Effective Action on Global Warming Prevention

by the Japan's Electrical and Electronics Industries

Our Initiatives for Creating a Low-Carbon Society

Liaison Group of Japanese Electrical and Electronics Industries for Global Warming Prevention

The Japan Electrical Manufacturers' Association (JEMA) / Japan Electronics and Information Technology Industries Association (JEITA)
Japan Business Machine and Information System Industries Association (JBMIA) / Communications and Information network Association of Japan (CIAJ)
Association for Electric Home Appliances (AEHA) / The Japan Refrigeration and Air Conditioning Industry Association (JRAIA) / Japan Lighting Manufacturers Association (JLMA)

1 Initiatives for Medium-and-Long Term Global Warming Prevention

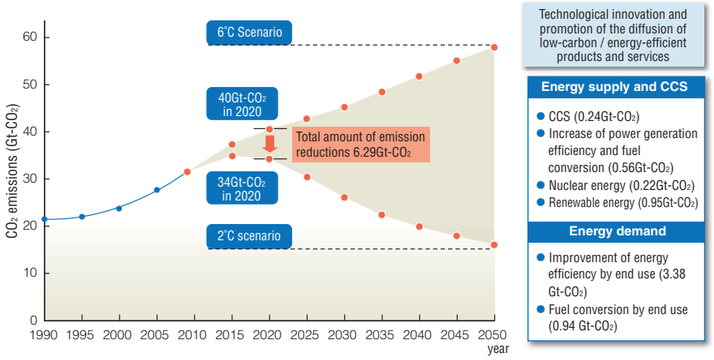
-Contribution to medium-and-long term CO_2 emission reductions by technological innovation

Awareness of Global Warming

(Predicted amount of CO_2 emissions in the medium-and-long term and reduction scenarios)

IPCC*1 stated in its fourth report that, in order to suppress the temperature rise to within 2˚C by the end of the 21st century, greenhouse gas emissions have to be reduced after the peak in 2020 and to be halved compared to the 1990 level by 2050.
However, energy-derived CO_2 emissions had increased by as much as 50% as of 2009, and IEA*2 predicts that CO_2 emissions in 2050 will be almost 1.9 times the current level and the average temperature will rise by 6˚C if no countermeasures are taken (6˚C Scenario). On the other hand, it indicates a view that technological innovation and promotion of the diffusion of energy-saving products and services would enable halving CO_2 emissions by 2050 and suppressing the rise of average temperature to within 2˚C (2˚C scenario).

*1 IPCC: Intergovernmental Panel on Climate Change
*2 IEA: International Energy Agency



Source: IEA Energy Technology Perspectives 2012 "Scenarios & Strategies to 2050"

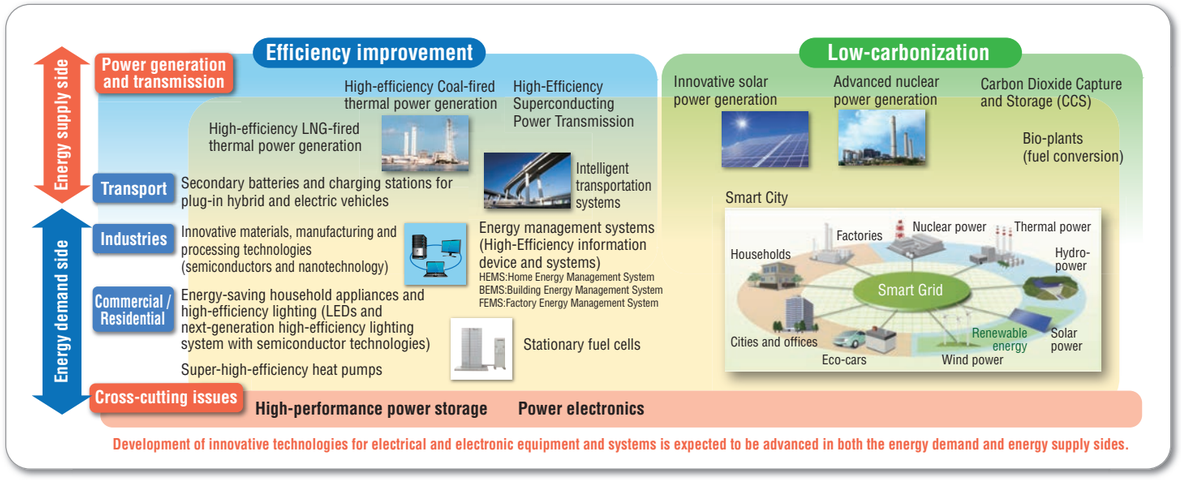
Contribution to Energy Supply by Technological Innovation

IEA estimates that CO_2 emissions will decrease by approximately 2Gt in 2020 through improving efficiency of thermal power generation, disseminating renewable energy such as solar power generation, and so on as low-carbon technologies for energy supply.
In addition to such technological development, we will contribute to medium-and-long term CO_2 emission reductions by advancing development of technologies to capture and store CO_2 (CCS*3) from exhaust gas of coal-fired thermal power, and so on.

*3 CCS: Carbon Dioxide Capture and Storage

Contribution by Facilitating Diffusion of Energy-efficient products and Services

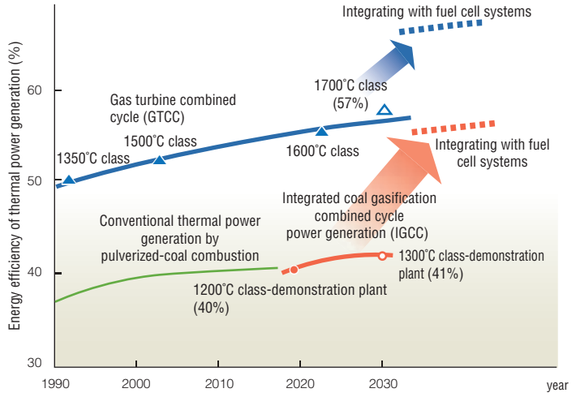
Approximately 30% of energy consumed in the world is used as electric energy by our products (motive power by motor, heat source by lighting, ICT and heat pumps).
We have achieved low-carbonization and energy-efficiency in various scenes where energy is used, through developing high-efficiency products and providing their combined systems and services. We will be also contributing to achieving secure, safe, and comfortable urban infrastructure by smart grids, intelligent transportation systems, and so on utilizing IT technologies.



Source: Created by Japan's EE Industries with data from "Ministry of Economy, Trade and Industry, Cool Earth Energy Innovative Technology Plan (2008)"

Leading High-efficiency Technologies for Thermal Power Generation

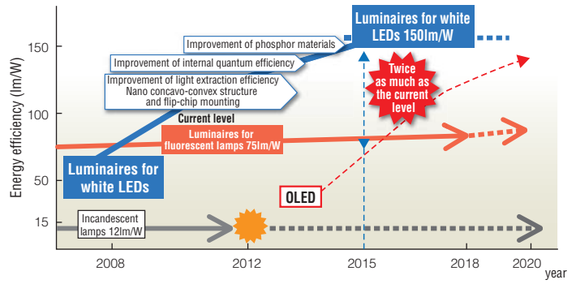
For thermal power generation (coal, oil, and natural gas), which supplies almost 70% of the electricity consumed in the world, we have been working on improvement of power generation efficiency by technological development such as increase of steam temperature and pressure, pulverized-coal combustion, and combined operation of gas turbines and steam turbines.
As a result, the efficiency of domestic thermal power generation is currently among the best in the world. Furthermore, we are advancing technological development to improve the efficiency by integrating solid oxide fuel cells with combined gas turbine systems, and so on.



Source: Created by Japan's EE Industries with data from Agency of Natural Resources and Energy

Achieving High Efficiency of Lighting

Luminaires have been improved in energy efficiency through transitions from incandescent lamps to fluorescent lamps, then to Hf fluorescent lamps, and further to LEDs. Development of luminaires for LEDs is in progress towards 2015 with the aim of doubling the energy efficiency compared with that of fluorescent lamps (75 lm/W).
Furthermore, next-generation high-efficiency lighting systems are also under development utilizing semiconductor technologies such as organic light emitting diodes.

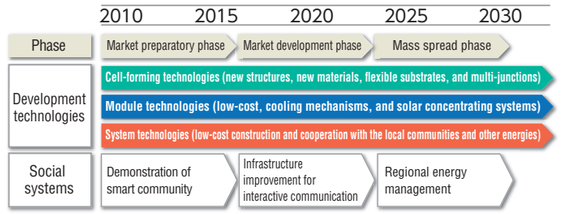


Source: Japan Lighting Manufacturers Association (formerly Japan Luminaires Association)

Technological Development in the Renewable Energy

Road map for technological development of solar power generation

For solar power generation, we are advancing development of modular technologies that embrace new technologies to form cells, cooling mechanisms, solar concentrating systems, and so on with the aim to enhance panels' power generation efficiency and resource-saving. To disseminate them, we are also engaged in developing appropriate systems for power system interconnection, such as energy storage functions and demand and supply control utilizing IT technologies.



Source: Created by Japan's EE Industries with data from NEDO, "PV2030+" and Japan Photovoltaic Energy Association, "JPEA PV OUTLOOK 2030"

Floating off-shore wind turbine systems

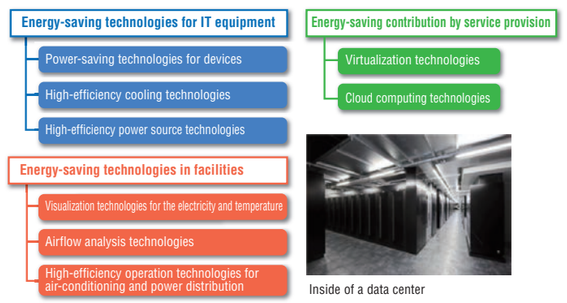
Development of off-shore wind power generation, where the strong wind can be expected stably, is in progress worldwide. Particularly for the large off-shore floating wind turbine system that is appropriate for the steep submarine topography of Japan, we have participated in demonstration projects (2 MW and 7 MW) off the coast of Fukushima and have been working on its commercialization.

Demonstration projects of floating off-shore wind turbine systems for reconstruction of Fukushima by a consortium of industries, governments, and the academic sector (image figure)

Energy-efficient Technologies of Data Centers

Energy consumption of data centers in 2020 is predicted to become approximately 4 times that in 2005. Energy consumption in buildings breaks down into 50% for IT equipment, 40% for air-conditioning, and the rest for lighting, and so on*4.
Besides raising device power-saving and virtualization to improve the utilization efficiency of IT equipment, technologies of air flow simulation to "visualize" the room temperature of data centers and so on have been introduced to advance the energy utilization efficiency.

*4 GIPC, "Survey and Estimation Committee Report (2013)"



Inside of a data center

2 Initiatives for Greenhouse Gas Emission Reductions in the Commercial and Residential and Industrial Sectors

-Contribution to greenhouse gas emission reductions and promotion of high-efficiency product manufacturing

Development and Promotion of Energy-Saving appliances

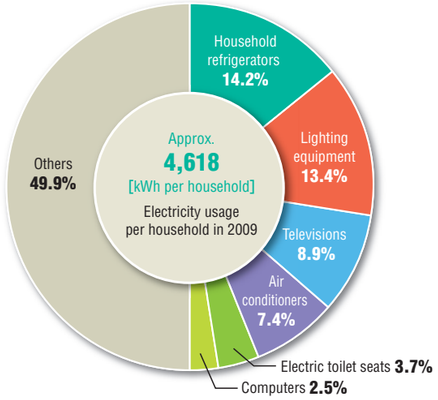
(Continuous initiatives to improve energy-saving performance)

As many home appliances and some of office equipment are designated as target devices of the Top-Runner Standard*5 under the energy-saving law, we have been engaged in enhancing energy-saving performance significantly by a steady step towards improvement of energy efficiency, reduction of standby power consumption, and so on through development and introduction of innovative technologies.

Through these initiatives, we will continue to contribute to energy-saving and CO_2 emission reductions in the household and residential sectors.

*5 Top-Runner Standard: The standard mandates improvement of energy consumption of home appliances in household and automobiles beyond products currently on the market

Power Consumption by Home Appliances in Household (2009)



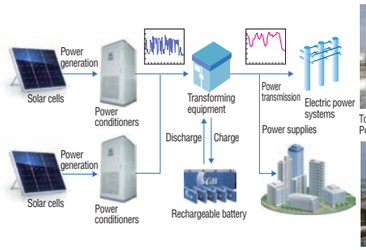
Source: Created by Japan's EE Industries with data from Agency of Natural Resources and Energy

Promotion and diffusion of Solar Power Generation

Introduction of solar power generation has been promoted rapidly in recent years with support by the "Purchasing Surplus Electricity Programme," the "Feed-in Tariff Scheme," and so on. Given the circumstances, we have initiated mass production of solar cells promptly and expedited to cost reduction and heighten efficiency.

For Mega-Solar power generation system that is expected to expand in the future, we will work on facilitating the spread as well as reducing the cost of the entire system by developing high-efficiency and large-capacity power conditioners, and so on.

An example of the structure of solar power generation systems

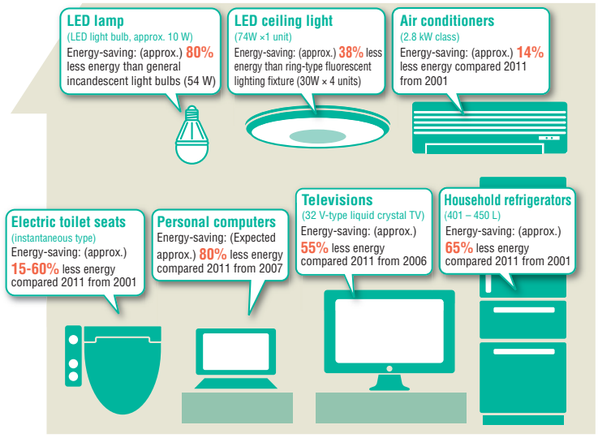


Source: Japan's EE Industries

Tokyo Electric Power Company, Ukishima Solar Power Plant (7MW)

Tohoku Electric Power Company, Hachinohe Solar Power Plant (1.5MW)

Improvement of energy efficiency of home appliances



Source: Created by Japan's EE Industries with data from Agency of Natural Resources and Energy and Association for Electric Home Appliances

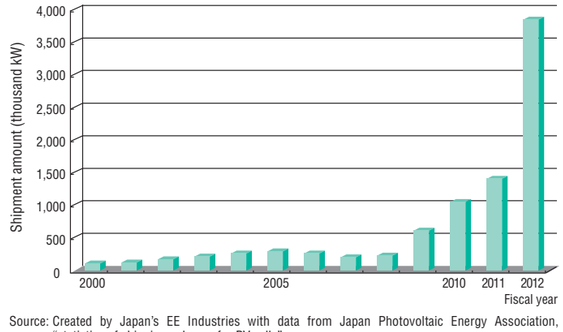
Promotion of Energy-Saving of Office Buildings by LED Lighting

Use of high-efficiency LED lighting that has high energy-saving performance and adoption of lighting design appropriate for each usage enable acceleration of energy-savings of the entire office building.

An office that accomplished full LED installation in the ceiling lighting has successfully reduced the expense of lighting to almost one-third that of fluorescent lighting by using personal control, motion sensors, and daylight sensors at the same time.

Source: IINO BUILDING - The grand prize of "Energy saving and effective lighting design award 2011", Ministry of Environment

Shipment transitions of solar power for domestic electricity (for household use and business use)



Source: Created by Japan's EE Industries with data from Japan Photovoltaic Energy Association, "statistics of shipping volumes for PV cells"

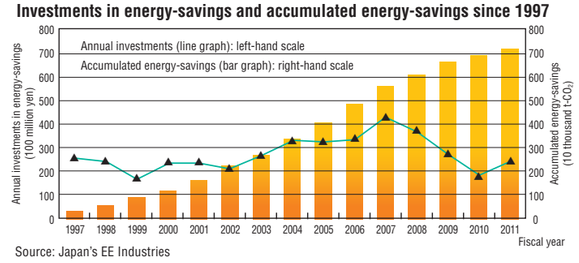
Promoting Energy-Efficient Manufacturing

We formulated a voluntary action plan for global warming prevention and have been investing as much as approximately 30 billion yen annually in energy-saving efforts since 1997. As a result, we achieved a reduction of almost seven million t-CO_2 emissions in total by 2011.

And continuous promotion of our initiatives has enabled us to reach the lowest level of greenhouse gas emissions per sales amount in the fields of devices, home electric appliances, etc., in comparison with other companies in the same businesses around the world.

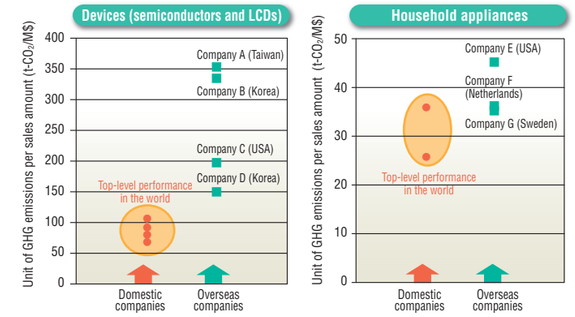
We will continue to expedite the manufacturing of products with proper energy efficiency by not only innovating production processes and improving energy-consumption efficiency but also by enhancing physical- distribution efficiency and promoting energy-saving measures in offices of all kinds.

Investments in energy-savings and accumulated energy-savings since 1997



Source: Japan's EE Industries

Unit of GHG emissions per sales amount in 2010 (in comparison with overseas companies in same business)



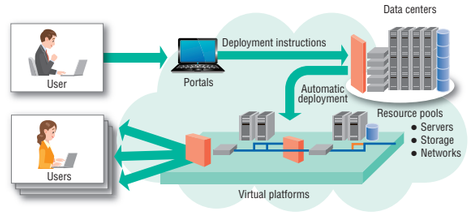
Source: Created by Japan's EE Industries with data from each company's financial report and the carbon Disclosure Project

Promotion of Energy-Saving Measures by IT Solutions

Energy-savings by cloud computing systems

Energy-savings can be achieved by integrating client server systems, which used to be placed in each office, into the servers of data centers to considerably reduce the number of servers.

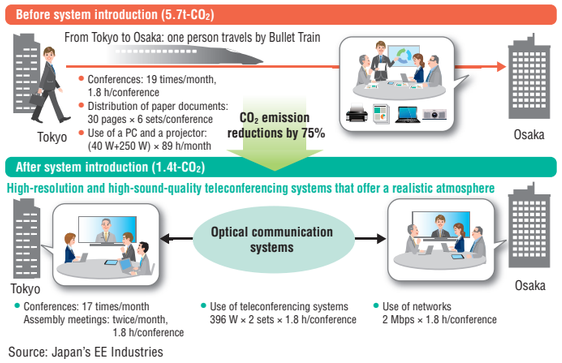
One successful example shows that the number of servers decreased by almost 90% as a result of integrating the client server systems in six offices worldwide into one data center.



Source: Japan's EE Industries

Energy-savings by remote teleconference solutions

The introduction of high-resolution and high-sound-quality teleconferencing enables smooth remote communications and significantly reduces the energy otherwise needed to travel, as well as the travel expenses and time.

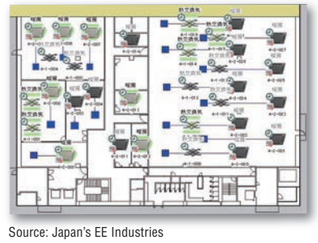


Source: Japan's EE Industries

Energy-savings by air-conditioning monitoring systems

We are significantly contributing to reducing energy-losses in factories and offices by rapidly optimizing air-conditioner operations using centralized control by IT.

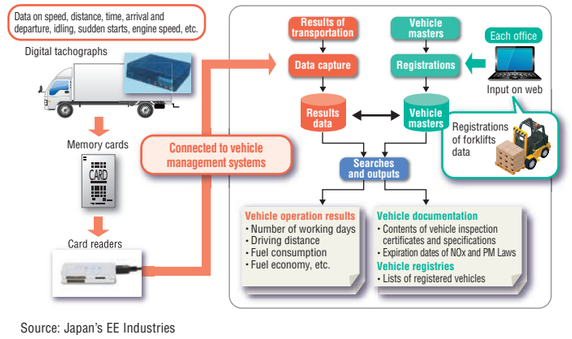
Examples include improved room-temperature settings, mode selectors, ON/OFF control, timer control, and demand control.



Source: Japan's EE Industries

Efficiency improvement of physical distribution systems by IT

Energy-savings for physical distribution are ongoing through improvements in load efficiency, the expansion of joint transportation, and the efficiency enhancement of transportation and delivery networks. And, by installing digital tachographs on transport vehicles, we are increasingly "visualizing" the improvements.



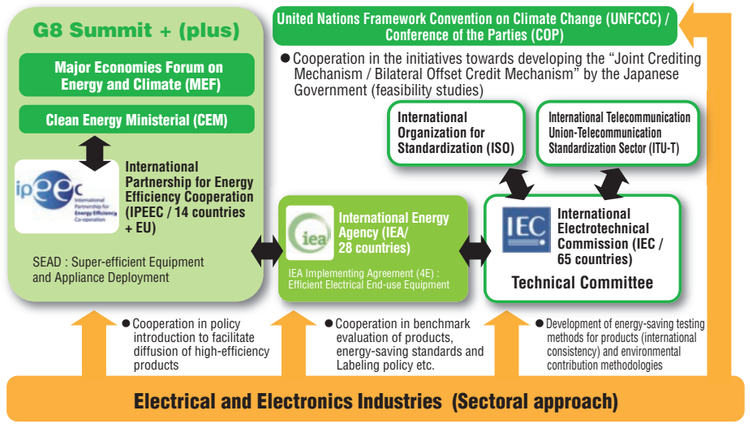
Source: Japan's EE Industries

3 Initiatives for Greenhouse Gas Emission Reductions through International Cooperation

-Global contribution through cooperation in international standardization and new reduction mechanisms

International Cooperation in Facilitating Diffusion of Low-Carbon and Energy Efficient Products

Policy introduction to facilitate diffusion of high-efficiency products and the methods to appropriately evaluate energy-saving performance are under discussion in various ways within the international framework. We are promoting the global adoption of low-carbon and energy efficient products, and have proposed evaluation and measuring methods for energy efficiency in international markets.



Source: Japan's EE Industries

Initiatives for international standardization (IEC*6) in the electric and electronic products sector

For international standardization of the rules of quantification, reporting, and verification of greenhouse gas emissions, we are advancing development of rational and transparent methodologies appropriate for the electric and electronic products sector.
Participating in the activities to facilitate diffusion of high-efficiency products under the International Partnership for Energy Efficiency Cooperation (IPEEC) and in the International Energy Agency (IEA) Implementing Agreement for energy-saving evaluation, we are also making various proposals globally for greenhouse gas emission reductions as well as appealing the excellent energy-saving performance of Japanese electric and electronic products.

*6 IEC: International Electrotechnical Commission

Participation in new mechanisms towards global warming prevention

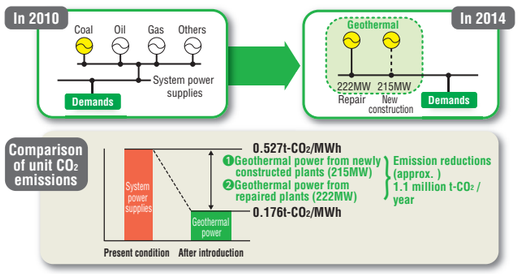
The Japanese Government advocates the introduction of the Joint Crediting Mechanism / Bilateral Offset Credit Mechanism*7 with a focus on the Asian region. Gathering our expertise that we have acquired to date, we evaluate the feasibility of global warming prevention policies of each country for the purpose of realizing these new mechanisms.

*7 Joint Crediting Mechanism / Bilateral Offset Credit Mechanism: Mechanisms to evaluate achieved contributions to greenhouse gas emission reduction or absorption from Japan in a quantitative manner for the purpose of contributing to global emission reductions, through facilitating diffusion of greenhouse gas emission reduction technologies, products, systems, services, and infrastructure as well as implementation of mitigation actions in developing countries. Japan intends to accelerate mechanism design while getting cooperation from host countries, and aims to start the mechanism as soon as possible after 2013 while ensuring the mechanism transparency to contribute to the discussions at the United Nations.

An example of conducted feasibility studies

- New construction and repair of geothermal power generation in the Philippines

Geothermal power generation is renewable energy that can generate large energy stably. In the case of the Philippines, the potential CO_2 emission reductions are estimated at almost 1.1 million t-CO_2 per year, as power supply from system power supplies (thermal power generation such as coal, oil, and gas) will no longer be required by the repair of power plants which are currently stopped and operation of newly constructed plants.

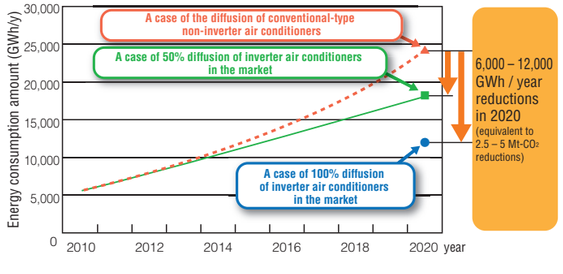


Source: Created by Japan's EE Industries with data from Joint Crediting Mechanism, feasibility studies report (March, 2011)

An example of conducted feasibility studies

- Diffusion of inverter air conditioners in Vietnam

In emerging countries where air conditioners are anticipated to be rapidly spread and expanded in the future, improvement of energy efficiency is expected by introduction of inverters that can control optimum current and voltage. In the case of Vietnam, it is estimated that electric power consumption can be suppressed to 12,000 GWh per year at most in the entire country in 2020.

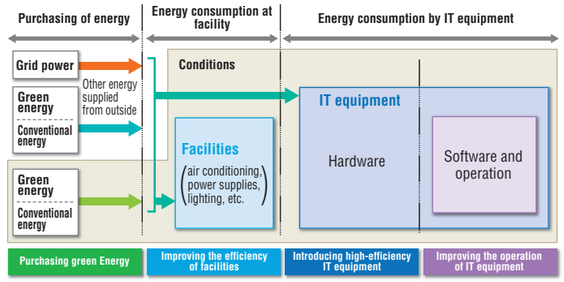


Source: Created by Japan's EE Industries with data from ABAC Vietnam meeting (July, 2012) with Joint Crediting Mechanism, feasibility studies

Evaluation of Energy Performance for Data Centers (DPPE*8)

The amount of information that data centers handle has been growing in geometric progression due to the spread of cloud-type services, smart phones, and so on. As a result, energy consumption has been also continuously increasing.
In response, Japan, the United States, and Europe collaborated to develop a set of metrics (DPPE) that evaluate energy consumption of data centers using four elements (purchasing of energy, use of facility, purchasing of IT equipment, and operation of IT equipment). They are the world's first successful metrics to comprehensively evaluate the use of green energy, energy-saving performance of IT equipment, and so on, in addition to energy consumption of conventional attached facilities.

*8 DPPE:Datacenter Performance Per Energy



Source: Green IT Promotion Council (2013)

Energy-saving Diagnoses of Asian Countries by IT

We not only send experts to Asian countries to carry out energy-saving diagnoses and related seminars but also receive the persons in charge from those countries in Japan to hold training and so on. We conduct field surveys to propose concrete measures from which we can expect energy-saving effects and the prediction of improvement effects.
For instance, in Singapore, we proposed that reduction effects of almost 2,000 t-CO_2 annually can be expected by energy management of buildings, optimum control of air conditioners by IT, and renewal of freezing machines to the compact type.

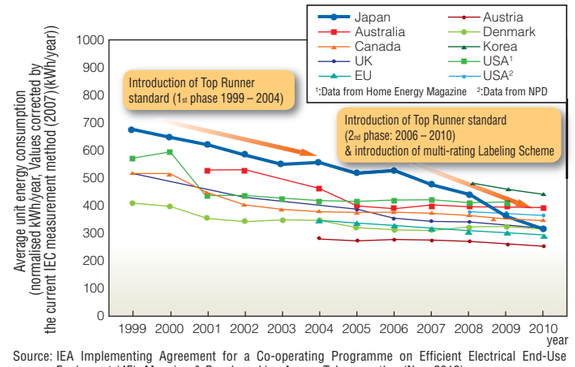
Initiatives for Smart City Development

UNEP*9 forecasts that "Two-thirds of the world population will live in urban areas in 2050." We will provide an environment where people can live securely and comfortably through "urban management" utilizing IT in these expanding cities.
Demonstration plans towards Smart City development are in progress in every region worldwide and we are actively participating in them*10.
We also positively support the international standardization (ISO/TC268/SC1) of "Smart Community Instructors Evaluation."

*9 UNEP: United Nations Environment Programme
*10 Demonstration plan of Smart city: Japan, USA, Spain, UK, France, Italy, Bulgaria, China, Vietnam, Thailand, Malaysia, India, and so on

International Evaluation of Energy-saving Performance of Electric Refrigerators

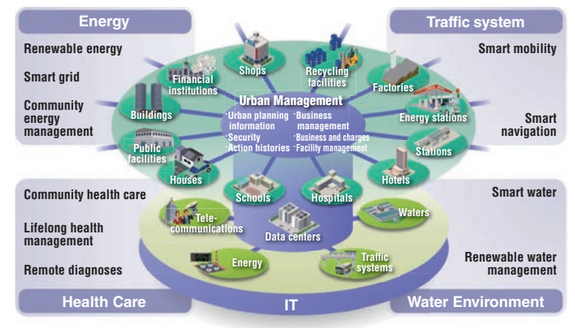
IEA evaluates the effects of energy-saving policies of every country through the benchmarks of energy-saving performance of electric and electronic products.
In Japan, in response to the policy introduction of the Top Runner standard and Labeling Scheme, household refrigerators have met the requirements with technological development, including compressors' performance improvement, inverter control, and introduction of vacuum insulation materials.
Japan's major improvements are at the top-level from a global standpoint. IEA also evaluates introduction of these policies and efforts of technological development to be effective for energy-saving measures in the household sectors.



Source: IEA Implementing Agreement for a Co-operating Programme on Efficient Electrical End-Use Equipment (4E), Mapping & Benchmarking Annex, Tokyo meeting (Nov, 2012)

Target facilities	Countries	Diagnoses Summary	Potentials of Energy-saving
Data centers	Vietnam	● Air-conditioning setting ● Verification of operation ● Thermohydraulic analyses ● Separation effects of cold and warm air by blank panels	-140t-CO_2/year
	Singapore	● Power supplies, air-conditioning, etc. ● Loss reductions in power supplies based on the PUE and DPPE measurements	-392t-CO_2/year
Buildings and public facilities	China	● Buildings (IT equipment, lighting, and air-conditioning) ● Utilization of visualized energy consumption data for energy-saving activities	-1t-CO_2/year
	Vietnam	● Offices (IT equipment and lighting) ● Energy-saving promotion by energy visualization ● Use of high-efficiency PCs	-33t-CO_2/year
	Vietnam	● Operational improvement of air-conditioning ● Efficiency increasing of lighting	-192t-CO_2/year
	Singapore	● Potentials of BEMS utilization ● Optimum control of air conditioners and renewal to compact freezing machines	-2,169t-CO_2/year
Factories	China	● Pumps for recirculating cooling water system ● Energy-saving by introduction of inverters	-590t-CO_2/year
	China	● Plants with large energy consumption ● Optimization of control based on simulation	-1,808t-CO_2/year

Source: Green IT Promotion Council (2011)



Source: Japan's EE Industries

4 Initiatives for Action Plan toward Achieving a Low-Carbon Society

-Electrical and electronics industries' Action Plan for Commitment to a Low-Carbon Society towards 2020

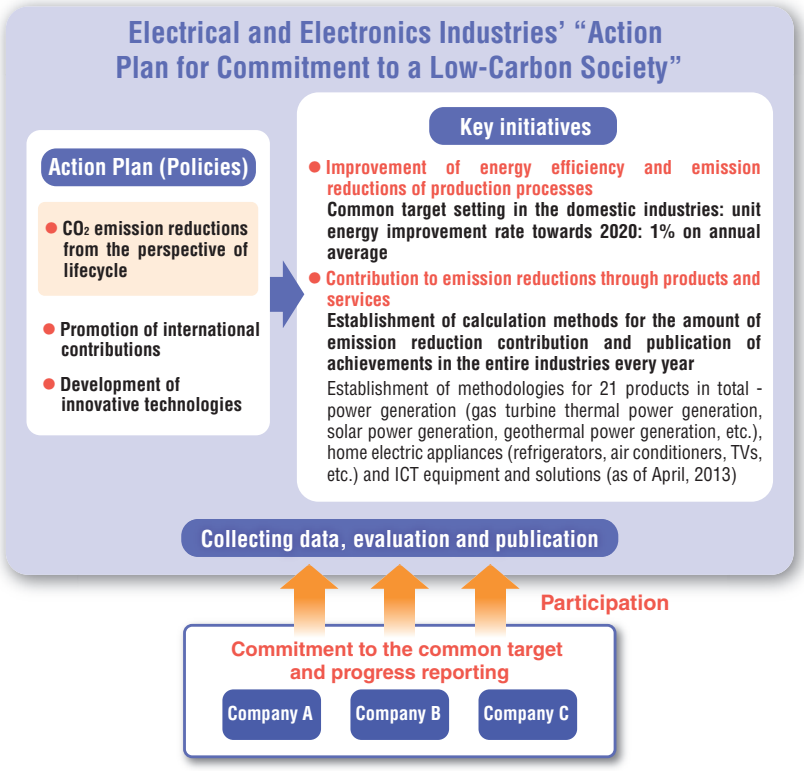
Electrical and Electronics Industries' "Action Plan for Commitment to a Low-Carbon Society"

Japan's EE industries have been actively working on global warming prevention on a global scale by promoting "innovative technological development and creation of environmentally conscious products" that contribute to stable energy supply and achievement of a low-carbon society as well as by striving for and strengthening of industrial competitiveness in light of the global market.

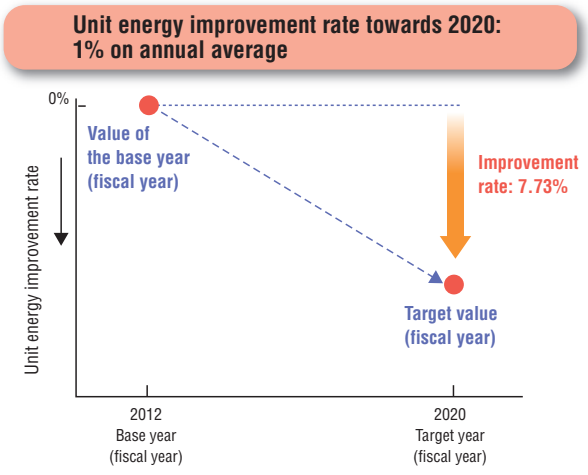
We participate in Keidanren's Commitment to a Low-Carbon Society*11 and are aiming to improve energy efficiency of production processes by 1% annually on average. For the purpose of contributing to emission reductions in society through products and services, we will establish calculation methods for the amount of emission reduction contribution and publish the achieved amount in the entire industries every fiscal year.

As of May 2013, almost 70% of member companies participate in the Action Plan for Commitment to a Low-Carbon Society.

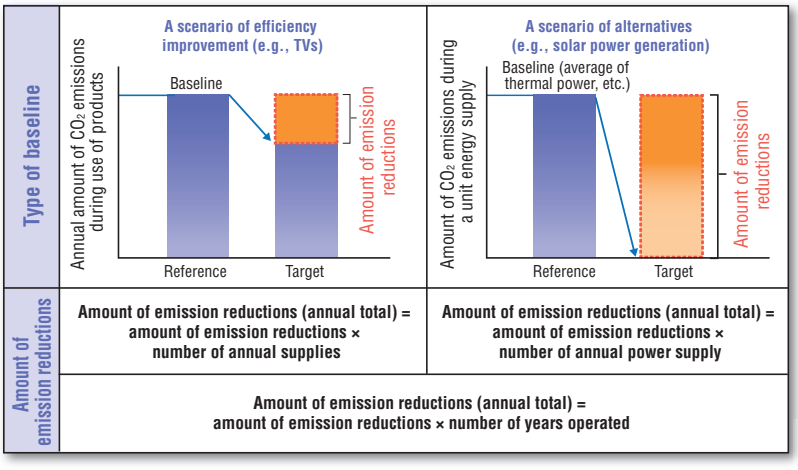
*11 Keidanren's Commitment to a Low- Carbon Society
http://www.keidanren.or.jp/en/policy/2013/003.html



Common target of the industries and participating companies



Evaluation methods for emission reductions



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