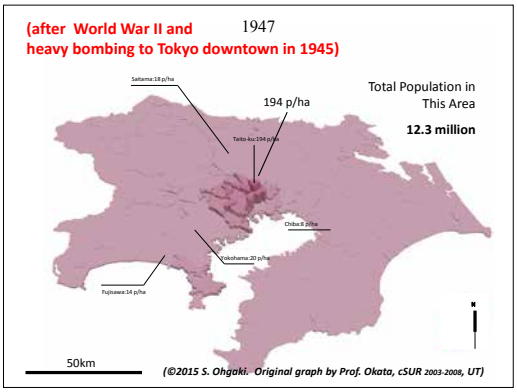
That is, how to change the structure of Tokyo.



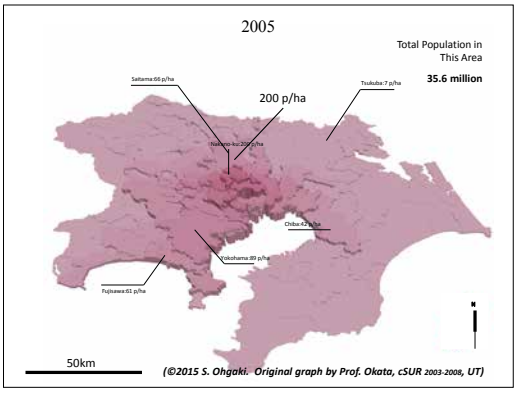
This is 1920, that is Tokyo area plus neighboring prefectures. The total population is 8.2 million people living there. And very concentrated urban central areas existed.



Next is 1925, just after the tremendous earthquake in Tokyo, 1923. But the structure of the population density is still the same as 5 years ago.

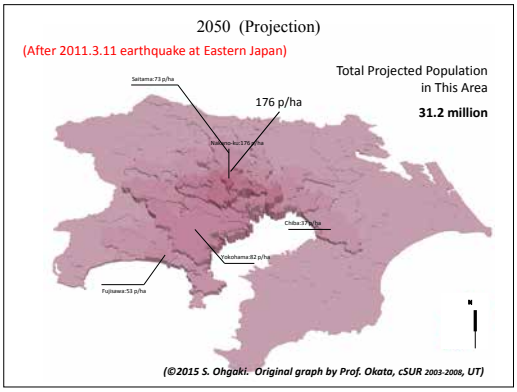


This is 1947, that is just after World War II and Tokyo suffered heavy bombing in its downtown in 1945. By the way, I was born in 1947.

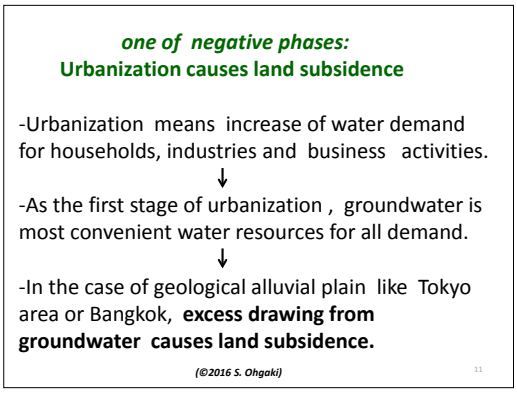


After around 60 years, that is 2005, I've become an old man and this is entering into a senior generation. Anyway, Tokyo's structure has perfectly changed during the last 60 years, that is economic growth and

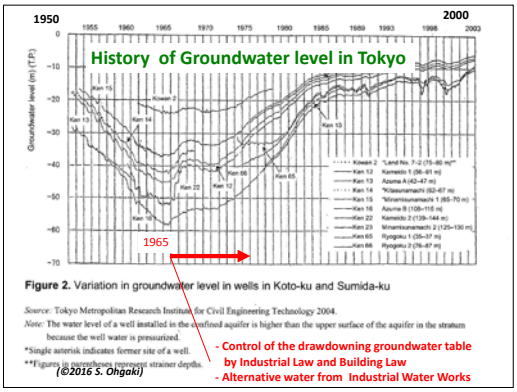
also, mainly, expansion of the railway system of Tokyo. The central area's population density decreased but it spread to outward.



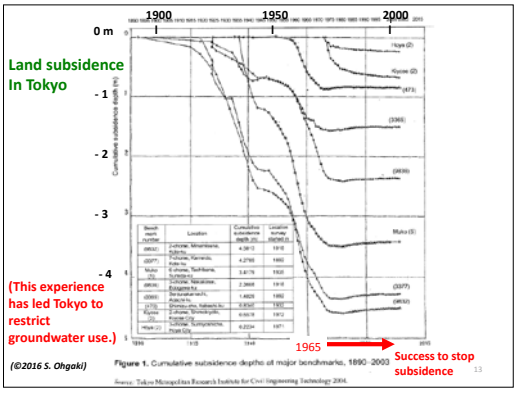
This is a projection in 2050, we assumed around 31 million, a little bit smaller than now. But the structure of the population is all the same.
So already, Japanese speakers explained this morning about the 1960s or 1970s public nuisance or matters related to that economic growth.



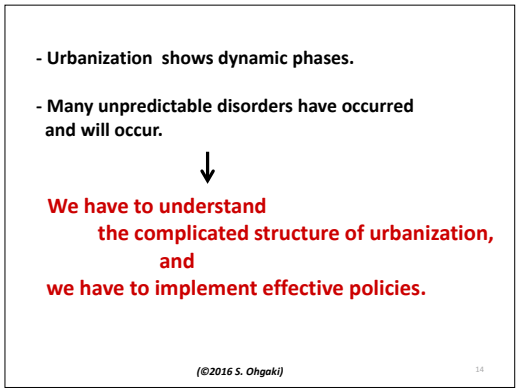
And so that is another negative phase I will introduce here. Urbanization caused ground subsidence. Urbanization means increase of water demand for households, industries, and business activities. As a first stage of urbanization, groundwater is the most convenient water resource for all demands from the viewpoint of quality and amount. In the case of a geologically alluvial plain like Tokyo area or like Bangkok of Thailand, excess drawing from groundwater causes ground subsidence. Maybe this is different here but this is a good reference related to the environment policies.



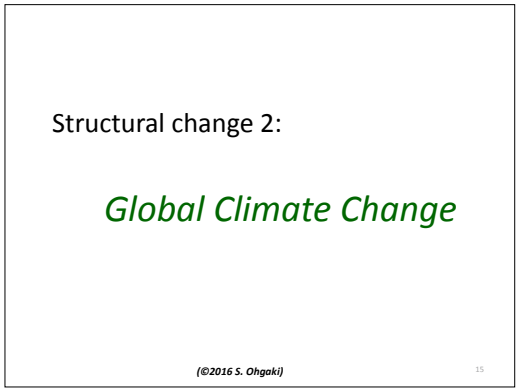
This is data of the history of the groundwater level in Tokyo from 1950 to 2000. And you can see, after 1965, the groundwater level went back many places in the Tokyo area. Could you look at the red color, red letters? This policy is done by control of the drawing groundwater table by industrial law and building law. Another one is an alternative water supply and was done from industrial water works. This method stopped severe reduction of the groundwater level.



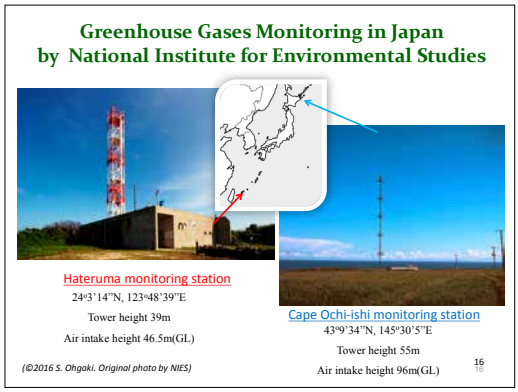
So from this situation, ground subsidence stopped in 1965. Of course, the level has not rebounded, but just stopped. And you can see the left hand side bottom, this experience, ground subsidence, has led the Tokyo metropolitan authority to restrict groundwater use; it continues today. The Tokyo metropolitan authority reviews it very strictly.



Urbanization shows dynamic phases and many unpredictable disorders have occurred and reoccurred. And from this, we have to understand the complicated structures of urbanization totally or interactively and we have to implement effective policies.

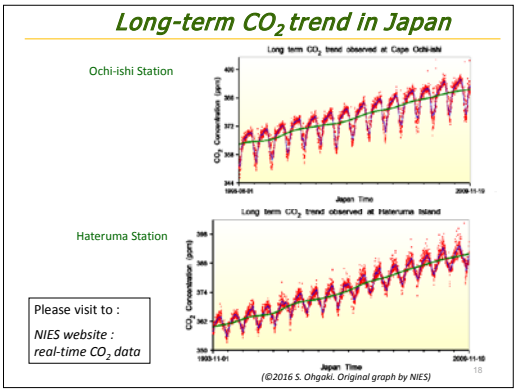


I would like to move on to global climate change.

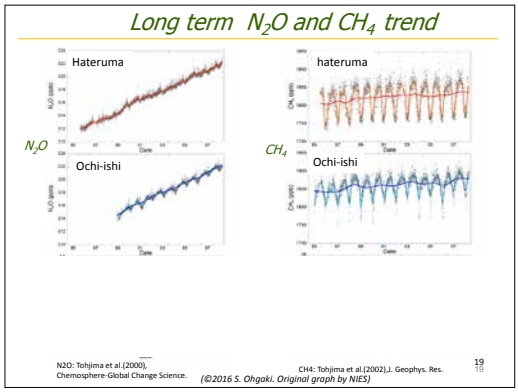


This is a greenhouse gas monitoring in Japan by the national institute of environmental study. One is located at the Hokkaido area to the north and another is near the Okinawa area to the south, two ground monitoring stations. This is an introduction to these activities.

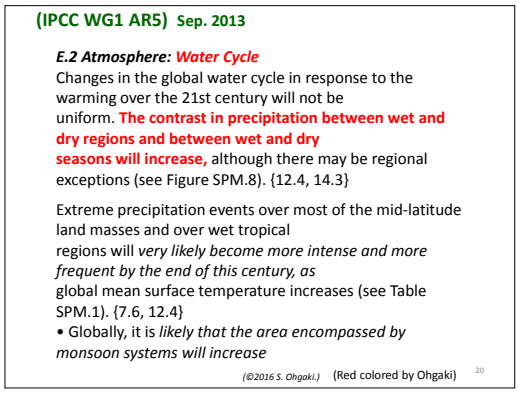
Not only by the ground, observation is done by ship, by airplane or by satellite. That is, the CO_2 or other gases are observed by this institute.



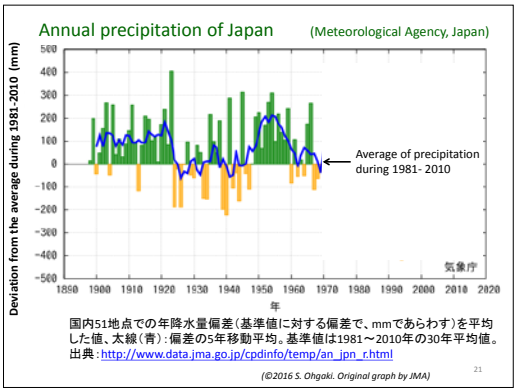
This is the data, as you know very well, that CO_2 long-term trend is like this, this is almost the same across the country. It is increasing.



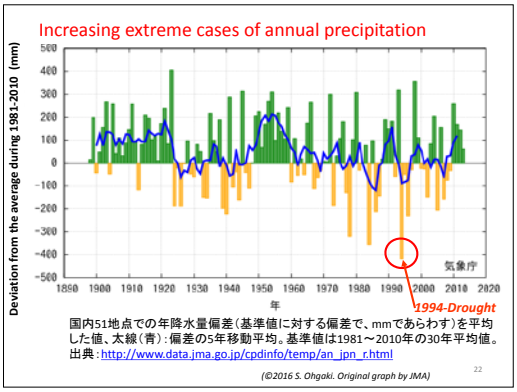
Not only the CO_2 gas, NO_2 gas on the left hand side is increased in the atmosphere. On the right hand side, methane CH_4 also increased. So this matter is a very effective gas for global warming. Of course if we have a volcano eruption, or the sun changes its activities, in such case warming stops and cooling sometimes occurs. We cannot tell, but the content of the atmosphere's air is now dramatically changing.



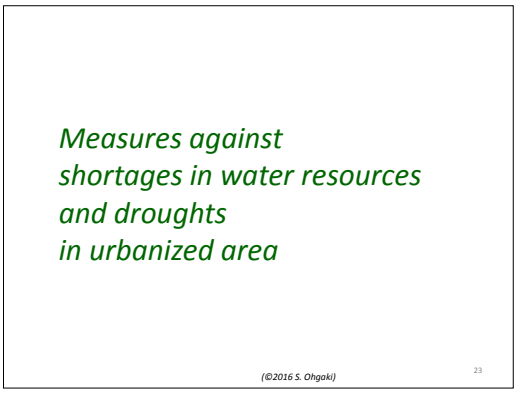
From these data, including other countries' data, the international panel of climate change, IPCC, reported about water cycle; could you see the red color? The contrast in precipitation between wet and dry regions and between wet and dry seasons will increase. It means dry and wet, specially or, timely, a different season becomes peak. And they say it will increase but actually it has already increased.



This is an annual precipitation or rainfall of Japan in the last 110 years. Vertical axis shows deviation from the average during the 1981 to 2010. It looks like that one. The green one is larger than the average and the yellow one is less than the average.



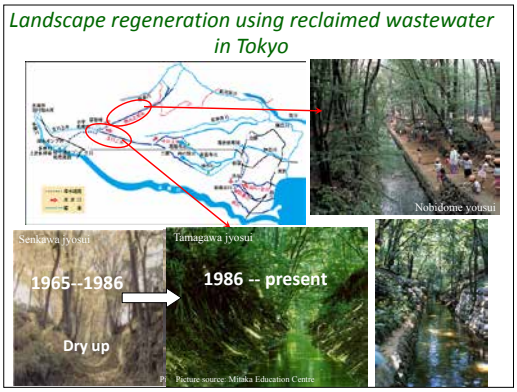
After 1998, it's like that, it means a kind of flooding is increasing and drought is increasing. Especially the 1994's drought was a big problem in the west side of Japan.



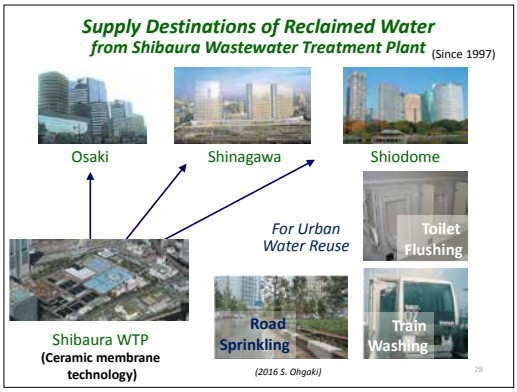
So how do we conduct measures against shortage in water resources and droughts in urbanized areas?

This is a rainwater harvesting, the big roof is a wrestling stadium or a baseball stadium and they gather water for toilet flushing.

This area is supplied from sewage treatment plant for toilet flush water and that is since 1948. This is a kind of a big system for toilet flushing in the business areas.

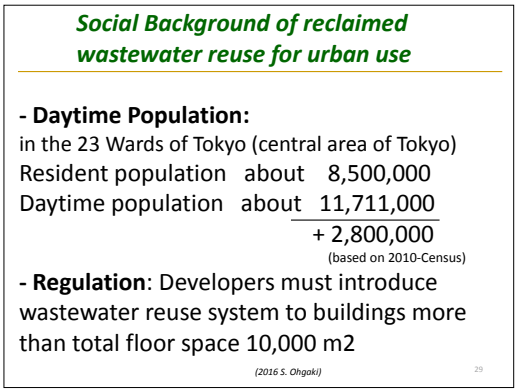


This is another landscape regeneration. The dried up river is regenerated by waste water reuse or reclaimed water use for caves scenery.



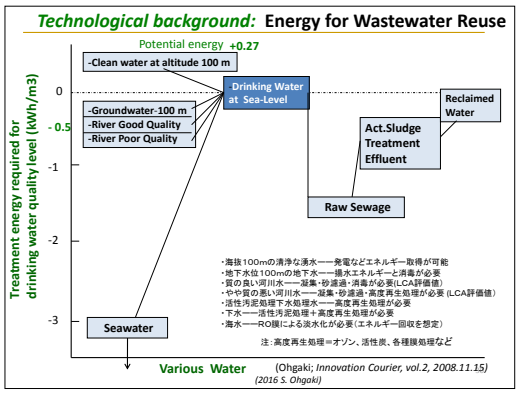
More a little bit of the newer one, from 1991, in the Shinagawa area the Shibaura wastewater treatment plant has been covering the Osaki or Shinagawa, Shiodome business center areas. That wastewater treatment plant introduced the ceramic membrane technology, a new one, and so they supply this one.

This is the Shinjuku skyscraper area and Tokyo city halls.

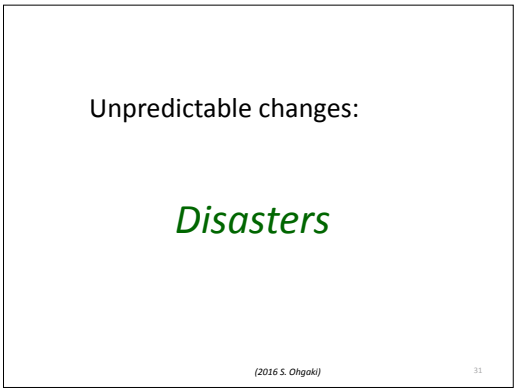


What is the social background of reclaimed waste

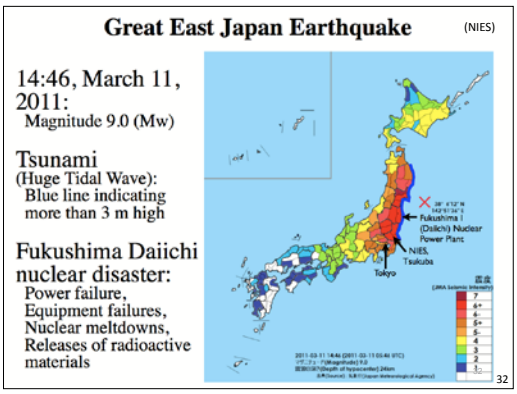
water reuse for urban use in Tokyo? I will show you two. The top 1 is daytime populations. In the perfectly central area of Tokyo, the residential population is about 8.5 million people but there are many business offices and so every day, about 2.8 million people come from the areas nearby. And they use the toilet. In the daytime only they use much water. So this is the background. And another one, a more straightforward background, is regulations. And the developers must introduce a wastewater reuse system to buildings in the Tokyo areas with more than a total floor space of 10,000 square meters. 10,000 square meters buildings, not so big ones. So many building developers have to introduce these systems.



Maybe everybody asks about wastewater reuse needing much energy, but I would like to show you this. The vertical axis is the treatment energy required for drinking water qualities. If it is low, it means much energy is needed for drinking water from that water. For example, on the left hand side, you can see about 0.5 is for the river quality water or river water, a good one needs about 0.5 kilowatt hour per cubic meters. But compared to this, if we want to make drinking water from raw sewage, in that case, around 1.5 or 2 kilowatt hour per cubic meters is needed. In the case of sea water, the energy required for desalination is, I plotted about 3, but actually, 3.5 is a very ideal condition. So it means, if people accept to drink the reclaimed wastewater, drinking water made from raw sewage is cheaper and easier than the seawater. That is the situation.

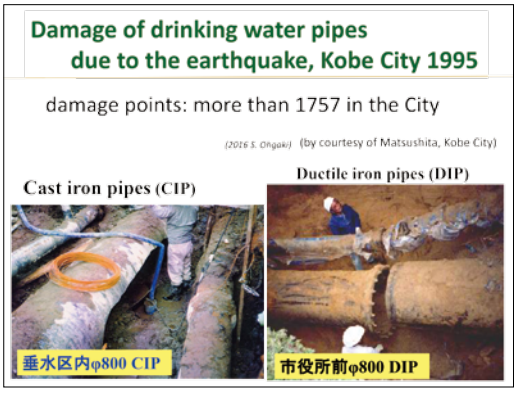


I would like to move to the unpredictable changes about disasters.



The greatest was Japan's earthquake in 2011, and I would like to say it was just a tremendous, terrible event.

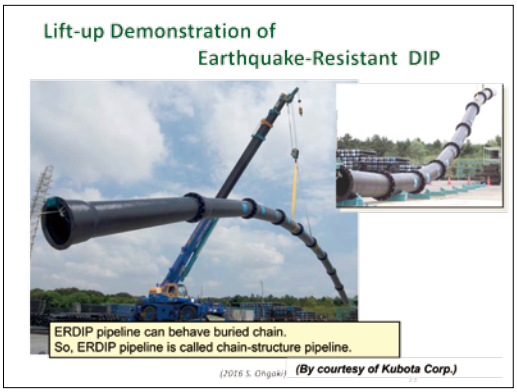
I would like to go back to another Kobe City's aspect. The population is 1.5 million and the Hanshin Awaji earthquake in 1995 had its epicenter in the downtown area. It means that just below the city was the center of the earthquake.



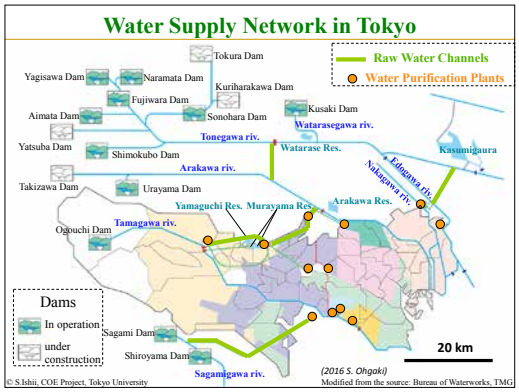
The Tashkent earthquake in 1966 had almost the same structure. Water supply systems were broken like this.

So we have to consider some measures against unpredictable changes.

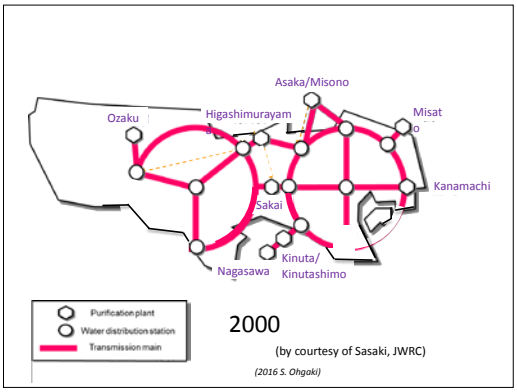
Kobe is a long city and there are two pipelines, big pipelines. They constructed a third one. This is the very deep place, over 60 meter depth and this is almost finished, and they have 3 pipelines for measures against earthquake.



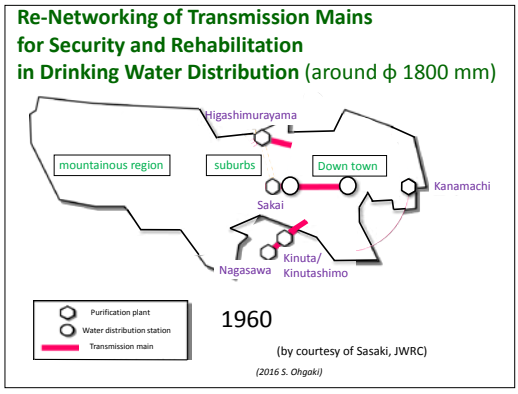
It uses another new science and technology for pipes. That is, the pipe is very elastic to survive against earthquakes. They call it the Earthquake Resistant DIP.



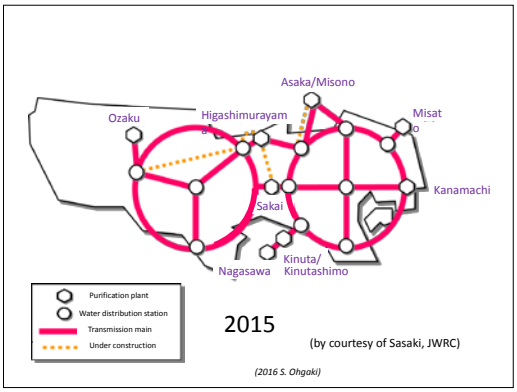
In the case of Tokyo, there are three main water resources.



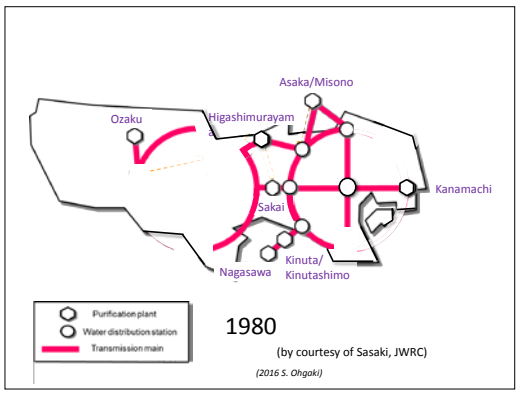
In 1980, the network was expanded, 2000 was like this.

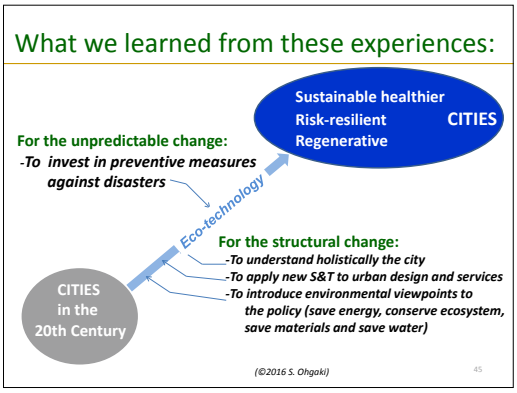


And they are re-networking the transmission main. This is the main pipeline for security and rehabilitation in drinking water distribution.
They started in the 1960s, each pipeline is about 1.8 meter diameter.



Last year, almost finished, that is 2015, the pipeline was like this. If some trouble occurs or pipes get broken, they send water from any place inside of Tokyo, which is its system design.





These are final figures as conclusion, and what we have learned from this experience or these measures will be discussed. One is, we are now in cities of 20th century, but we are now in the 21st century, and we are intending to have sustainable healthier cities, or

risk-resilient cities or regenerative cities and for this, the ecotechnology is important. And so for the left hand side, for the unpredictable change, to invest in preventive measures against disasters is the most important investment to unpredictable changes. On the right hand side, for the structural change, to understand holistically the cities is important. I show you the groundwater level around subsidence, urban area structure is very complicated socially and naturally, so we have to understand it holistically. The second one is to apply new science and technology to urban design and services without any delay, which means service speed is important. The third one is to introduce environmental viewpoints to the policy. Already many people touched upon this one. Save energy, conserve the ecosystem, save materials, save water.

I think there are different situations in different countries, different cities, different backgrounds, different natural conditions, or different indigenous histories. But, I think that with some exchange of information between different cities, we may get much useful information.

Thank you for your attention. Rahmat.

Dr. Anvar ANARBAEV

Chief of Laboratory,
Institute of Energy and Automatization Academy of Sciences of Uzbekistan

Session 2

Success Stories in Sphere of Ecotechnology Practice

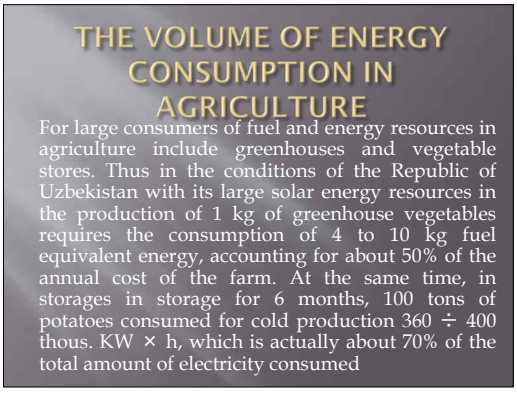
Prospects for Environmental Technologies in Rural Areas of Uzbekistan Using Solar Energy Installations

Dear colleagues,

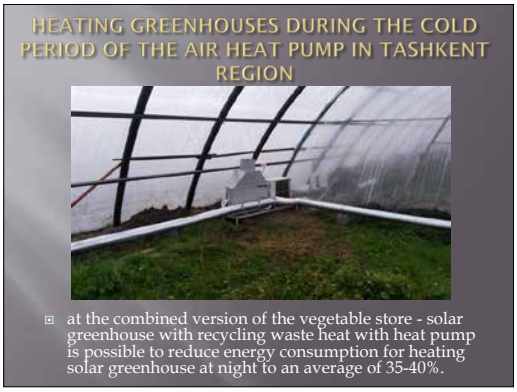
This report will present the developments of environmentally friendly technologies for agriculture in Uzbekistan, which are carried out within the framework of scientific and technical programs in recent years.

The importance of such developments is the fact that agricultural production is fundamental to Uzbekistan, where about 60% of the population lives in rural areas. Usually in these remote settlements, energy is carried outwards through power lines, as well as by a supply of fuel, which is very expensive. In this case, it is advised to use stand-alone power supply systems based on renewable energy sources, especially solar energy.

First of all I will address in this report the issues of fuel and energy resources in solar greenhouses, allowing cold time of the year to grow crops, and vegetable stores to keep them preserved.



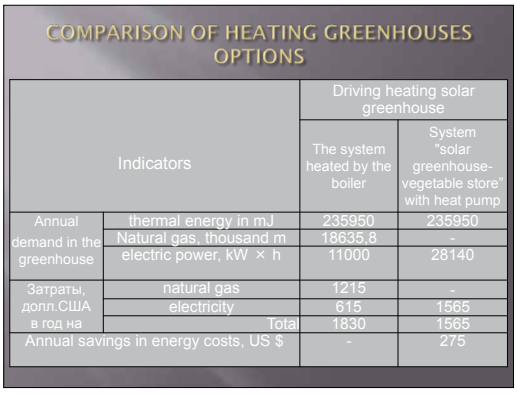
Large consumers of fuel and energy resources in agriculture include greenhouses and vegetable stores. Thus, in the conditions of the Republic of Uzbekistan with its large solar energy resources, the production of 1 kg of greenhouse vegetables requires the consumption of 4 to 10 kg fuel equivalent energy, accounting for about 50% of the annual cost of a farm. At the same time, in storage for 6 months, 100 tons of potatoes consumed for cold production 360 ÷ 400 thous. kW × h, which is actually about 70% of the total amount of electricity consumed.



This slide shows installation of a solar-heated greenhouse in the Tashkent region using an air heat pump with a backup power source used in photovoltaic systems.

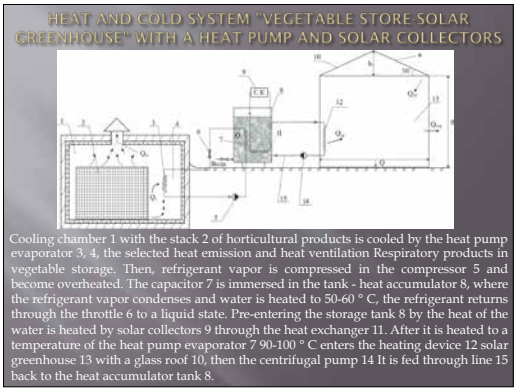
At the combined version of the vegetable store, a solar greenhouse recycling waste heat by a heat pump is possible to reduce energy consumption for heating a solar greenhouse at night to an average of 35–40% of previous cost.

It is advisable to use heat pumps, use of which prevents emissions into the environment from fuel boilers and which consumes 3 times less electricity than conventional heating.



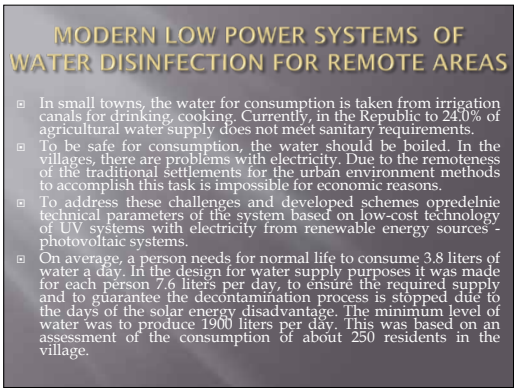
Indicators		Driving heating solar greenhouse	
		The system heated by the boiler	System "solar greenhouse-vegetable store" with heat pump
Annual demand in the greenhouse	thermal energy in mJ	235950	235950
	Natural gas, thousand m	18635,8	-
	electric power, kW × h	11000	28140
Затраты, долл.США в год на	natural gas	1215	-
	electricity	615	1565
	Total	1830	1565
Annual savings in energy costs, US $		-	275

The table shows the results of the evaluation of the economic benefits from the use of the heat pump module solar greenhouse of 200 m² at the expense of fuel and energy resources.



Especially promising use of the heat pump for the complex “solar greenhouse-vegetable store.” This slide shows the heat extraction circuit heat pump from the vegetable store and transferring it into a solar greenhouse. This allows efficient use of reverse cycle heat pump.

Cooling chamber 1 with the stack 2 of horticultural products is cooled by the heat pump evaporator 3, 4, the selected heat emission, and heat ventilation respiratory products in vegetable storage. Then, refrigerant vapor is compressed in the compressor 5 and becomes overheated. The capacitor 7 is immersed in the tank—heat accumulator 8, where the refrigerant vapor condenses and water is heated to 50–60 °C, the refrigerant returns through the throttle 6 to a liquid state. It pre-enters the storage tank 8 by the heat of the water which is heated by solar collectors 9 through the heat exchanger 11. After it is heated to a temperature of the heat pump evaporator 7, 90–100 °C, it enters the heating device 12 and solar greenhouse 13 with a glass roof 10, then the centrifugal pump 14. It is fed through line 15 back to the heat accumulator tank 8.



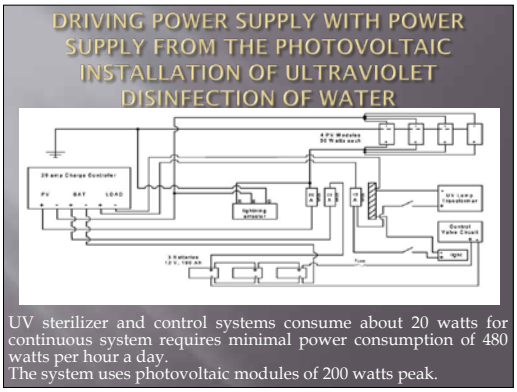
The next environmental technology is a method of disinfecting water by ultraviolet radiation. Compared to chemical treatment with chlorine to remote communities such a compact low power system can receive the necessary electrical energy from photovoltaic systems.

In small towns, the water for consumption is taken from irrigation canals for drinking and cooking. Currently, in the Republic, up to 24.0% of the agricultural water supply does not meet sanitary requirements.

To be safe for consumption, the water should be boiled. In the villages, there are problems with electricity. Due to the remoteness of the traditional settlements, it is impossible for economic reasons for the urban environment methods to accomplish this task.

To address these challenges, schemes utilizing opredelnie technical parameters of the system based on low-cost technology of UV systems with electricity from renewable energy sources—photovoltaic systems have been developed.

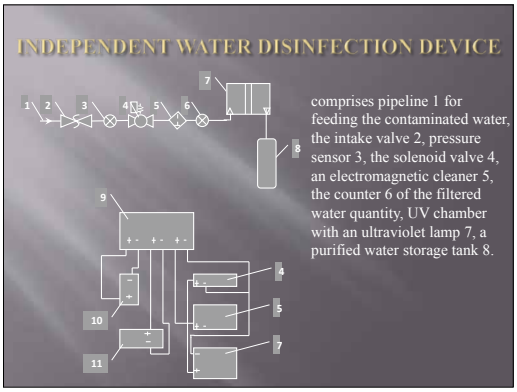
On average, a person needs for a normal life to consume 3.8 liters of water a day. In the design for water supply purposes it was made for each person to consume 7.6 liters per day to ensure the required supply and to guarantee the decontamination process which is liable to stop due to the solar energy disadvantage. The minimum level of water to produce was 1900 liters per day. This was based on an assessment of the consumption of about 250 residents in the village.



This slide shows development of a scheme of power supply installation of water UV disinfection with the help of photovoltaic systems and their energy parameters.

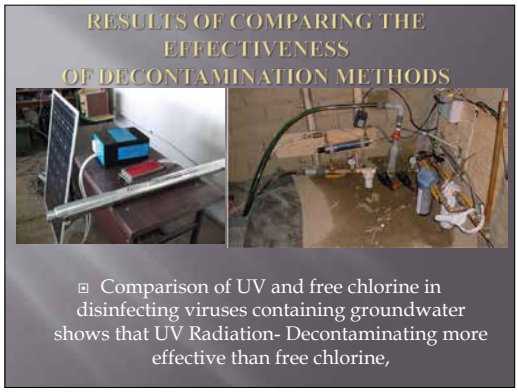
UV sterilizer and control systems consume about 20 watts for a continuous system and require minimal power consumption of 480 watts per hour a day.

The system uses photovoltaic modules of 200 watts peak.



You may see the general scheme of water disinfection technology at the expense of filtration and UV irradiation, for which a patent application was filed.

It is comprised of pipeline 1 for feeding the contaminated water, the intake valve 2, pressure sensor 3, the solenoid valve 4, an electromagnetic cleaner 5, the counter 6 of the filtered water quantity, UV chamber with an ultraviolet lamp 7, and a purified water storage tank 8.

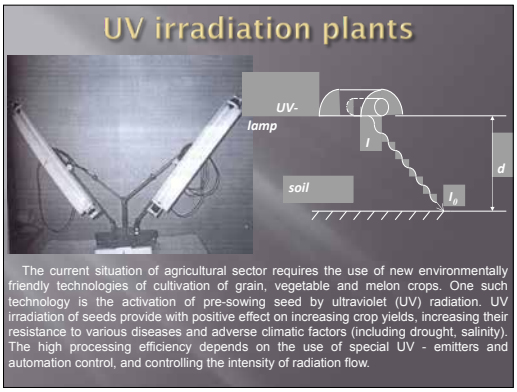


In the laboratory the apparatus of disinfection of a drinking water system was assembled and experiments were conducted.
Comparison of UV and free chlorine in disinfecting viruses contained in groundwater shows that UV Radiation-Decontaminating is more effective than free chlorine.

CAPITAL INVESTMENT IN THE CREATION OF INSTALLATION

Position	Quantity	Unit cost, US dollar $	The total cost in US dollar $
Photovoltaic battery	4	260	1040
Batteries	3	172,5	517,5
Inverter	1	361,3	362
Installation of photovoltaic panels	4	45	180
Installation of accumulators	3	22,5	67,5
Setting up the inverter	1	90	90
Adjustment of the power transformer	1	60	60
Setting up the controller	1	20	20
Conducting cable	2м	3,0	6,0
Adjustment of automation and protection devices	1	82	82
UV lamp filters		850 Total:	3275

The slide shows the required investments that show the economic attractiveness of the use of such facilities for the rural population. And there is no water contamination by chemicals.



Another economically attractive use of UV irradiation in a different wavelength range is to stimulate the growth of plants (seeds during the growing season) without the use of chemical fertilizers. Experiments have been conducted in many parts of the country, which showed that even in the face of drought and soil salinity, cotton yield increased by 20%. Such work is carried out regarding Japanese rice cultivation.
The current situation of the agricultural sector requires the use of new environmentally friendly technologies for cultivation of grain, vegetable, and melon crops. One such technology is the activation of pre-sowing seed by ultraviolet (UV) radiation. UV irradiation of seeds provides a positive effect on increasing crop yields, increasing their resistance to various diseases and adverse climatic factors (including drought and salinity). The high processing efficiency depends on the use of special UV emitters and automation control, and controlling the intensity of radiation flow.

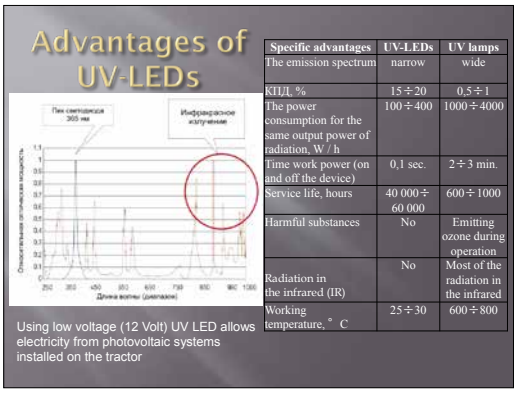
The results of the UV processing crops (dry year).

	Different varieties of cotton						Improving indicators, %
	необр.	UV treatment.	необр.	UV treatment	необр.	UV treatment.	
Germination, %	72	93	71	90	72	92	21 - 22
germination energy,%	70	72	69	73	92	79	3 - 5
Productivity, kg / ha	22	37	23	35	39	39	35 - 40

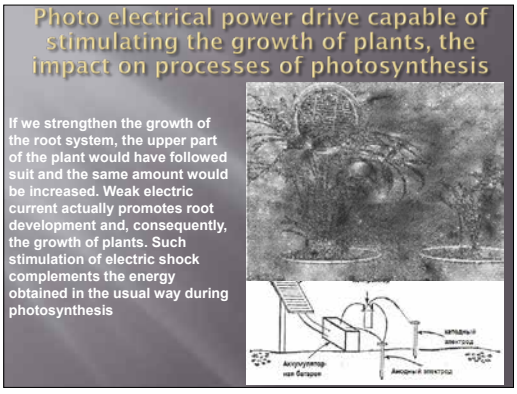
Presowing UV - seed treatment also has a positive effect on increasing the yield of other crops, melons and vegetable crops. Since processing of UV irradiation of wheat seeds increases its yield by an average of 30%, corn - 40% Barley - 10%, peppers - 65%, eggplant - 50% Cucumber - 30% sugar beet - 25 %, melons and watermelons - 30%. Along with this UV radiation seed treatment has a positive effect on improving the sugar content, vitamin C, carotene, etc. Furthermore an accelerating ripening agricultures 3 -. 15 days.

Pre-sowing UV-seed treatment also has a positive effect on increasing the yield of other crops, especially melons and vegetables. Processing of UV irradiation of wheat seeds increases its yield by an

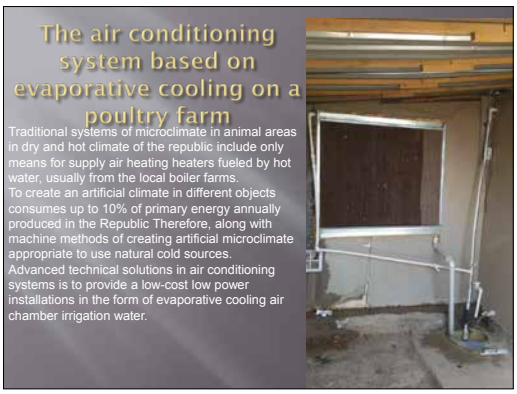
average of 30%, corn 40%, barley 10%, peppers 65%, eggplant 50%, cucumber 30%, sugar beet 25 %, melons and watermelons 30%. Along with this, UV radiation seed treatment has a positive effect on improving the sugar content, vitamin C, carotene, etc. Furthermore, an accelerating ripening agricultures 3–15 days is achieved.



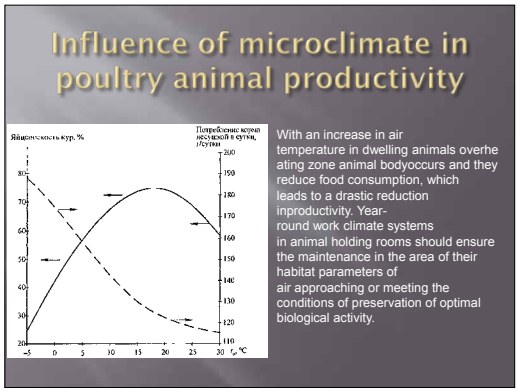
The development of such systems based on UV LED lamps makes the development of this technology even more ecological, because the absence of such lamps, as evident from the graph of the infrared component, negatively affects the development of the plant. At the same time, lamp power consumption is reduced up to 6 times which makes effective use of photovoltaic electricity and it is compact enough to install such systems on tractors.



If we strengthen the growth of the root system, the upper part of the plant would have followed suit and the same amount would be increased. Weak electric current actually promotes root development and, consequently, the growth of plants. Such stimulation of electric shock complements the energy obtained in the usual way during photosynthesis.
Further PV modules can be employed directly, as shown in the photograph, for stimulating the development of the root system of the plant. To do this, energy storage of solar radiation and its return at night is needed.



Another environmental technology on which we would like to draw your attention—it is used to create a climate in livestock evaporative cooling installations complexes instead of energy-intensive compressor systems.
Traditional systems of microclimate in animal areas in dry and hot climate of the Republic include only means for supply of air heating heaters fueled by hot water, usually from the local boiler farms.
To create an artificial climate in different objects consumes up to 10% of primary energy annually produced in the Republic. Therefore, along with machine methods of creating artificial microclimate it is appropriate to use natural cold sources.
Advanced technical solutions in air-conditioning systems are to provide low-cost low-power installations in the form of evaporative cooling air chamber irrigation water.



This is important because of the fact that at high temperatures during the summer, domestic livestock no longer consumes enough forage and productivity falls.

With an increased temperature in dwelling animals, an overheating zone in the animal body occurs and they reduce food consumption, which leads to a drastic reduction in productivity. Year-round climate systems in animal holding rooms should ensure the maintenance in the area of their habitat parameters of air approaching or meeting the conditions of preservation of optimal biological activity.

This slide shows development at the Institute of Energy and Automation, Academy of Sciences of Uzbekistan laboratory installations, which received a patent.

Compared to the power consumption of refrigerant compressors to drive fans and pumps, the proposed installations require up to 10 times and, unlike existing towers, up to 6 times less water flow through the apparatus.

Developed at the Institute of Energy and Automation, a two-stage cooler with a rotary regenerative heat exchanger is calculated with a flow rate through the air of 160 m³/h, in the cold—200 W (Patent of the Republic of Uzbekistan 2016).

Further development of two-stage evaporative air cooling systems is expected in the creation of independent power supply based on solar photovoltaic cells.

Thank you for your attention!

Mr. Kunio NAKAJIMA

Vice President, Honda Foundation
Adviser of Japan Bioindustry Association

Session 2

Success Stories in Sphere of Ecotechnology Practice

Tama River's Pollution and Purification about These 50 years

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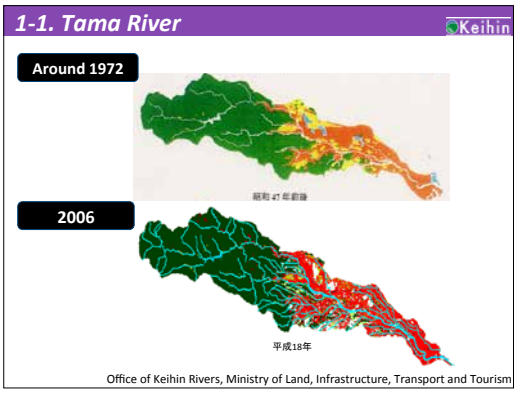


The Tama River is a river which runs from north-west to south-east of the Tokyo Metropolis. The downstream of the river constitutes the border between the Tokyo Metropolis and Kanagawa prefecture. The length of the river is 140 km and its basin area is 1,250 km². The present population in the basin is 4.3 million, which is twice as large as that of the city of Tashkent. The area up to 50 km from the mouth of the Tama River is a plain field and the upper-stream area is mountain valleys.

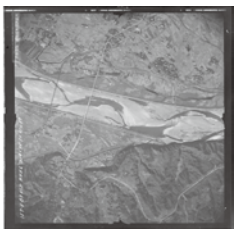
By the way, rivers in Japan are short in length and their basin areas are small. The Tonegawa and Shinanogawa Rivers, big rivers by Japanese standards, have a length of less than 400 km, which is far shorter than the Amu Darya and Syr Darya rivers whose lengths are more than 2,000 km. People and factories are concentrated in the 50 km downstream part of the Tama River. On the north side of the river mouth is the Haneda Airport and on the south side is the Keihin industrial area, which is a big industrial complex. All sorts of industries, including steel, petro-chemicals, automobile, and electric/electronics, are located in this area. Hamura city is located in an area 50 km away from the mouth of the Tama River. Here, water from the upstream is taken in by a dam and stored as drinking and industrial water in a reservoir, which is located separately from the Tama River.

3 **1-2. Tama River**

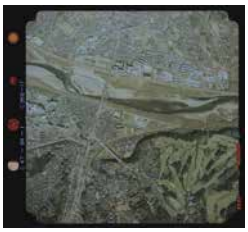
Bureau of Waterworks, Tokyo Metropolitan

This dam was built approximately 350 years ago and is still in operation. Therefore, the downstream area from Hamura city onwards basically consists of river water from tributaries and water discharged from residents and factories.

4 **1-3. Tama River**



Tama River in 1956



Tama River in 1984

Geospatial Information Authority of Japan

In the 1960s, Japan changed its economic policy, to one emphasizing "rapid economic growth." The Tama River was also changed by the implementation of this policy.

First, along with the rapid economic growth, "mass production, mass consumption, and mass disposal" was brought about. Second, concentration of population began to affect the Tama River basin. As both individuals and society were not familiar with the consequences of mass disposal, the quality of the water in the Tama River rapidly deteriorated. Before then, people could swim and engage in fishery even far downstream in the Tama River.

5 **2-1. Transition about these 50 years**

Kawasaki City

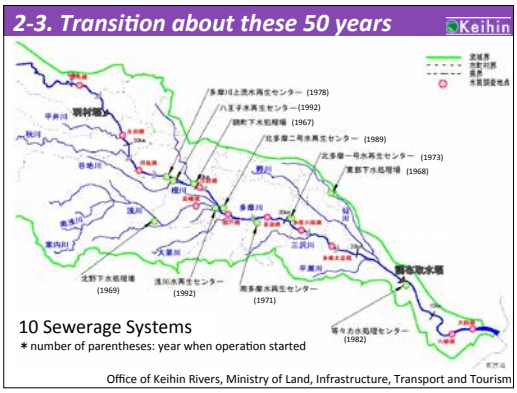
6 **2-2. Transition about these 50 years** Keihin

Among residents, there were people who not only discharged contaminated water but also dumped useless solid waste in the riverbed. In the 1970s, as laws concerning pollution were prepared, those related to water quality were drastically changed and the related regulations were consolidated. Based on this, regulations on water discharged from enterprises were reinforced. On the other hand, along with reinforcement of regulations, the government gave funding support, tax breaks, technical advice, etc. pertaining to preventative measures for contaminated water. Furthermore, based on the Sewerage Service Act, the government financially supported the Tokyo Metropolis and Kanagawa prefecture, which led to the construction of wastewater treatment plants and sewerage in the Tama River basin. Waste treatment plants were also constructed and this facilitated solid waste treatment including solid waste from wastewater treatment plants. Methods of cleaning clothing changed substantially during the rapid economic growth period. The change was from "manual cleaning using soap" to "electrical washing machine using detergent."

The talk between detergent manufacturers and the government led to a transformation from a detergent

which was difficult to decompose in water to a detergent which decomposed easily, and this solved the problem of bubbles and foam in the river although not as directly as the regulations and government support did. In Japan, river contamination is measured in BOD (biochemical oxygen demand).

7



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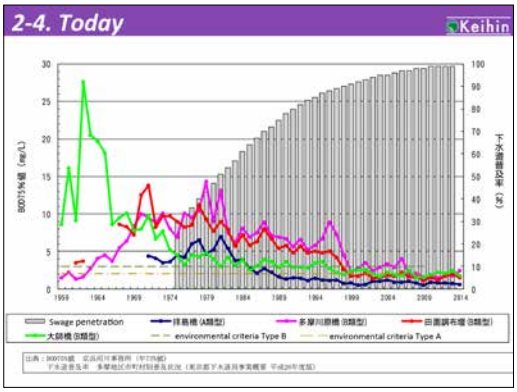
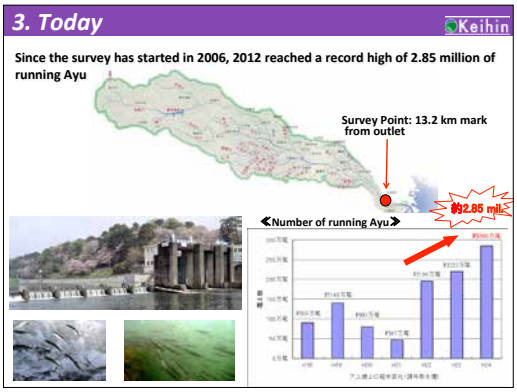


As Slide 7 and 8 show, contamination progressed not only in the lower basin but also in the upper basin. However, after the turn of the century, environmental standards began to be met thanks to the positive effect of wastewater treatment plants and sewerage. That more than 90% of the Japanese people regarded themselves as "middle-class citizens" is proof that the rapid economic growth policy was highly evaluated by the citizens (around 1970–1992).

9



In Japan, the existence of "ayu" (a river fish 20–25 cm in length) in a river is often viewed as criteria for determining whether that river is clean or not. 40 to 50 years ago, "ayu" disappeared from the Tama River. Today millions of "ayu" swim in the river. This is a cause of great happiness. Through preparation and implementation of laws and regulations, building of waste disposal plants and sewerage, as well as changes in composition of detergents, etc., purification of water was mostly achieved over a period of 30 to 40 years. 30 to 40 years may have been too long a time for this change to take place. However, it is difficult to solve such problems within a matter of few years due to the difficulty in acquiring necessary land in a short period of time and securing the tremendously large budget. Had the river constituted not a border between prefectures, but a border between countries, even a solution over 30 years or 40 years would have been nearly impossible. From now, not only relying on administrative actions, citizens in the surrounding area should come to have a more enhanced view of the Tama River. Fortunately, at present no fewer than 20 NPOs are actively engaged in activities in various fields. Stronger ties between the administration and the residents are sought after through information sharing and other means.

10

Session 3

Future of Advanced Environment Technology (Future infrastructure with introduction of technological innovation)

Dr. Sirojiddin MIRZAEV
Chief of Unit, Institute of Ion-Plasma and Laser Technologies

Dr. Hirohisa UCHIDA
Executive Director, Honda Foundation
Professor of Tokai University

Dr. Sharafitdin MIRZAAKHMEDOV
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Chief of Unit, Institute of Ion-Plasma and Laser Technologies

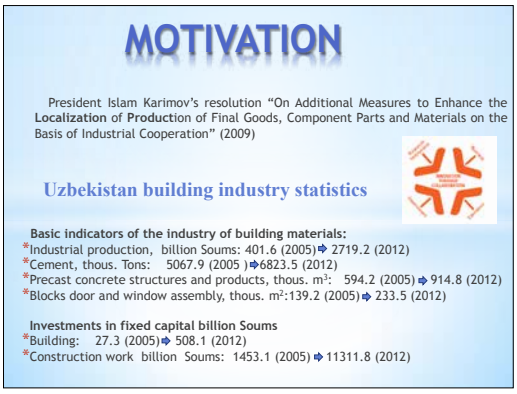
Session 3

Future of Advanced Environment Technology
(Future infrastructure with introduction of technological innovation)

Resource Efficient Technologies and Materials for the Construction Industry

Ladies and Gentlemen, guests of the Uzbek-Japan Symposium!

Today, there were many interesting reports reflecting all the diversity and complexity of the issues and problems of environmentally friendly technologies. When we talk about the future of environmental technologies in the field of the environment, first thing that we imagine is people who built their own houses. Thus, construction activity started with the appearance of humankind on the earth at the beginning of his emergence. It could confidently be asserted that primitive homes meet all ecological requirements, located next to trees and foliage and other materials, most of which are renewable raw materials. However, they did not meet the requirements of human comfort and then began a rapid development of construction and the search for new materials, which continues up to these days.

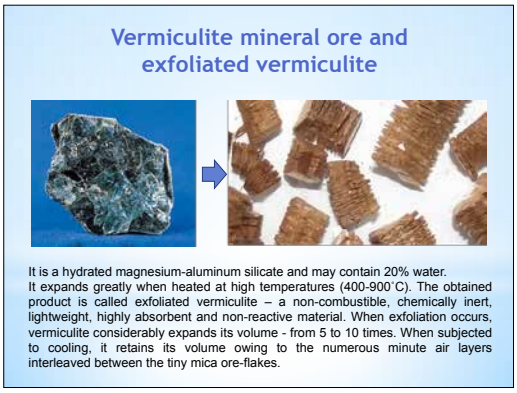


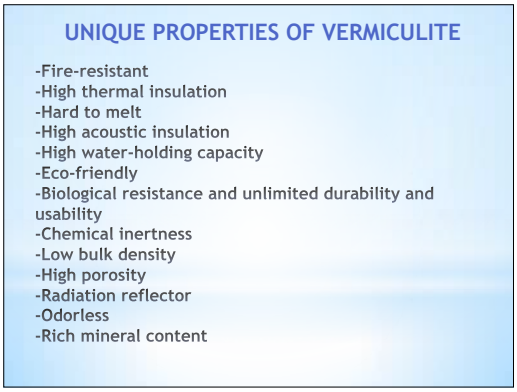
Basic indicators of the industry of building materials
Industrial production, bln. Soums. 401.6 (2005) 2719.2 (2012)
Cement, thous. tons of 5067.9 (2005) 6823.5 (2012)
Precast concrete structures and products,
thous. m³ 594.2 (2005) 914.8 (2012)
Blocks door and window assembly, thous. m² 139.2 (2005) 233.5 (2012)
Investments in fixed capital billion soums,
Construction 27.3 (2005) 508.1 (2012),
Construction work bln. UZS.
1453.1 (2005), 11311.8 (2012)

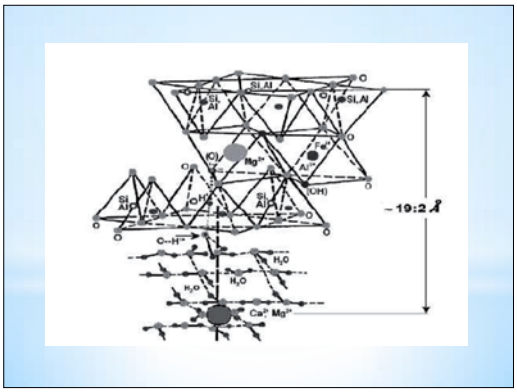
There raises a question, how does a professional physicist

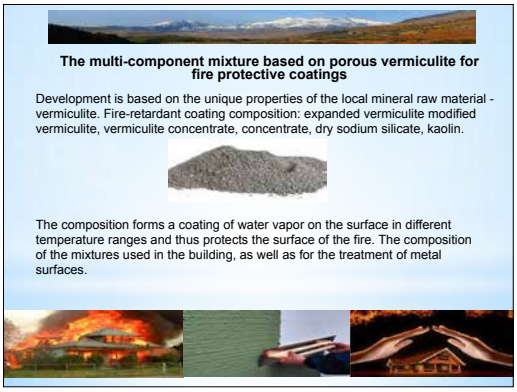
effect the problems of the construction industry in general? Engine of the advanced technology is an ever increasing requirement of a humankind. The creators of these technologies are the major research laboratories and scientists.

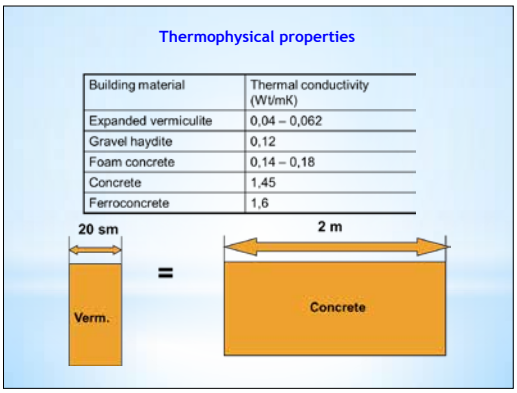
In Uzbekistan, the process started with the President of Uzbekistan's Decree from December 1, 2009 # PP-1236 "On additional measures for deepening of localization of production of finished products, components and materials based on industrial cooperation," on the basis of deep processing of local mineral resources, involvement in the production process of large waste and innovative developments.



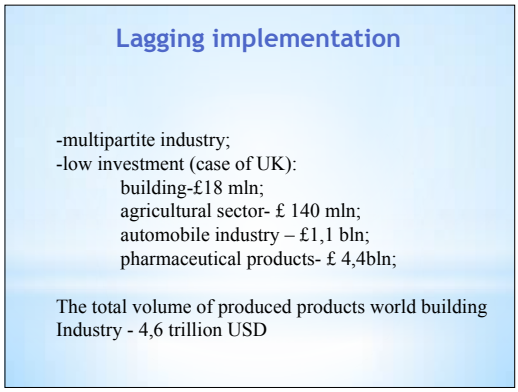




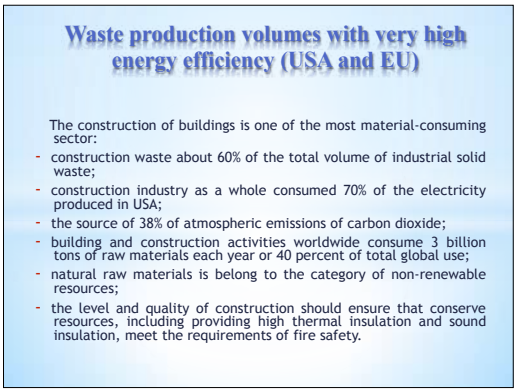


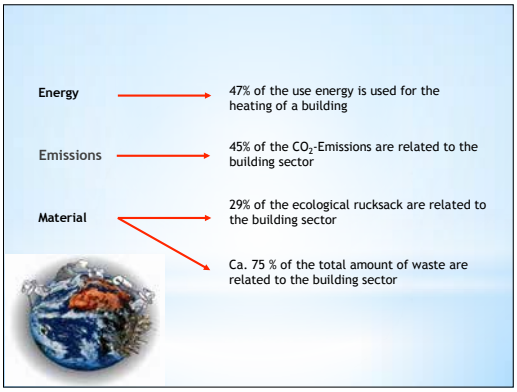


We are actively involved in the search process and the creation of new materials with predetermined properties and presented new developments in the Republican Innovation Fair. As a developer, I am interested in promoting the new knowledge-based materials on the market and, therefore, studying the entire process from the stage of development and production. Analyzing all experience in Uzbekistan and many years of experience gained from working together with colleagues from Germany, I would like to introduce to your attention an opinion on the development of future technologies in the construction industry and our developments in this area.



The construction industry has traditionally been among the most conservative sectors of the modern economy, the pace of implementation of the various technological innovations is significantly behind the average pace of the global economy as a whole.
The relatively low efficiency of the construction industry compared to most other sectors is largely due to its multicast industry, different segments of which have a high degree of autonomy in relation to each other, while the overall level of system integration of these components, in particular in the sub-sector housing is negligible. In addition, this "slow innovation" of the construction industry as a whole is also linked to the fact that it, in turn, is built tough enough to even wider value chain created by the real estate market, which does not stimulate radical technological innovation. One of the most tangible manifestations of this technological conservatism is a very low level of investment in research and development in the construction industry, compared to other industrial sectors. Here, in this regard, only one illustrative example of a statistic is that, according to the UK Office for National Statistics, in 2009 the total investment in the UK construction companies for only research was £18 million, compared to, even clearly not for the innovative agribusiness - £140 million, in the automotive industry - £1,1 billion, and in the pharmaceutical industry - £4.4 billion in small generalizing to the above illustration we will refer further fragment from a recent case study of the famous American economist Robert Eccles: "Despite the enormous scale of production capacity and the geographical range of the global construction industry (in 2007 the total volume produced by world building industry products totaled $4.6 trillion), which broadly brings together all aspects of the construction process—planning and design, the actual stage of construction projects, their subsequent reconstruction, as well as repair and maintenance, it was not able to adequately respond to the serious problems resulting from rapid urbanization and sustainable growth of our civilization.
The process of diffusion of new technologies and innovative solutions in this highly fragmented industry is seriously hampered because some developers do not have sufficient economic incentives and financial resources for unhindered access to the "collective technological knowledge base" industry as a whole and further the effective practical application of these new technologies.





The real "talisman" of the industry is also enormous amounts of waste products in conjunction with a very low energy efficiency and extremely high level of total energy consumption. For example, in the United States, at the beginning of the new millennium, construction waste accounted for about 60% of total non-industrial solid waste, with the American construction industry as a whole consuming 70% of the country's electricity and is the source of 38% of

atmospheric emissions of carbon dioxide. On average of the total cost of construction work in the industry, according to some estimates, about 30% comes from a variety of "non-economic factors," such as manufacturing faults and mistakes, unused materials, underutilization of the labor force, and so on.

A similar critical issue of the EU: At present, the various buildings and facilities account for about 40% of total energy consumption in Europe and almost a third of total CO_2 emissions in the region. At the same time, the European construction industry as a whole consumes every year millions of tons of non-renewable natural resources and produces 22% of the total volume of industrial waste. A number of different factors dictate the need for radical reform of the construction industry today. The domination of the industry over the years established production methods and processes, and the inertia of its legislative regulation imposes serious restrictions on the introduction of more efficient technologies and solutions.

Nevertheless, in spite of all the above-mentioned serious problem areas, to talk about the construction industry as a chronic and hopeless outsider innovation would be, in my opinion, not so correct.

At the very least, quite widespread in the pseudo-scientific circles is the view/myth that the construction industry over the last century has not changed much and still, for the most part, using heavily outdated technologies and materials. This is hardly the case. Moreover, even if we take as an example of its formally most conservative component, housing, despite the fact that most of the new homes are still being built, "old-fashioned," rather than prefabricated modular principle, virtually all the key components of the construction process (as used in basic construction materials, and field trips) have undergone over the past decade a very significant transformation. In addition, the overall positive effect of the latter to reduce production costs and reduce the average time of the production cycle of construction work is undeniable. In particular, we need only briefly mention that which has become customary in the industry technologies, circuits and elements as massive panel, the universal application of a variety of insulation, and of insulation materials and products, wall panels, factory assembly supporting structures, or, finally, much more energy-efficient window frames and doors compared to the very recent past. If we talk about the construction industry as a whole, this may also be in the continuation of this theme. We can cite estimates of growth of average constructional strength of the most important materials used in the industry, given in a recent publication in the International Journal of Engineering and Technology: "Over the past 50 years, the strength of structural steel has increased by 40%, the reinforcing rods - 50%, and concrete - almost 100%."

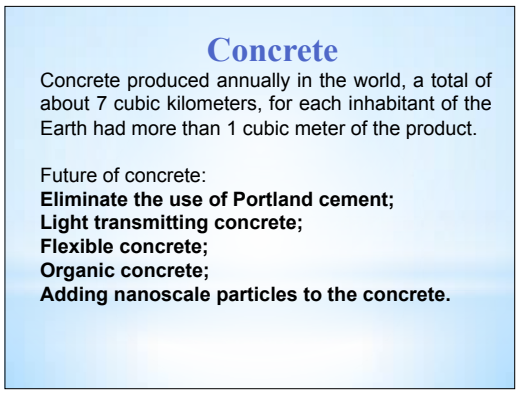
The average rate of technological innovation in the construction industry over the past decade has increased significantly, largely due to the efforts of external economic pressure on it and increased public attention to various factors related to environmental protection, first and foremost, with the tightening of the requirements for environmental friendliness and energy efficiency.

Another very important factor, which should assist in the next few decades, a decisive effect on the rate of technological renovation industry, could become a progressive depletion of a number of non-renewable natural materials, widely used in the global construction industry. Thus, according to estimates provided by the specialists of the US Geological Survey, subject to maintaining the current average annual growth rate of world production (about 2% per year), already during the life of the next two or three generations earth supplies of many major metals and minerals are practically exhausted: a sharp deficit in lead and tin may occur over the next 15 years, copper - 20 years, iron ore and bauxite - after 60–65 years. In light of these alarming predictions, this begs an obvious conclusion for a single construction industry,

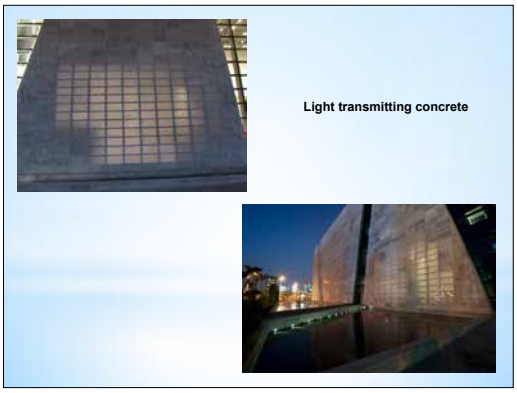
which boils down to the need to implement it in a very limited time frame of full-scale reorganization of the main production processes, in particular, finding a rapid reduction in the specific consumption of the mechanisms underlying commodity materials and sharply increasing efforts to develop alternative technological solutions, and the creation of new materials. In other words, the notorious "House of the Future" for quite objective reasons will have to be not only much more energy and resource efficient, but also, in many cases, should be completely changed to become "material filling" integrating a number of important elements/components.

The growth of new developments.

However, according to the most optimistic experts construction industry, in the first of the new century, for a decade there was a massive surge in the development and introduction of new materials and technologies, and many of these innovative materials and products are very interesting and promising for the future use of the industry's physical and chemical characteristics. In addition, there has appeared additional incentive to outline a radical technological transformation in the building materials sector in recent years of steel and various factors related to environment management. As a result, now across the whole industry, there is even a certain surplus of promising technological capabilities.



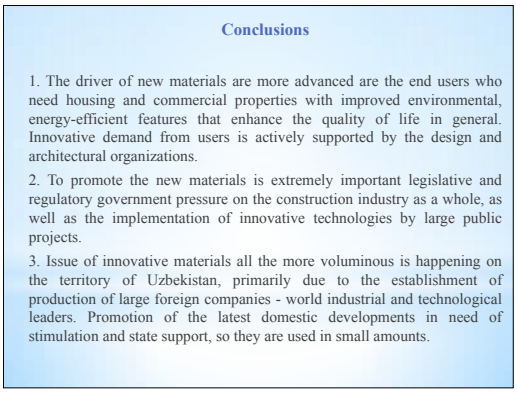
Concrete—the second total consumption of human civilization (after water) substance, in other words, it is the most actively used artificial material. Therefore, in the middle of the last decade, about seven cubic kilometers of concrete was produced each year in the world, i.e., each inhabitant of the earth had more than 1 cubic meter of the product. Such a huge volume of concrete produced by mankind and its mass distribution in the construction industry, among other things, make this material an essential element, which is clearly marked in recent years of the process accelerating the "greening" of building materials. Although concrete, in principle, can not be considered a high pollution material, such a large scale of production of concrete (more precisely, its key chemical component—Portland cement), annually accounts for between 5 to 10% of total emissions of carbon dioxide into the atmosphere. The second key area of research aimed at increasing the efficiency and useful properties of concrete is searching for mechanisms and ways to reduce specific energy consumption during production and subsequent operation.



- Decrease usage of Portland cement, either diluting it with a variety of natural and/or artificial additives (e.g., fly ash), if any, or replacing traditional Portland cement with other materials, the production of which requires much less heat;
- "Flexible concrete" which is allegedly 500 times more resistant to cracking in comparison with conventional concrete and approximately 40%

lighter than the latter, different and more increased durability, i.e., retain their essential properties approximately twice longer than normal concrete;
- (Organic concrete) this exotic concrete type is essentially a hybrid combination of organic and inorganic materials to naturally grow on its surface various types of living vegetation: because the concrete will retain its water, it can be used as a kind of "energy batteries," it feeds water to green vegetation in the dry season;
- Technical University of Budapest established translucent (light transmissive) concrete. This new type of concrete consists of fine concrete with a 5% fiber glass additive. Dosed concrete impregnation fiber glass allows enough sunlight available (up to 20-meter-thick walls) to pass from the outside into the room, and from the inside out;
- Adding to the concrete nanoscale particles of quartz dust (fine silica powder) allows achievement of a significant increase in the durability of concrete structures exposed to various chemicals;
- The inclusion of small amounts of concrete (1%) of carbon nanotubes improves the mechanical properties of the concrete;
- A recent study of hematite nanoparticles (hematite, Fe_2O_3) has also demonstrated that the addition of these particles has at last made the concrete become significantly more durable.

Finally, the average pace and scope of technological advances in the industry will largely depend on the extent and speed of the transition to automated methods of construction and the mass introduction of robotics and technologies with minimal human intervention. So, many of the experts today concur that one of the key trends in the coming decades in the construction industry should be accelerated transition from traditional technology of erection of houses directly on the construction site to the prefabricated modular housing. According to world-renowned Canadian architect Avi Friedman, even in the middle of the last decade, "after ten years the role and functions of housing and construction companies will be transformed significantly. Houses will be built in large numbers for the technology, resembling a car assembly line of standardized prefabricated or modular components, designed with the help of computers. Companies are mainly sold on the market as 'package solutions,' standard housing complexes assembled at the factory in accordance with a pre-selected customers plan and transported in virtually finished form directly to the place of assembly."



Conclusions

1. In terms of application materials, Uzbekistan is still lagging behind the developed countries, developing within the framework of global technological trends, such as environmental friendliness, energy efficiency, optimization of the construction process.
2. The drivers of demand for new materials which are more advanced are the end users who need housing and commercial properties with improved environmental, energy-efficient features that enhance the quality of life in general. Innovative demand from users is actively supported by the design and architectural organizations.
3. To promote the new materials, we need to have necessary legislative and regulatory government pressure on the construction industry as a whole, as well as the implementation of innovative technologies by large public projects.
4. Development of innovative materials is happening more voluminously in the territory of Uzbekistan, primarily due to the establishment of production facilities by large foreign companies—world industrial and technological leaders. And, promotion of the latest domestic developments is in need of stimulation and state support.

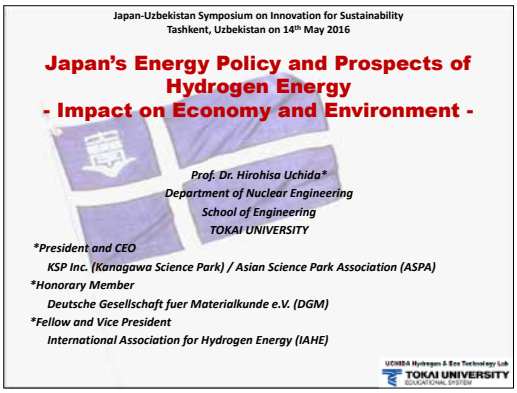
Dr. Hirohisa UCHIDA

Executive Director, Honda Foundation
Professor of Tokai University

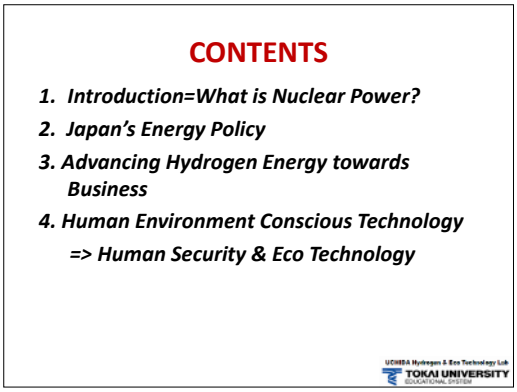
Session 3

Future of Advanced Environment Technology (Future infrastructure with introduction of technological innovation)

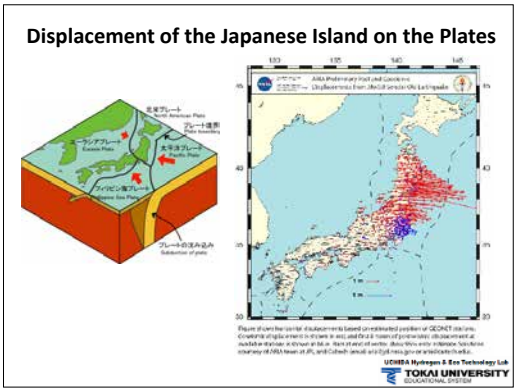
Japan's Energy Policy and Prospects of Hydrogen Energy —Impact on Economy and Environment—



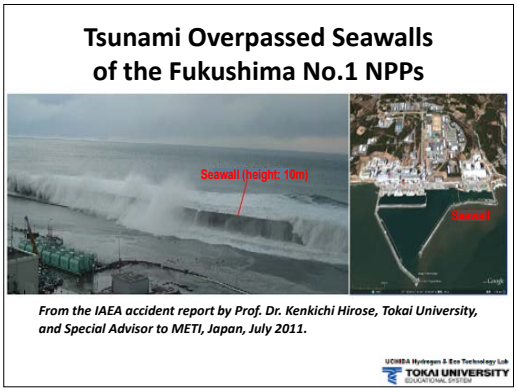
Thank you very much, Dr. Matsumoto. Now ladies and gentlemen, I'll run my power point. I have so much data and many pictures to share with you.



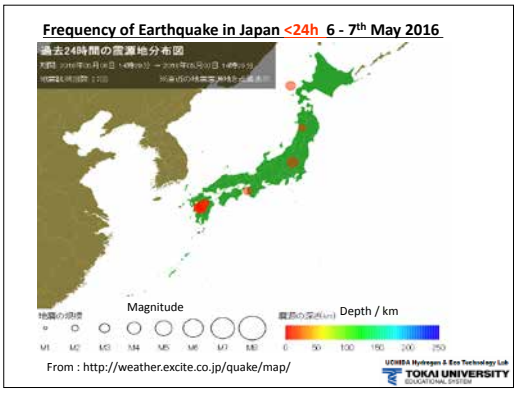
Today, I want to talk about Japan's energy policy and the prospects of hydrogen energy in Japan. The first one is an introduction, "what is nuclear power?" This is a very important point to consider if you think about Japanese energy policy. The second one is Japan's energy policy and advancing hydrogen energy towards business and human environment conscious technology. This is very important to consider concerning human security and ecotechnology.



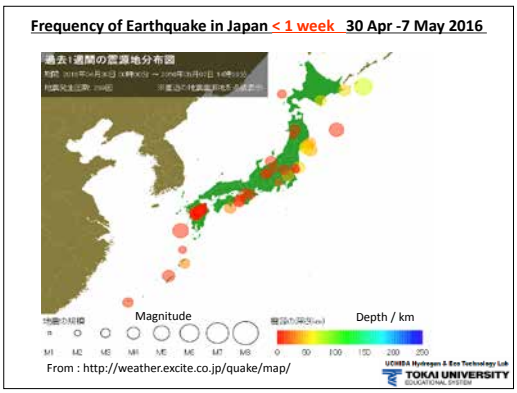
So, as you know well, five years ago, we experienced a big earthquake and now the Japanese island became deformed, 1 to 5 meters out of place.



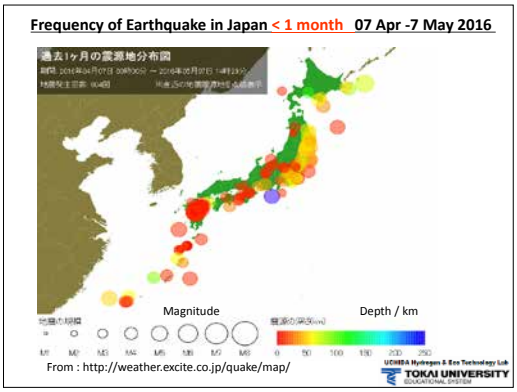
And this is Fukushima Daiichi, number 1, nuclear power plant and there was already an approximately 10-meter high sea wall at that time. But in spite of that, an even higher tsunami came over the wall and destroyed this emergency diesel oil tank. So the critical emergency function could not work well and that was the main reason for the meltdown itself. I would like to show you the actual data.

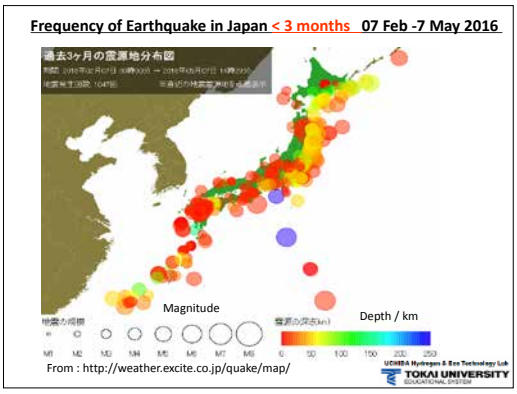


In Japan, we are experiencing earthquakes everyday so this is within 24 hours. This is a particular case, between 6th and 7th May.



But for one week, you can see here earthquake source depth and magnitude, right?



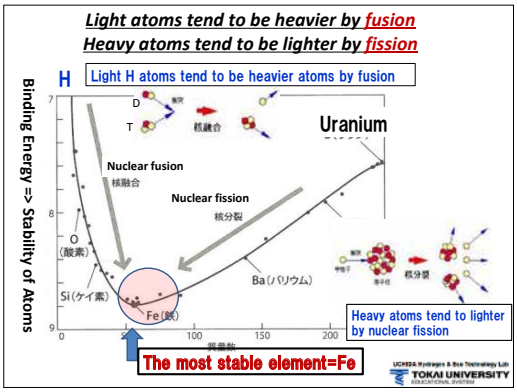


And one month, 3 months. So everywhere in Japan, you can experience earthquakes. And recently, especially the Kyushu area one, a very big one.

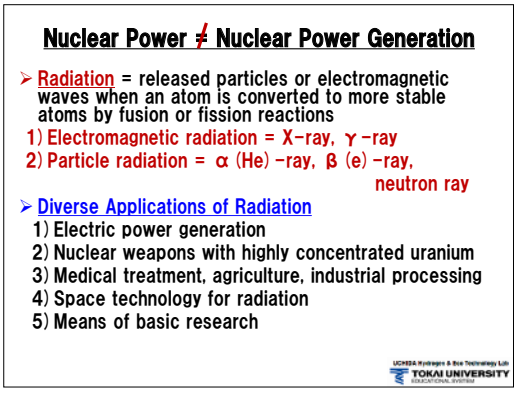
The Fukushima nuclear accident was a wake-up call for the Japanese to rethink energy and energy politics.

TOKAI UNIVERSITY

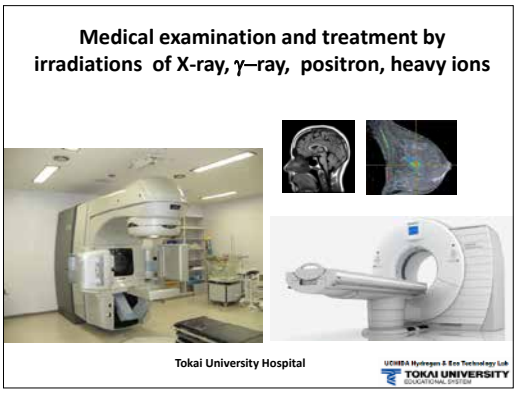
So like this, the Fukushima nuclear accident was really a wake-up call for the Japanese people to rethink energy, and energy politics.



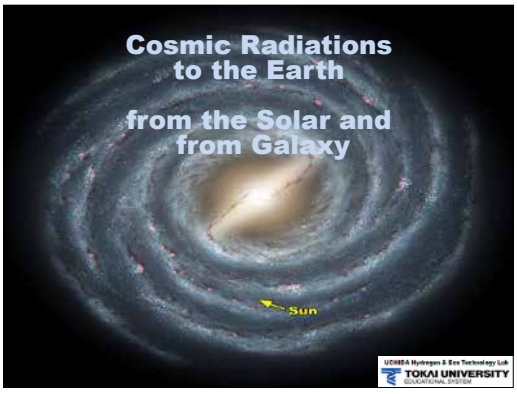
Now I would like to tell you about nuclear engineering or what is nuclear power. So light atoms like hydrogen, tend to become heavier by fusion or on the other hand, uranium, such heavy atoms tend to become light atoms by fission. This is a typical radioactive reaction by fusion or fission as to which direction they will go. The light atoms tend to go to iron and heavy atoms tend to go to iron. Iron is the most stable element on Earth. So nuclear power is not actually nuclear power generation.



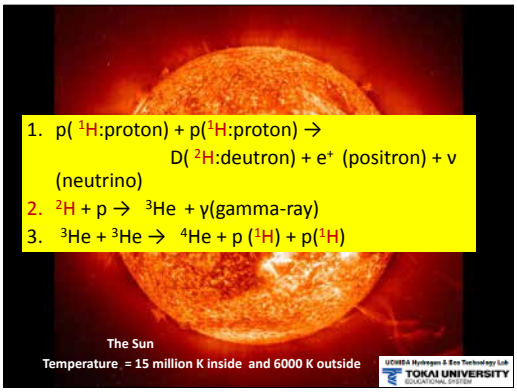
Nuclear power means a very diverse technology. So I show you the radiation cell, you can understand there are electromagnetic radiation, X-rays, gamma rays and particle radiation, alpha rays, gamma and beta rays, and neutral rays. Using these radioactive radiation sources, for example, electric power generation as you all know well, and the second one, for nuclear weapons, too. These sources are also used for medical treatment, agriculture, and industry processing too. These markets are also very large and radiation can also be used for space technology. You must remember this point, too; I'm always telling this to students. And the last one, this is an important means of basic research in our material science. As you can see here, radiation has many diverse applications. Unfortunately, I don't have time to explain it now. For example, think of the particular case of the radio tire. That would be processed by gamma ray, too.



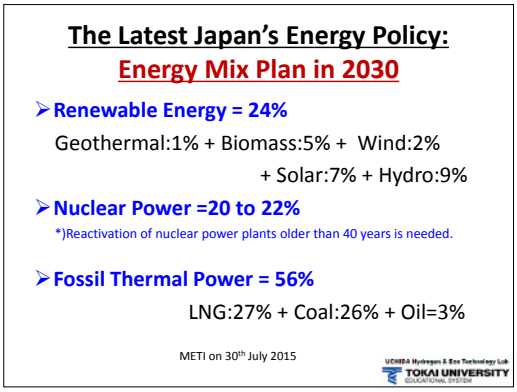
So if you go to hospital, maybe you have seen X-rays, gamma rays, positron, and heavy iron treatment equipment like these. It's very very important for us.



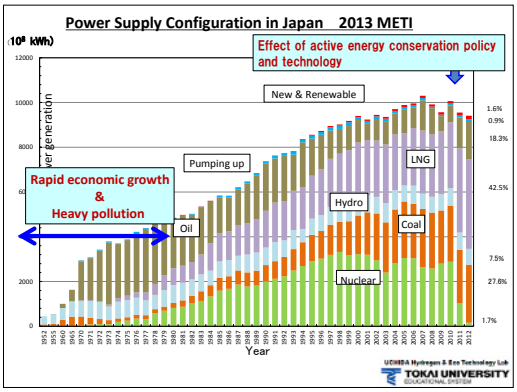
So our solar system is lying around here.
This is a big galaxy.



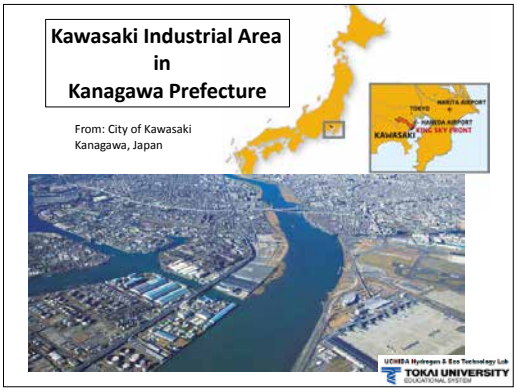
And this is our sun. Why is it exhibiting a very high temperature, 15 million degrees? What's happening inside? The inside is undergoing such a fusion reaction of light particles like hydrogen and hydrogen isotopes. Therefore, we are getting high heat and radiation, too.



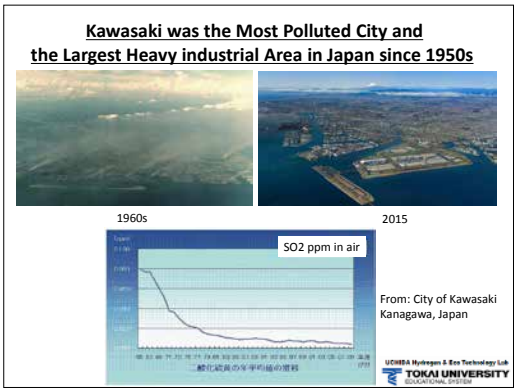
Now comes the latest Japan's energy policy, that is the Energy Mix Plan, which is envisioned for 2030. The Japanese government clearly cannot show the future plan. This is a very complicated situation now following the nuclear accident. Anyway, the plan puts renewable energy around 24 percent and nuclear energy at 20 to 22 percent. But in this case, we should use older power plants, older than 40 years, and we should use it, otherwise we cannot achieve the 20% goal for nuclear power use. As for thermal power, at around 60 percent, maybe this is very realistic.



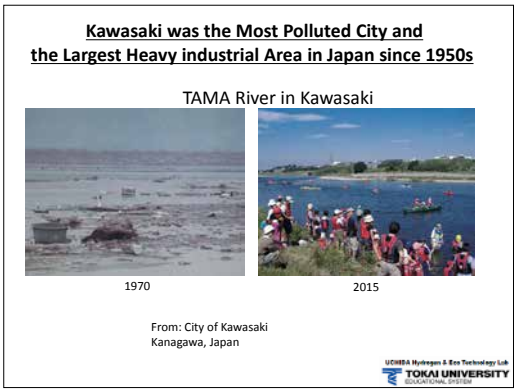
As you can see here, power supply configuration in Japan since 1950 to the present. So now you can see this point here. Recently, we have had a flat or rather declining power supply. Why? This is a reflection of energy conservation policy and technology with that effect, I think. And on the other hand, please look at the other side, the left side, you can see around 50 to 70, what happened at that time? We burned a huge amount of oil. Yes that was the time where rapid economic growth for Japan and heavy pollution were experienced.
Of course, today, you have heard about it many times.



Yes, once again, this is a typical pollution case, Kawasaki where I am working, Kawasaki industrial area was one of the largest industrial areas in Japan. This is the Tama River, as Mr. Nakajima explained before, this is Tokyo and this is the Kanagawa area. So you have seen today many times the situation in the 50s and 60s.

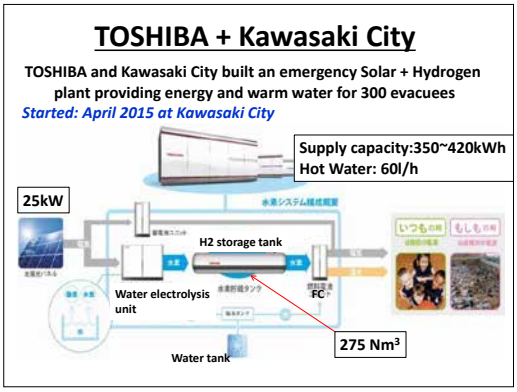


Now it is so clean.



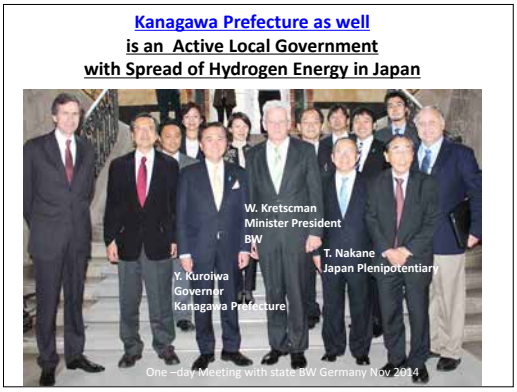
Also, the Tama River was so dirty, and it became like this. So Kawasaki city is still conscious of how it overcame these problems.

Therefore, they also want a clean technology policy. A very active city in Japan, one of the most active cities in Japan, Kawasaki City, where we have Toshiba, Tokyo Gas, Chiyoda Corporation, and many other oil companies, they are working very actively with hydrogen.



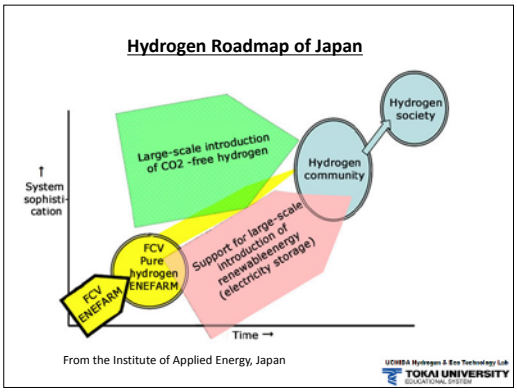
Toshiba, for example, recently passed this Toshiba H21 system, and this is very interesting. This is solar photovoltaic type energy, and using this, we can decompose water into oxygen and hydrogen and you can store hydrogen here, and in case you need it, you supply this hydrogen to fuel cells. And then you can keep around 300 people and you can supply warm water and electricity. This is a typical recent hydrogen case.

Also, Kanagawa prefecture, where Kawasaki city is situated, is very active with clean energy, ecotechnology direction.

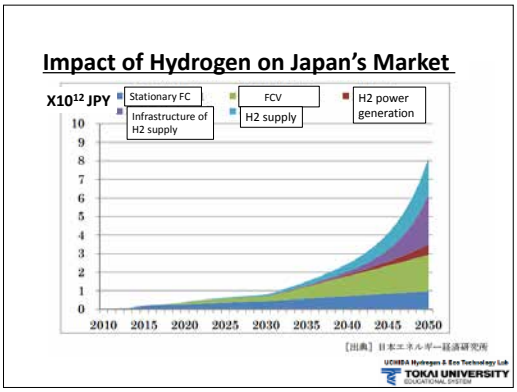


This is Mayor Kuroiwa and two years ago we met Mr. Krichman, the minister of the president of Baden-Württemberg of Germany, and together with Mr. Nakane, Japan.

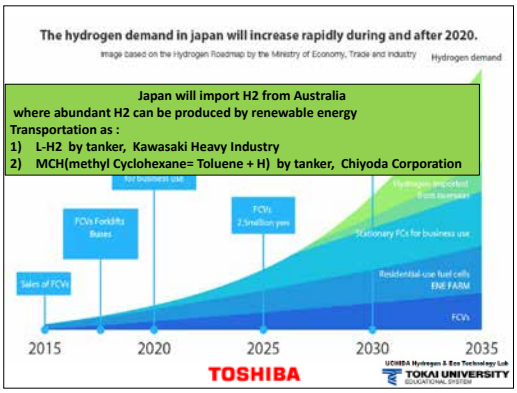
That was very nice, almost all day we discussed the environmental problem and we met also Mr. Zetsche, the president of Daimler AG and we also discussed hydrogen technology there.



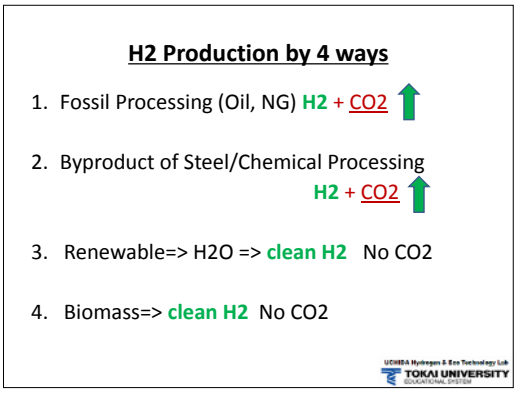
This is a very rough hydrogen road map in Japan, the first stage using fuels and technology, stations and mobile, and then we realized a large scale of hydrogen production, and so on. We are just around here, and soon, we want to have a hydrogen community and a hydrogen society.



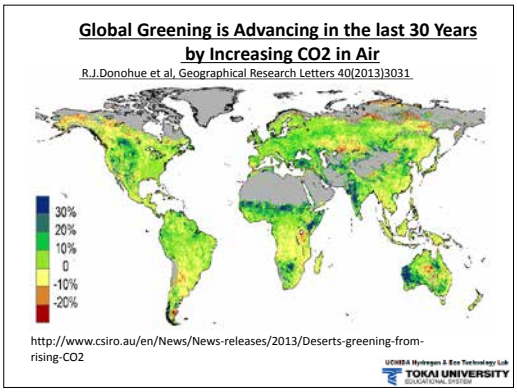
Okay, this is the impact of hydrogen on Japan's market. Maybe you have seen them somewhere, in many places hydrogen will be used, and this tendency increases very rapidly here.



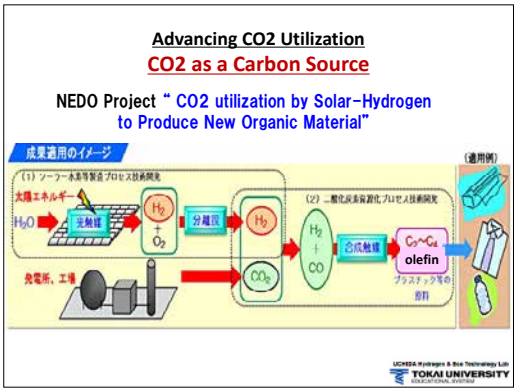
This is hydrogen demand. Most times here you can look around for fuels and technology, but here, we import hydrogen from outside. At present, we are taking it from Australia. Australia has a huge amount of renewable energy and we can transport it in liquefied hydrogen form. This is Kawasaki Heavy Industry. Another case is Chiyoda Corporation, using toluene. Toluene absorbs hydrogen, over 6 percent in a weight, and then you can also transport this hydrogen. In spite of that, the hydrogen price will be cheaper than the price produced in Japan.



So hydrogen production has mainly four ways, the first one is using fossil processing oil, natural gas, or by-product of steel or chemical processing. In these cases, we have CO_2 emissions, but another case is using renewable energy, and decomposition of water. This is clean hydrogen or another case of biomass. Then you can also get clean hydrogen too.

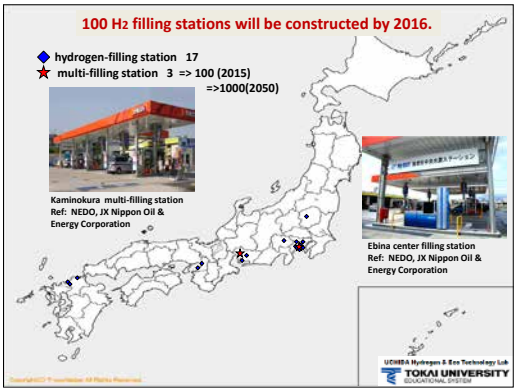


As you know well, the CO_2 concentration surrounding us is increasing and what happened, do you know that, in the last 30 years, greening is bouncing across the whole world. This is only one positive side of CO_2 increase, we should also know this side, and otherwise, we are only hearing of the negative side of CO_2. CO_2 is very, very important as you know its importance in growing plants.



In Japan we have an interesting project. For example, this is NEDO (New Energy Development Organization). Renewable energy produces hydrogen, and CO_2 from a factory, and we mix this one and we form olefin. Olefin is a material for plastic, an organic material. And Japan is driving in this direction very actively so that we will use CO_2. CO_2 we think this is source of carbon. Then we want to put carbon in material. As far as I know, there are so many international conferences on CO_2 utilization.

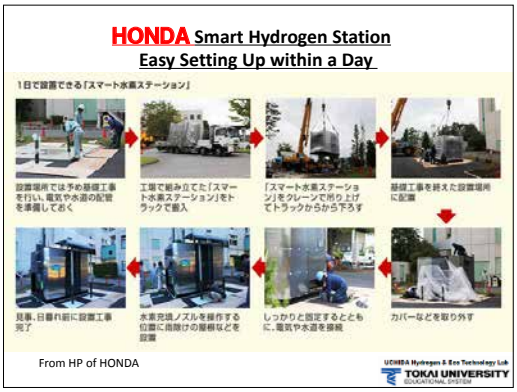
For this session, I heard also that you are just trying CO_2 utilization to produce hydrocarbon, maybe we can discuss it later. This is the first multi station. Multi station means this is a hydrogen supply part and another part is a normal gasoline supply station.



Around this year, the government will put 100 filling stations in Japan, hydrogen stations.

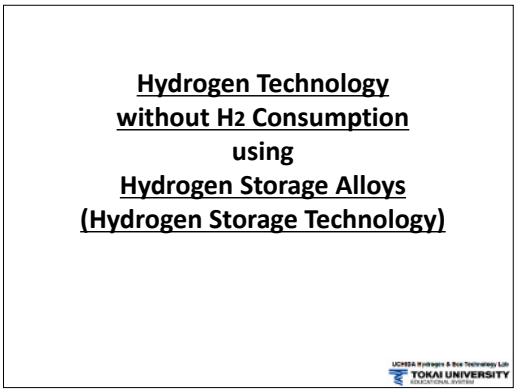
Recently, mobile stations have been going around. They are going to different sites. And they show if you need hydrogen, a hydrogen car goes and you can get it.

For instance, Honda is producing a very interesting global system.

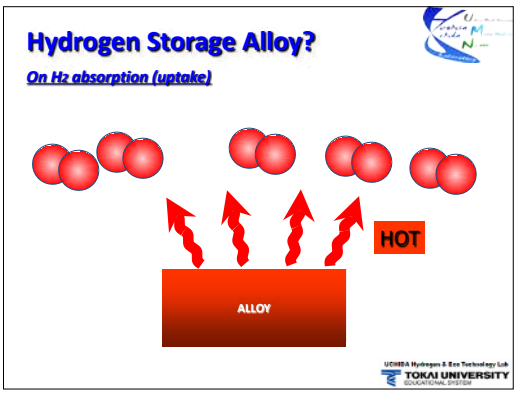


So these small stations will be transported easily by truck and put down here, within one day it is okay. You can put these in so easily. This is a typical Japanese product.

Please look at smaller and smart hydrogen supply system. Mr. Moriya, after me, will explain it more accurately. And this smaller hydrogen station is very nice. As you know well, in Japanese society, Japanese houses and streets are narrow, not so wide like in Tashkent here in Uzbekistan. So you can put these small hydrogen stations here and you can supply hydrogen there.

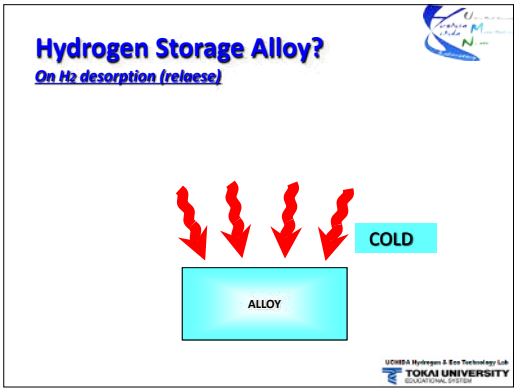


And hydrogen technology is actually a very special technology. Without hydrogen consumption, in this case, we utilize a hydrogen storage alloy.

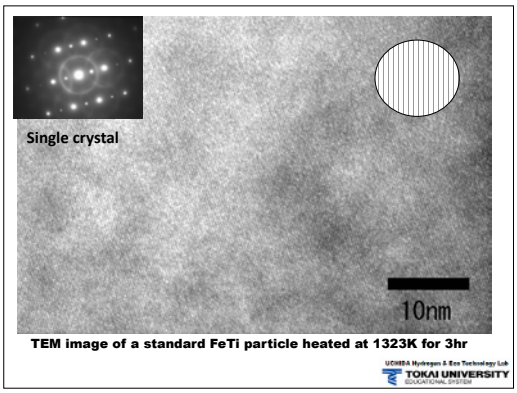


What is this? This is metal alloy here, and at room temperature, this metal can absorb a hydrogen molecule very quickly, much faster than we breathe.

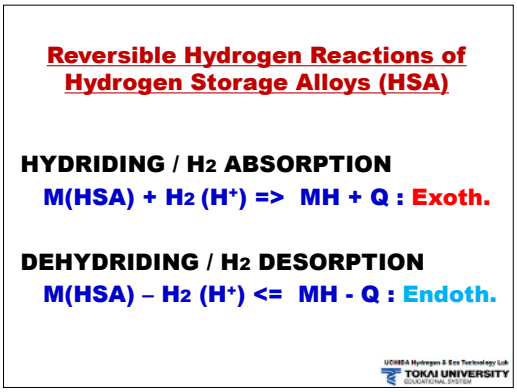
But this is endothermic reaction. So, its surrounding becomes warm. If hydrogen is already inside and we dissolve hydrogen, what happens, going out, and in this case, this is endothermic reaction.



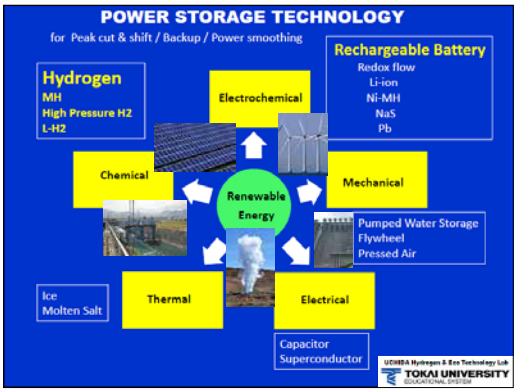
Mainly, this alloy absorbs heat from its surrounding so you can cool down, utilizing these things.



This is a transmission electron microscope picture. You can see here a small, small white dot. These are metal atoms. And among these metal atoms, the smallest hydrogen atom can go inside and store itself in metal.

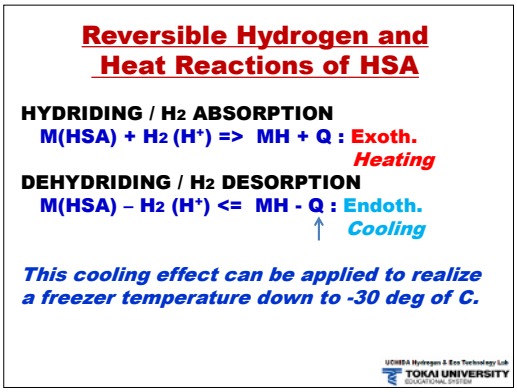


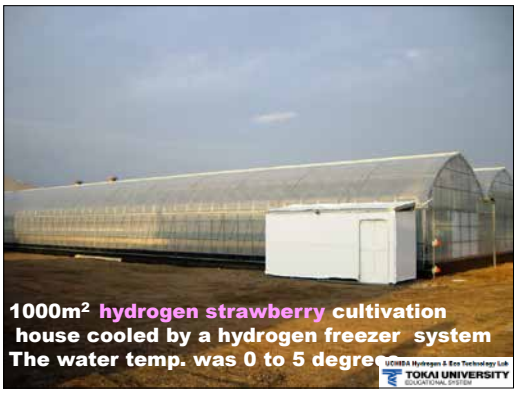
This is its mechanism. This is just a chemical reaction.



This system can be applied to renewable energy storage, as, usually, you can charge a used renewable energy battery. Whichever battery, lithium ion or another, it doesn't matter. Recharging a battery has a very strong self-discharge effect. But if you use this electricity from renewable energy, decompose water first, and if you store hydrogen, as metal hydride or liquefied hydrogen or high pressure gas, you can keep it, for 20 to 40 years.

We've tested it already. It's very stable and safe because in this case, metal hydride, you can keep it under 5 atmospheres, or one atmosphere, it depends on the case. No problem.





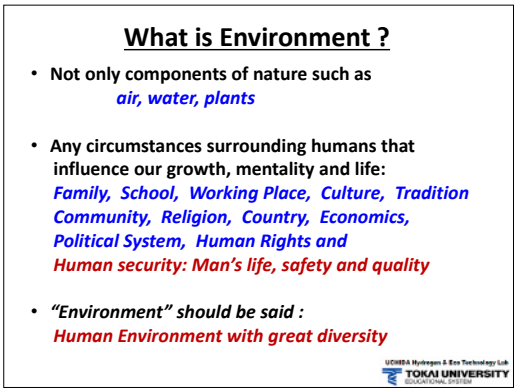
So reversible hydrogen, and heat reactions are as I have shown you already, and if you look at it here, the heating or cooling effect, what we can do, yes, we utilize this endothermic cooling effect and we apply this cooling effect to naturally produced cold water, and we apply it to a 1,000 square meter hydrogen strawberry cultivation house. I tested it already for 5 years. If you flow cold water under the strawberry site, and you can cultivate strawberries even around 40 degrees.

Usually, strawberries need cool temperatures but in this case, it will be okay if you have cold water inside. We demonstrated this already.

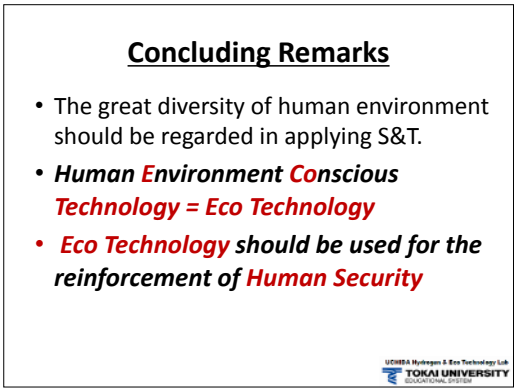
And another case, with cold water, between 0 and 5 degrees, you can breed fish, and we tested that also.

This is only 1.2 USRT, not so large, this is a hydrogen storage alloy and cold water.
This is another pool for fish, and we tested, from small fish to big ones.

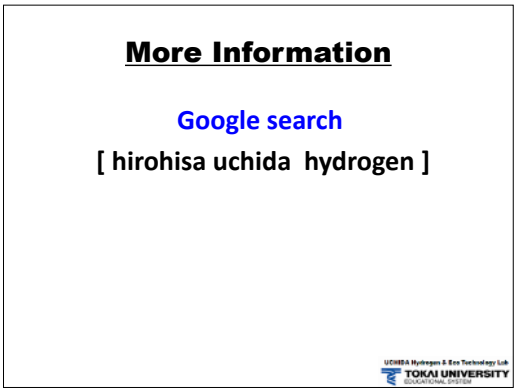
This is also nice for future agriculture and fish breeding. You can do it anywhere if you have hydrogen and heat waste.



So what is the environment? I am arriving to the concluding part. Not only the components of nature such as air, water, or plants but actually circumstances surrounding us, and what we feel every day, family, school, working place, culture, tradition, community, religion, country, government, political system, or human rights or human security, these are all part. These are all factors for circumstance, or environment. So actually, if you say environment, you should say human environment.



This is a very important point. So the great diversity of human environment should be regarded as applied science and technology. Of course this is very important as many people pointed out. And human environment conscious ecotechnology, this is the most basic concept of ecotechnology, not ecology plus technology. Environment conscious technology. Ecotechnology should be used for reinforcement of human security. This is my conclusion of this talk.



Thank you very much.

Dr. Sharafitdin MIRZAAKHMEDOV

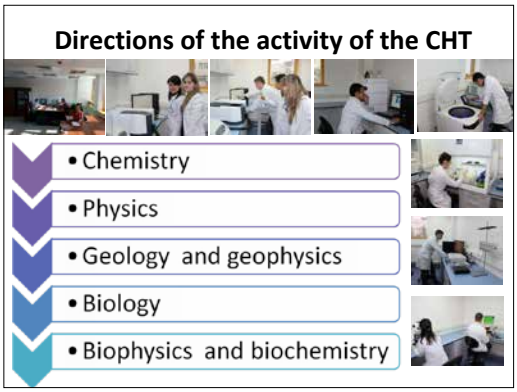
Director of Centre for High Technologies

Session 3

Future of Advanced Environment Technology (Future infrastructure with introduction of technological innovation)

The Role of Center for High Technologies (Tashkent) on Energy-saving and Environment Friendly Technologies Promotion

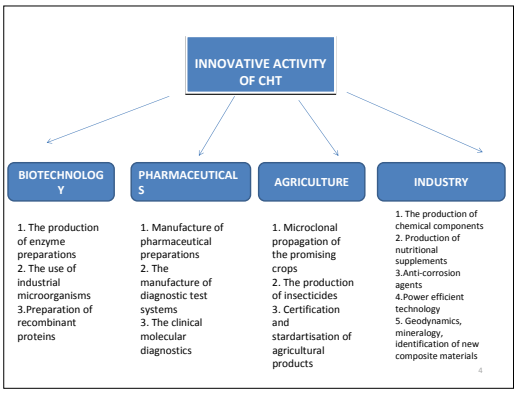
Dear Participants of the Uzbek-Japan Symposium!
Thank you very much for giving me the chance to present.



21st Century—the century of a knowledge based economy. Under these conditions, not only science should generate ideas, but also production must ensure their development.
Sustainable development of Uzbekistan in the world today can only be achieved by increasing the competitiveness of the economy and the quality of human resources that can be provided by the development of high technologies.

As part of the formation of the innovation system infrastructure of Uzbekistan in accordance with the Decree of the President of the Republic of

Uzbekistan, Educational and Experimental Center of High Technologies with the participation of Cambridge University, the UK, has established that the main directions of activity of TPs are chemistry, physics, geology and geophysics, biology, biophysics and biochemistry.



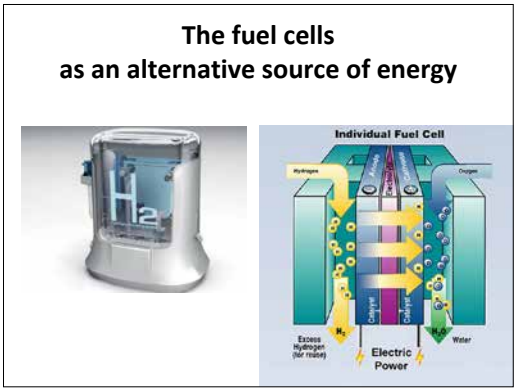
The Center of High Technologies is striving to become a leading initiative in Central Asia, which enables scientists, innovators and entrepreneurs to develop joint world-class solutions, cost-effective for all participants and the Republic of Uzbekistan as a whole.

Our strategy is to stimulate innovation in Uzbekistan to promote the scientific ecosystem of Uzbekistan, where research, business and education joined to develop solutions on mutual benefit basis to find sustainable solutions to social problems through:

- Creation of points of interaction of knowledge and ideas
- Promoting the development of talent: entrepreneurs, scientists and students
- Attracting investors

In accordance with the state strategy of industrial development of Uzbekistan, one of the key areas of improvement of the economy of Uzbekistan is to find a breakthrough technology in the field of energy, pharmacology and biotechnology.

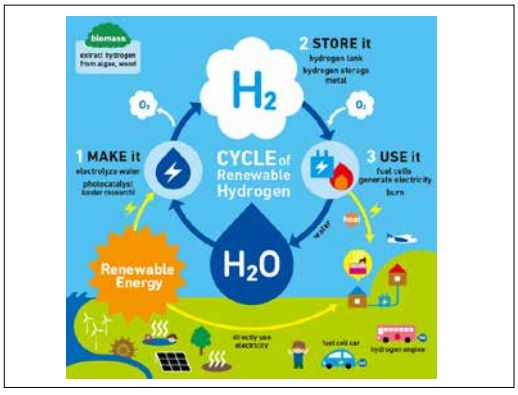
Efforts to develop such high-tech areas in Uzbekistan will promote economic development in the entire Central Asian region.



Therefore, today one of the most attractive sources of energy, especially for the transport industry, is fuel cells with high-energy conversion efficiency and low emissions of pollution in the environment.

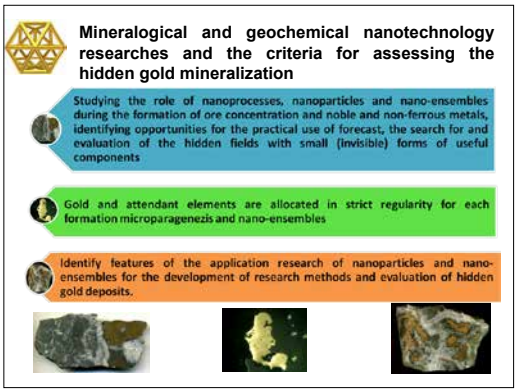
However, the absence of a developed network of hydrogen trading, and the presence of the risk and burden associated with the storage and transportation of hydrogen, hinder the widespread use of this line approaches.

Successful use of fuel cells in the near future can be achieved through the processing of hydrocarbons, that is, the production of hydrogen from a liquid fuel using a steam reforming system.



CHT employees' series of experiments have been ongoing, aimed at identifying the main physical and chemical characteristics of the generation of pure hydrogen by the catalytic decomposition of the alcohol molecules in the presence of homogeneous and heterogeneous, specially synthesized new generation of catalysts —transition metals. The results obtained allow finding the optimal ratio of catalysts which maximize production of pure hydrogen from a water-alcohol mixture with further

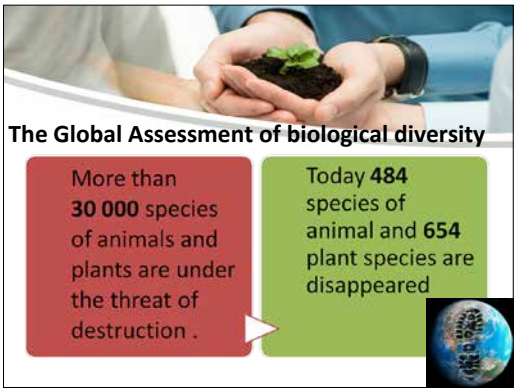
development technology which can be applied in various areas of industry in Uzbekistan.



Prediction, prospecting, and evaluation of mineral resources are an ever-pressing problem, particularly in areas with a developed mining and social infrastructure. Creation of an effective forecasting and prospecting model for gold deposits in recent years, complicated by the discovery of unconventional types of gold mineralization with an integrated U, Mo, Pt, Pd, etc.

Today it is conclusively proven that the most effective methods for the unambiguous type gold mineralization is micro nano mineralogical as gold—it is a typical micro- and even nano-mineral. However, an especially important indicator value is the distribution of micro and nano mineralogical forms of Te and Se.

Conducted in the CHT to study the role of nano processes, nanoparticles and nanoansambley in the formation of ore concentrations of precious and non-ferrous metals, identifying opportunities for the practical use of the forecast, the search for and evaluation of the hidden fields with the small (invisible) forms of useful components allow putting into practice these technologies efficiently for the development of research methods and evaluation of hidden gold deposits.



Another one of the problems that accompany economic development and scientific and technological progress is the reduction of biodiversity, including species diversity.

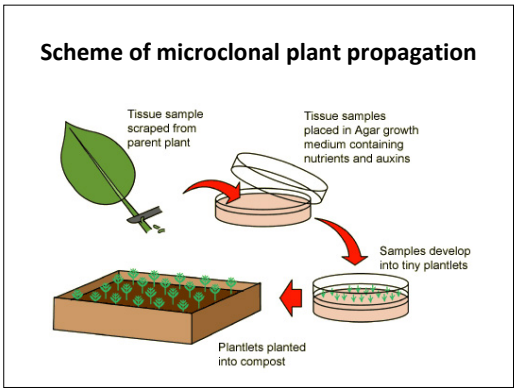
In the past two decades, biodiversity has begun to attract the attention of not only specialists in biology, but also economists, politicians, and the public in connection with the apparent threat of anthropogenic degradation of biodiversity, due to a much higher than normal degree of natural degradation.

According to the "Global Biodiversity Assessment," UNEP (1995), the threat of destruction affects more than 30,000 species of animals and plants. Over the past 400 years 484 animal species and 654 plant species have disappeared.

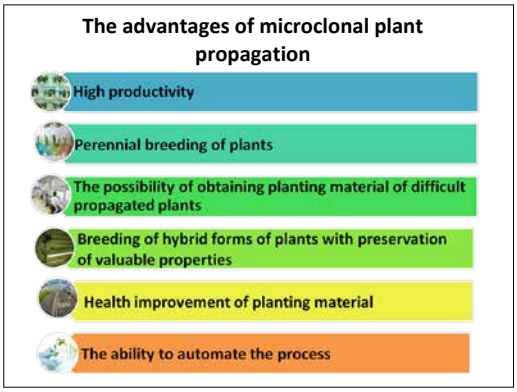
The economic feasibility of biodiversity increases due to the use of wild biota to meet the various needs of society in the field of science and education, industry, agriculture, including for the manufacture of medicines, as well as providing the population with food, fuel, energy, timber, and so on.

Over the past 50 years, the area of land used in agriculture remained virtually unchanged, while the world's population has more than doubled. An important role in solving the issue of providing the increased number of people with food is played by modern biotechnology.

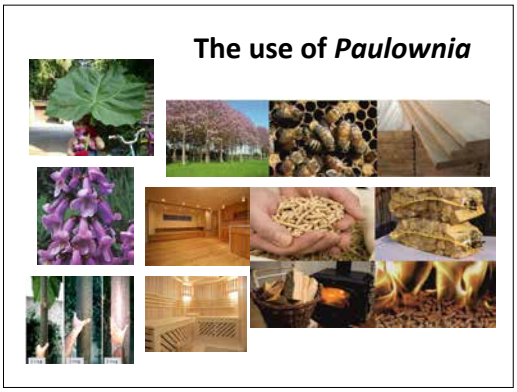
Plant biotechnology is one of the scientific and practical priorities of the XXI century. Widely used in the practice of traditional technologies, bookmarking and cultivation of crops have a number of significant shortcomings that do not allow control and prediction of such important features like quality, growth rate, disease resistance, etc.



Micro propagation technology is used to accelerate the cloning of many plant species, including trees. The ability to form a few million or more somatic embryos in vitro (test tube) is used for the mass and the continuous production of a plurality of cloned plants—the absolute genetic copies of the original "parent" plant released from viruses as donor plants cloning process occurs under sterile laboratory conditions.



This technology is aimed at organizing year-automated production of varieties of agricultural plants in the laboratory, which will greatly save the crop area, material and labor resources.
Today, members of the innovation team have successfully grown from a part of the donor plant full subsidiary plants—clones, which are then adapted to normal climatic conditions.



Paulownia—a very promising crop for Uzbekistan. Extremely rapid growth and development, rich in biomass, and excellent wood characteristics allow its use in the wood processing industry and furniture, as well as in construction. Because in Uzbekistan, in recent years, intensively developing alternative energy technologies, paulownia wood, having high heat dissipation, as well as waste from industrial processing, may be used for the production of wood pellets. It should be noted that according to the forecasts of economists, the human need for wood in the next 10 years will increase by 20%. In addition, having huge paulownia leaves is a real "factory" of oxygen, while over its life cleans thousands of cubic meters of air.
The next stage of the center's activities in dealing with the conservation of biodiversity is micropropagation of valuable medicinal plants in order to preserve the natural habitat of endemic and rare endangered species. Thus contributing to the promotion of energy-saving technologies, CHT will contribute to the preservation of the environment and sustainable development of Uzbekistan and the Central Asian region as a whole.

Thank you for your attention.

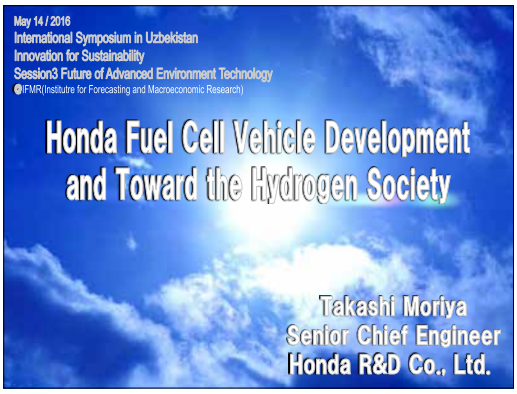
Mr. Takashi MORIYA

Senior Chief Engineer, Honda R&D Co., Ltd.

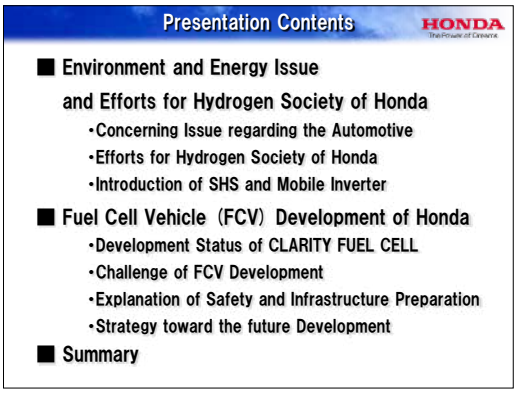
Session 3

Future of Advanced Environment Technology (Future infrastructure with introduction of technological innovation)

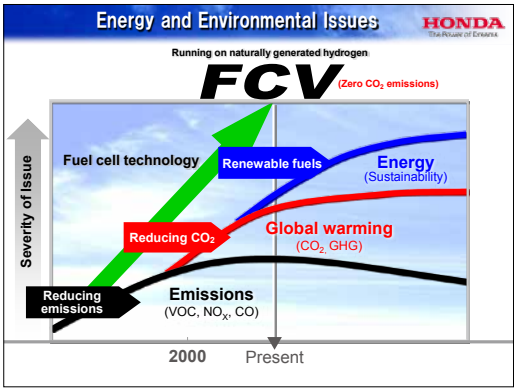
Honda Fuel Cell Vehicle Development and Toward the Hydrogen Society



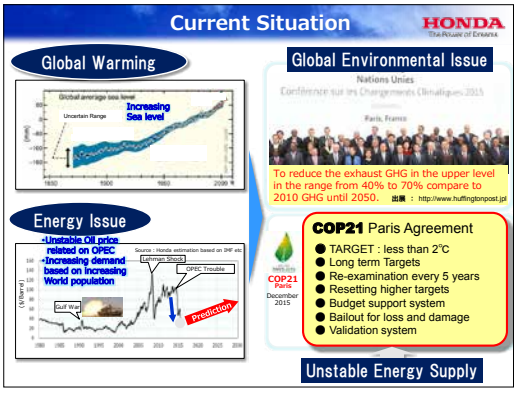
Thank you chairman, Dr. Matsumoto. I am Takashi Moriya of Honda R&D. I am honored to have an opportunity to make a presentation in Tashkent. I will explain Honda's fuel cell vehicle and status and efforts for establishing a hydrogen society.



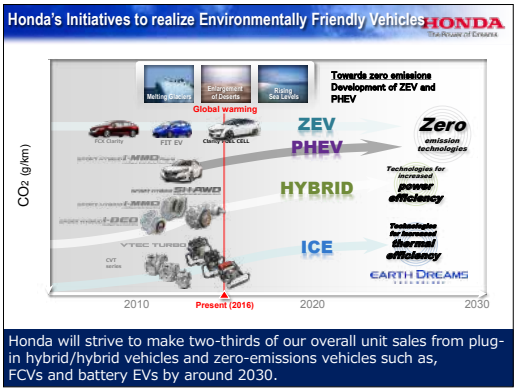
Today's contents are here. First, I will explain environment and energy issue and efforts for hydrogen society of Honda. And then, I will explain fuel cell vehicle, FCV, developed by Honda.



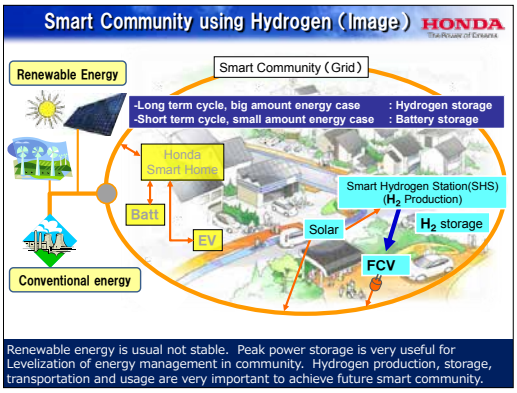
This slide, I started using from 1998 with changing the position of this triangle. This slide is a conceptual image of the issues facing the automobile industry today. Namely, harmful exhaust emissions, polluting the atmosphere, global warming related to CO_2 emissions when using fossil fuels, and the energy problem. At Honda, we believe fuel cell technology to be a very promising solution for all three issues. We consider the fuel cell vehicle to be the ultimate answer.



This slide explains the recent actual situation regarding the concerned issue. In order to achieve the target, less than 2 degrees centigrade, CO_2 concentration must be kept less than 450 ppm. However, the Keeling Curve in Hawaii, as Professor Uchida explained, already indicated over 400 ppm and sea level is increasing gradually. So this is the remaining concentration, only 50 ppm. And then in terms of energy issue, oil price is not stable because of various reasons. However, future prediction of price will increase because of limited resources. Lastly, December COP 21 in Paris, was held in Paris for discussion regarding the countermeasure of climate change. The US and China will participate in this framework. In this agreement, including a re-examination every five years, resetting higher targets and review of the validation system.

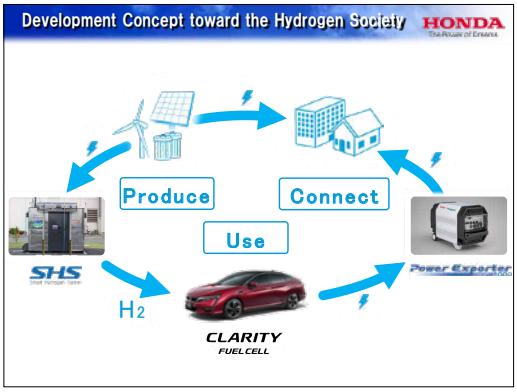


This is CO_2 reduction strategy of Honda. In the near future, we must reduce the CO_2 in the main market. At first, we concentrate to improve the efficiency and increase hybrid vehicles. Buying time for efforts of this countermeasure, we must develop the PHEV, the present hybrid vehicle and ZEV (Zero Emission Vehicle) vehicles there simultaneously in the future. And Honda will strive to make 2/3 of our over-all unit sales from PHEV and ZEV by around 2030.

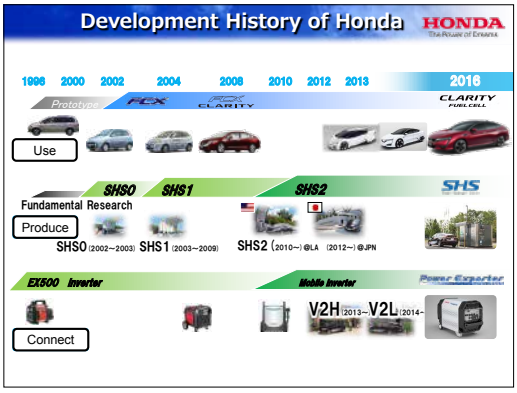


This is our smart community image, this means, in case of PHEV (Plug-In Hybrid Electric Vehicle) and ZEV, not only in vehicle usage of driving but also connecting the society. This is a smart community image including hydrogen. Usually, a smart community is based on electricity only. However, hydrogen will be a buffer of electricity from renewable energy. Renewable energy is usually not stable so peak power storage is very

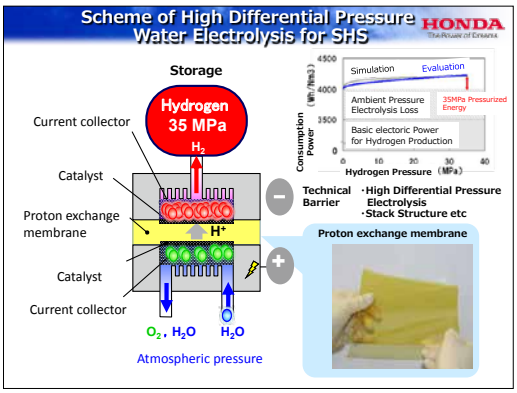
useful for leveling of energy management in the community. Hydrogen production, storage, transportation, and usage are very important to achieve this smart community. Our system is an example for this concept in the future, toward a clean society. We, Honda, believe the smart combined system using electricity and hydrogen will arrive.



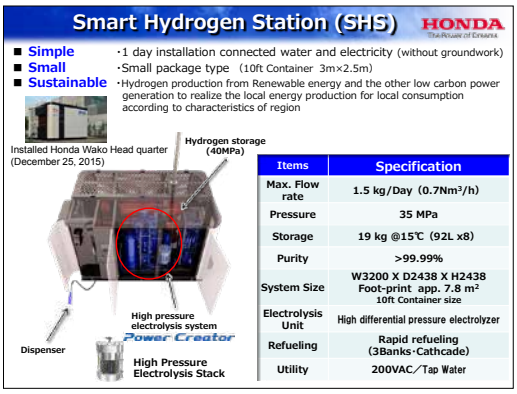
Honda not only concentrates to develop the FCV, but also to develop a smart hydrogen station and power exporter. This is the mobile inverter, SHS and power exporter. We are developing a strategy towards the hydrogen society and we call this concept “Produce, Use and Connect.”



This is the development history of Honda, vehicle development started from the end of 1980s. I will explain the details in slides. SHS has been developed from around 2000. The first one was a combination between ambient pressure electrolysis and a mechanical compressor from 2010.

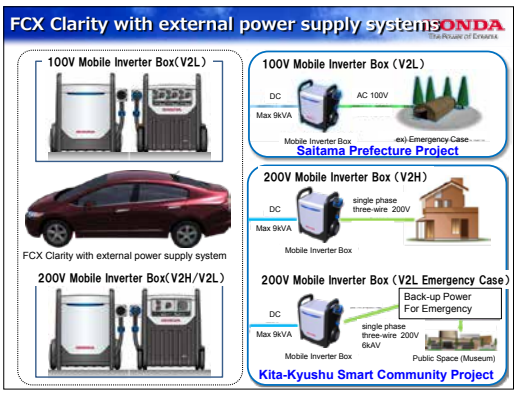


We developed high differential pressure electrolysis. And we developed the mobile inverter, we called power exporter based on power products R & D technology here. This is the concept of high differential pressure electrolysis. The structure is almost similar to fuel cell type and the membrane material is the same. Usually, ambient pressure electrolysis needs 4 kilowatt hour per normal cubic meter. This high pressure electrolysis keeps on continuous electricity, continuous power. The membrane has the same characteristics as the chemical hydrogen pump. So the water is here, and then the electricity is here. This is the electrolysis and maintains the electricity. In that case, it’s in the electrical hydrogen pump. This is the other side, that is, 35 mega pascal high pressure, and hydrogen storage. In this case, we don’t need the mechanical compressor, the very root of efficiency and very silent.

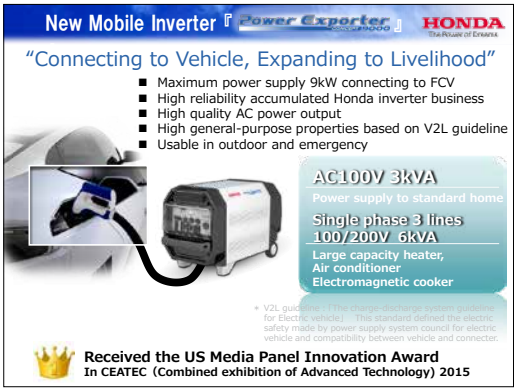


This is a current smart hydrogen station. This has already been explained by Professor Uchida. We name this system SHS. S means simple, small and sustainable. Simple means one-day installation

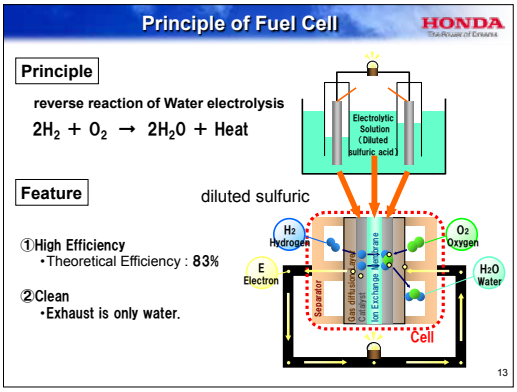
connected with water and electricity. Small means 10 feet container size package. And sustainable means the hydrogen production is not only solar but also other carbon-free power. In front of this container, a high pressure electrolysis system named “power creator,” hydrogen production capacity is only 1.5 kilograms per day. And a backyard 90 kilogram 40 mega pascal hydrogen storage vessel is installed. This production capacity is almost a 150 kilometer commute per day. That is a very small one.



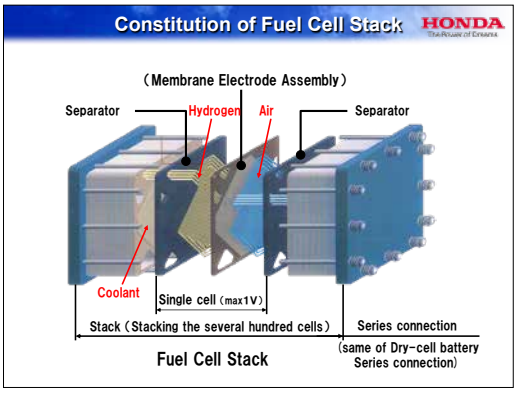
This trial introduces our power output demonstrations. This is Saitama, this is Kita-kyushu, the northern Kyushu area. Our concept is a mobile inverter box which the customer installs in the luggage room. When he/she faces trouble, on the road, in an emergency case or a disaster, it can recharge the backup power battery. This is 9 kilowatts of output. And this is 100 voltage and this is 200 voltage.



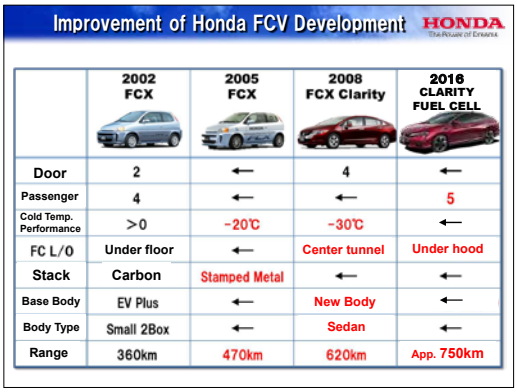
This is a new mobile power inverter named Power Exporter 9000, 9000 means 9 kilowatt, the maximum power supply is 9 kilowatts connected to FCV. Honda started to sell this Power Exporter at the same time as FCV sales.



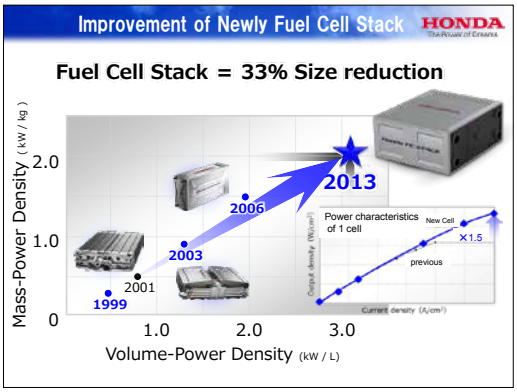
This is the principle of fuel cell, this is very simple. Electricity generated from hydrogen and oxygen in the air. This is the reverse reaction of electrolysis. Selector efficiency is 83%, very high, and exhaust is only water, very clean.



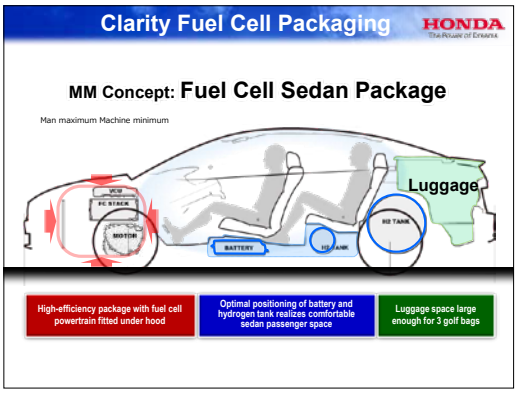
Fuel cell started to be constructed by stacking several hundred cells. A single cell is constructed and electro-coated thin polymer film and separators form gas for channel. This fuel is sandwiched in the middle of two separators, film and separators. Cell thickness is almost 1 millimeter, very thin. Current is depending on the achieved area, coated electrode, and voltage is depending on the stacking cell number.
Vehicle companies aspire for the reaction of stack-power density in order to install the vehicle package.



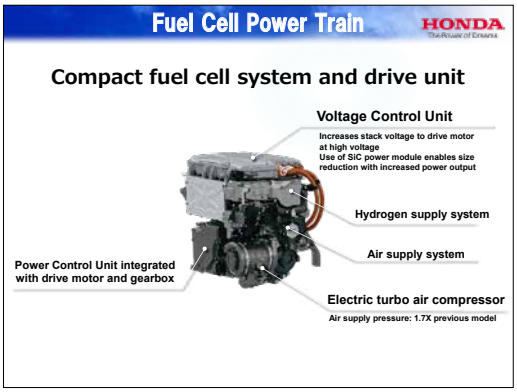
Honda introduced FCV from December 2nd 2002, the world's first. And we installed Honda in-house production stack using the stamp metal separator in 2005. And then in 2008, all brand new sedan type FCV, FCX Clarity were started to be leased. This Clarity installed the fuel cell system in the center tunnel using freedom of installation. Driving range improved using the certified mega pascal hydrogen storage system.



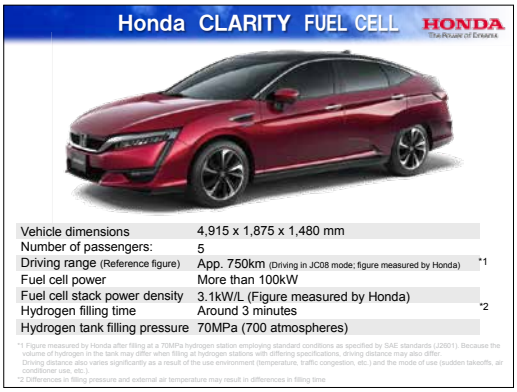
New fuel cell stack achieves top-level power density and compactness, achieving a 33 percent reduction compared to the previous one. In order to achieve this improvement, we achieved higher current density operation and we developed the thinner cell based on the previous stack concept.

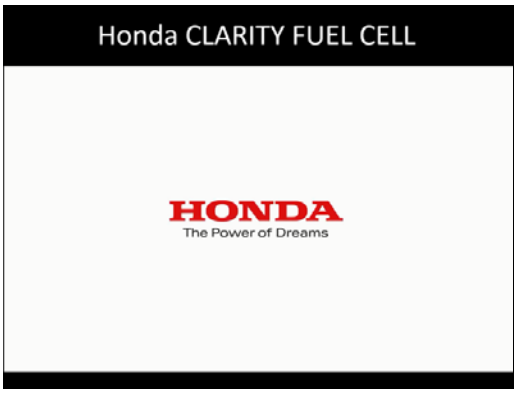


And then this March, Honda launched a new fuel cell vehicle named CLARITY FUEL CELL. I will explain the following slide. Honda has a basic vehicle design concept, we call it MM concept. MM means man, maximum, machine, minimum. Clarity Fuel Cell is designed based on this concept. The high efficiency package with fuel cell power train fitted under hood. This concept will be able to expand the other type of vehicle in the future. Optimal positioning of battery and hydrogen tank creates comfortable sedan package space. A battery is installed under front seat and a small hydrogen tank is installed inside, and while we are inside, enough space is secured thanks to this packaging design.

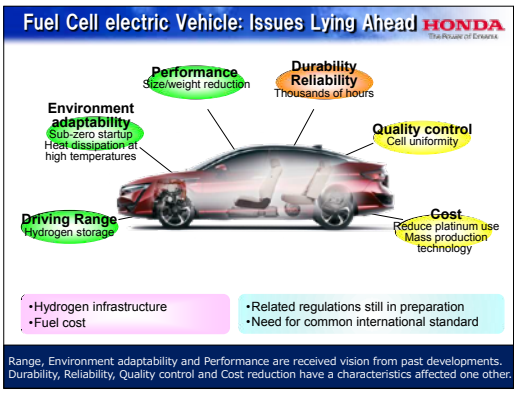


A fuel cell power train is integrated between BOP, Balance of Plant, voltage control unit and driving motor. A tower compressor is used for increasing air pressure, and driving motor installed and power control unit were redesigned for decreasing the height. This is the height and voltage control unit. An installed silicon carbide is located on the fuel cell tank.

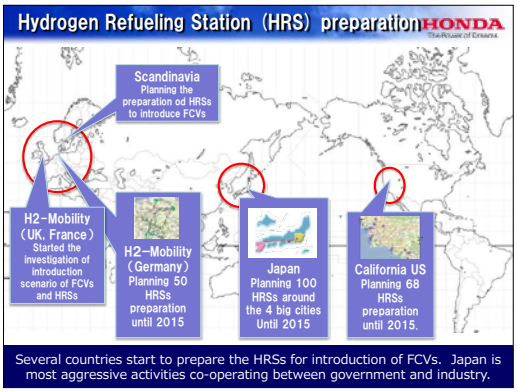




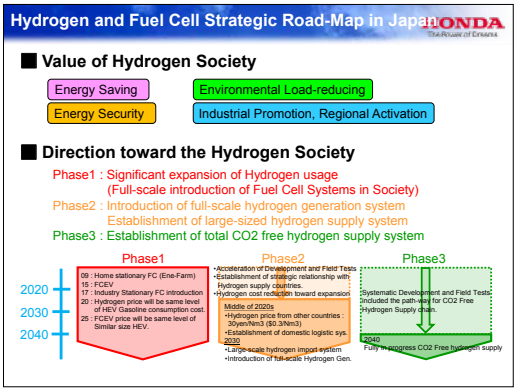
This is the main specification of Clarity Fuel Cell, 5 adult passengers can sit comfortably by fuel cell power train installed under hood and approximately 750 kilometer driving range in achieving by use of a 70 mega pascal hydrogen tank. Of course hydrogen filling time is around 3 minutes. And this is the video of the new FCV (video playing).



And for these green circles, we already have countermeasure. However, the car companies keep struggling for the development of durability, reliability, and quality control cost and then of course we need the hydrogen infrastructure for the expansion of the FCV, that is the harmonization of the important standards. It is very useful for cost reduction and the expansion of the vehicle for the global use.

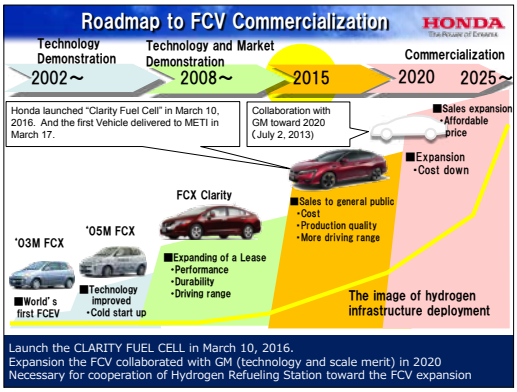


And this is the hydrogen refueling station deployment from all over the world. However, this plan is delayed in every region. Japan has the most aggressive activities in preparation of this hydrogen filling station, 81 stations have already a fixed budget and more than 70 stations have already opened.

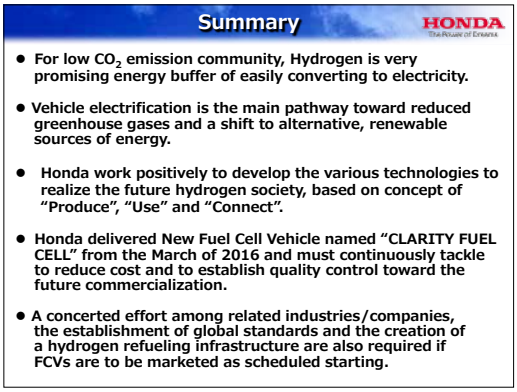


This is Japanese hydrogen and fuel cell strategy road map, published in June 2014. Depending on the cabinet approval of basic energy policy, which supports the value of the hydrogen society, these 4 items are needed. And this road map is separated in 3 phases. Phase one is a significant expansion of hydrogen usage, introduction of many fuel cell systems including the residential use for Ene-Farm and FCV. And phase 2 is introduction of full scale hydrogen generation system, and establishment of a large-size hydrogen supply system. I think this is very

important in case of the expansion of the hydrogen society and then, of course, fuel cell expansion is very important so a big amount of hydrogen is needed. Vehicle energy consumption is much smaller than total energy consumption. And then phase 3 is the establishment of total CO_2 free hydrogen supply system. The current system is very slow. The current situation revised an earlier plan for this road map. Honda launched the new Clarity Fuel Cell on March 10th 2016 this year and then Honda has collaborated with General Motors, so many Chevrolets are around here towards 2020.



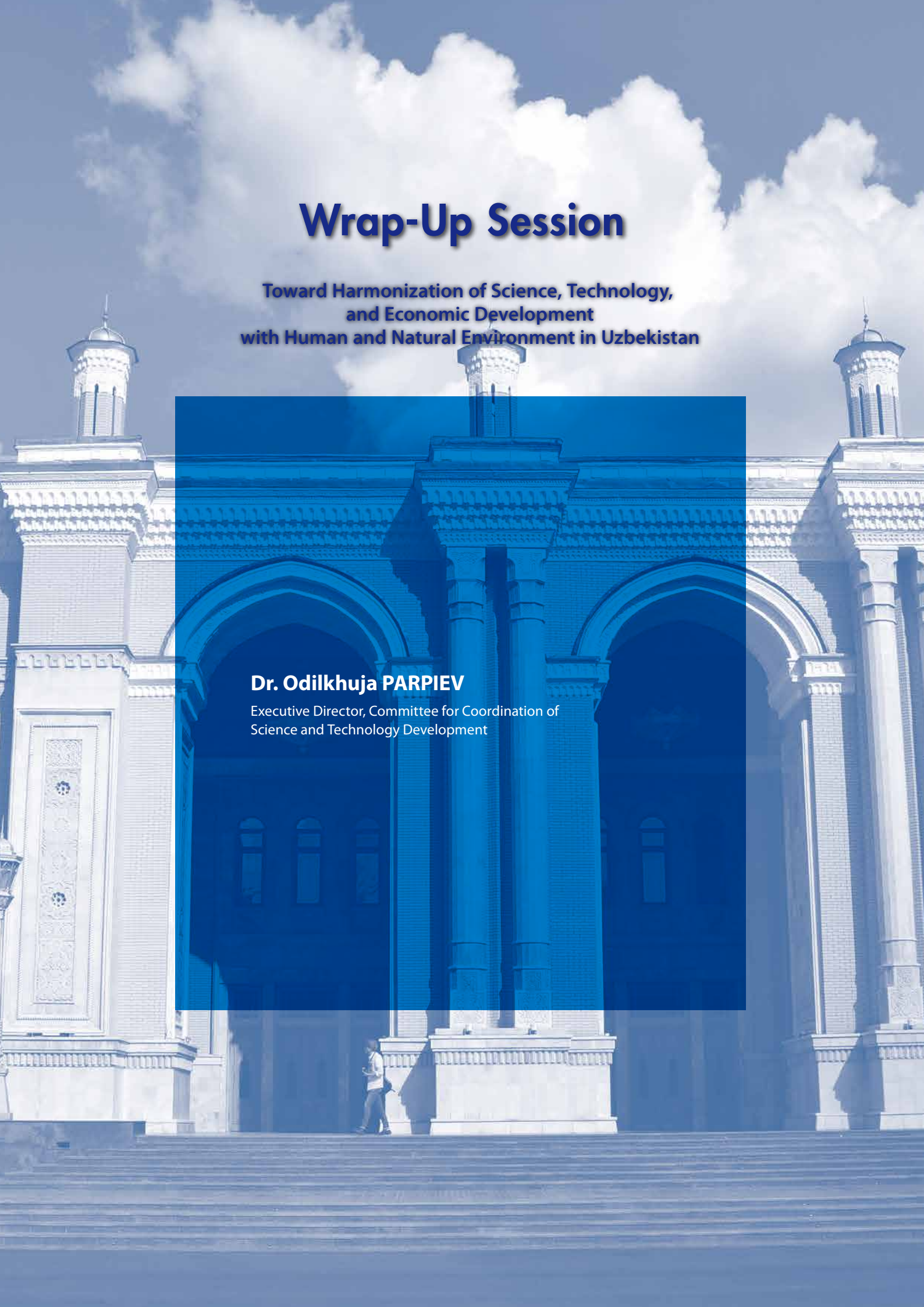
Regarding the perspective of fuel cell commercialization, we will be addressing cost reduction for the FCV expansion and also addressing realization of competitive hydrogen price, an expected business opportunity for the future.



This is a summary. Hydrogen is a very promising energy and of course the change to the electrification for the vehicle, and then that Honda tries to realize it in the concept of produce, use and connect. Clarity Fuel Cell launched, and we just keep on making our best effort for the expansion of the fuel cell vehicle in the market. Honda will keep an aggressive effort towards the future continuously.

HONDA
The Power of Dreams

Thank you very much for your attention.



Wrap-Up Session

Toward Harmonization of Science, Technology, and Economic Development with Human and Natural Environment in Uzbekistan

Dr. Odilkhuja PARPIEV

Executive Director, Committee for Coordination of Science and Technology Development

Dr. Odilkhuja PARPIEV

Executive Director,
Committee for Coordination of Science and Technology Development

Wrap-Up Session

Toward Harmonization of Science, Technology, and Economic Development with Human and Natural Environment in Uzbekistan

Today, jointly with Honda Foundation, the Committee for Coordination of Science and Technology Development held the Uzbek-Japan symposium on ecotechnologies, with the main purpose being to discuss topical issues regarding further development and application of environmentally friendly technologies.
Objectives of Symposium were to discuss issues like:

- World tendencies of development of ecotechnologies, current issues, problems and prospects of innovative technologies related to the environmental protection
- Technological evolution and legal aspects for economic development and environmental protection
- Success stories in the sphere of ecotechnology practice of Japanese and Uzbek researchers and industry
- Future of advanced environment technology
- Development of mutually beneficial cooperation between the social environmental organizations and the business community, etc.

And I think we have in detail discussed all the planned topics. As the opening remarks, we had the speech of Dr. Shavkat Salikhov, the President of the Academy of Sciences of Uzbekistan, Chairman of Committee for Coordination of Science and Technology Development and it was pleasure to listen to the interesting speech of H.E. Fumihiko Kato, Japanese Ambassador to Uzbekistan and Ms. Yoriko Kawaguchi, Former Foreign/Environment Minister of Japan. Speakers noted the importance of the Symposium and expressed confidence that this event will serve as the beginning of a mutually beneficial cooperation between the scientists of Uzbekistan and Japan on ecotechnologies and they wished for fruitful work from the symposium.

For the introductory session, we had a very interesting presentation from Mr. Hiroto Ishida, President of Honda Foundation, where he gave brief information on Honda Foundation and the concept of "Ecotechnology." As the second speaker, Mr. Nobuhiko Shima, President of Japan-Uzbekistan Association, noted the relationship between Uzbekistan and Japan.
As a keynote speaker, I tried to give you some information on the role of ecotechnologies on our science, how it is treated, and how the Uzbek scientists are approaching the issue. And, we also had as the keynote speaker Mr. Akira Kojima. He gave us information on the Japanese economic development phase and environmental protection issues.
Further, we had 3 sessions and each of the sessions had panel discussions.

Shortly, I will give conclusions for each session which we have heard from the presentations and discussions.
At Session 1 of the symposium "Technological Evolution and Legal Aspects for Economic

Development and Environmental Protection/ Restoration," we discussed Japan's experience in the field of economic development, environmental protection and legal support to the participants of this activity. During the presentations, it was noted that involvement of safe technologies and the legal regulation of this area will not only contribute to the reduction of harmful gas emissions, including greenhouse gas emissions that impact climate change, and to energy and heat supply improvement, especially in rural and remote areas, but will also ensure energy security and stable development of countries, especially Uzbekistan, which could benefit from this. And, there were made recommendations on improving the legislative, institutional, financial, and information base for large scale introduction of ecotechnology source usage, etc.

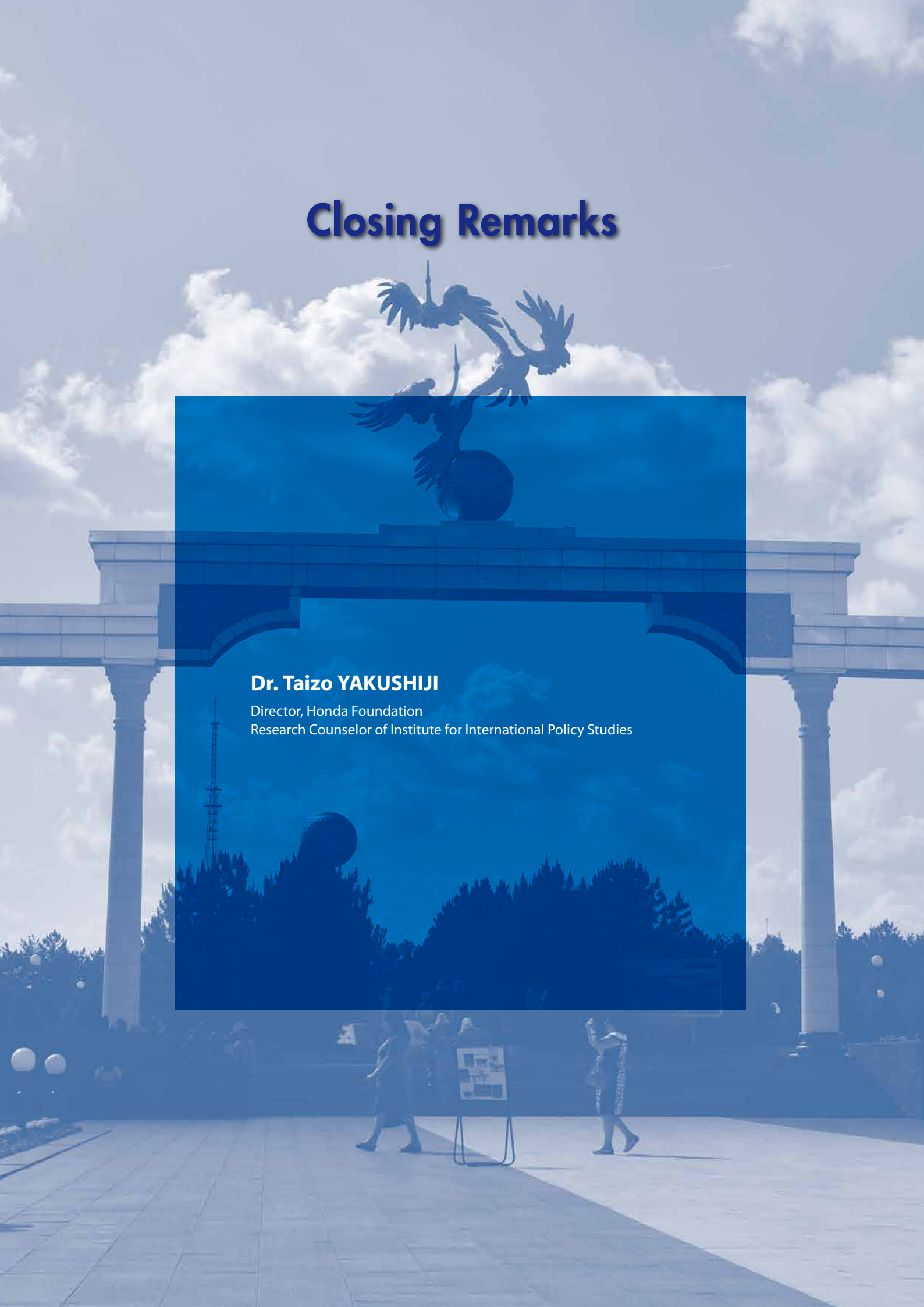
At Session 2 of the symposium "Success Stories in Sphere of Ecotechnology Practice," we discussed several interesting issues. The Japanese speakers mainly discussed the issue of water-related technologies, and how the Japanese scientists are working on purification and cleaning polluted water resources in urbanized areas in Japan. An example was given with the case of the Tama River, which was really interesting for the audience. And, Uzbek speakers gave some good examples of their experiences with UV irradiation plants, photo electrical power drive capable of stimulating the growth of plants, the impact on processes of photosynthesis, the air conditioning system based on evaporative cooling on a poultry farm, biogas settings for the agricultural needs, etc.

And, finally, during the Session 3 of the symposium "Future of Advanced Environment Technology (Future infrastructure with introduction of technological innovation)," discussion was made on the issues of future clean technologies, their usage, and harmony of science and technology with human, human security and the global environment. Many interesting clean technologies were demonstrated for hydrogen technologies actually applied to fuel cell vehicles, agriculture and fish breeding towards realizing a hydrogen society. In addition, energy saving technologies, resource efficient technologies for the construction of new industry and other environment friendly technologies were introduced by the Japanese and Uzbek scientists.

At the end of the symposium, we had the plenary session for generating all the proposals and recommendations. Let me point to some of the proposals and recommendations which were made during all the panel discussions.
The symposium concluded its work with a plenary session with the motto "Innovation for Sustainability-Harmonizing science, technology and economic development with human and natural environment" and the moderators of each session and the symposium noted:
We need to continue to work on improving the legal and regulatory framework for environmental protection and the development of environmental technologies, especially for Uzbekistan;
Governments and relevant ministries should pay more attention to the financial support for research in the field of ecotechnology, as well as to adopt a program to create favorable conditions for the development of international cooperation in the field of industrial safety and the environment;
Create technology platforms that consolidate efforts of government authorities, scientific-and-research and education and business communities to develop State policy in the field of safe technologies and environmental protection;
Special attention should be paid to the process of training of qualified personnel in the relevant fields. There should be organized human resource training for ecotechnology-related fields (scientists, highly qualified engineers and technical workers, economists, managers, lawyers, patent specialists, etc.);
In order to organize the information flow for the development of ecotechnologies, provide access for the scientific community of Uzbekistan to the Japanese databases and vice versa;
Create conditions for the Uzbek-Japanese joint research on the creation and implementation of environmental, environmentally-friendly, energy saving and other ecotechnology-related fields;
Develop mutually beneficial cooperation between the state, non-governmental environmental organizations and the business community.

At the end I would like to show my gratitude to Honda Foundation once more, and notice that it was honorable for our young scientists to receive three honorary diplomas, which are for young scientists and students, participants of the IX Fair of innovative ideas, technologies and projects.
And, I would like to conclude with the hope of future collaboration and I think the symposium concluded with great success!
Thank you for your attention!

Closing Remarks



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Closing Remarks

Instead of giving the final remarks, I will give you very interesting information from the Japanese government.

We have been running an international research collaboration network program. And in its five areas, there are two environmental technology areas related to what we talked about today.

I am going to give you detailed information about the projects; the global environmental solution project and the local society implementation project. This is called SATREPS, a research collaboration network program.

So I am encouraging all Uzbekistani universities to collaborate with their Japanese counterparts. And as ODA is there, which is huge amount of money, the project can run 3 to 5 years. It is a long period of commitment. I created the program almost 10 years ago when I was in the government. Then, as now, the major thrust of the program was to bring young scholars together. So we are looking at the future of the collaboration and strengthening the relations between Japanese scholars and Uzbekistani scholars and communicating with each other. So, I encourage both young scholars writing papers and giving these to international journals, and developing their competence. So people in development of local societies, and also those in the energy conservation area, please keep in touch.

This is how ODA is used, it is international, but also there is another budget, the so-called science and technology agency budget. That is very restrictive to the Japanese. In order to receive the grant, you have to collaborate with Japanese research associates first. Why don't you propose that program?

And then there are a couple of Japanese experts rating the program development which is useful for improvement.

Let me add some more information about SATREPS. It also targets the Low-carbon society and basic scale of the environmental issue including environment, energy or conservation or new material or whatever you call that which we have discussed. So why don't you ask about collaboration first? You know, collaboration first, jointly propose together, then you can be given a great amount of money, I hope.

Thank you very much.

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