

## A low-carbon society to reduce global warming

### Worldwide commitments

The Kyoto Protocol was adopted in 1997 in Kyoto at the 3rd session of the Conference of the Parties to the United Nations Framework Convention on Climate Change (COP3), where developed countries set their numerical target for reduction of greenhouse gases (GHGs) over the first commitment period (2008 – 2012). However, the U.S.A. does not participate in the Kyoto Protocol, and developing countries such as China and India do not have obligations to reduce greenhouse gases.

The process for establishing a new post-2020 framework applicable to all Parties was agreed upon at COP17 in Durban, South Africa. Japan is now making utmost effort to establish a new, fair and effective legal framework applicable to all Parties,

which will be agreed upon in 2015 and come into effect in 2020.

In FY 2011, Japan's total greenhouse gas emissions were 1.308 billion tons (CO<sub>2</sub> equivalents), which was increase by 4.0% compared to the previous year. Japan is embarking on the full-scale operation of the Joint Crediting Mechanism (JCM) in which Japan facilitates the diffusion of advanced low carbon technologies, products, systems, services, and infrastructures as well as mitigation actions in developing countries. Following an appropriate evaluation of the contribution to GHGs emission reductions or removals in developing countries, Japan will use the generated credits to achieve its emission reduction target.

### Local efforts

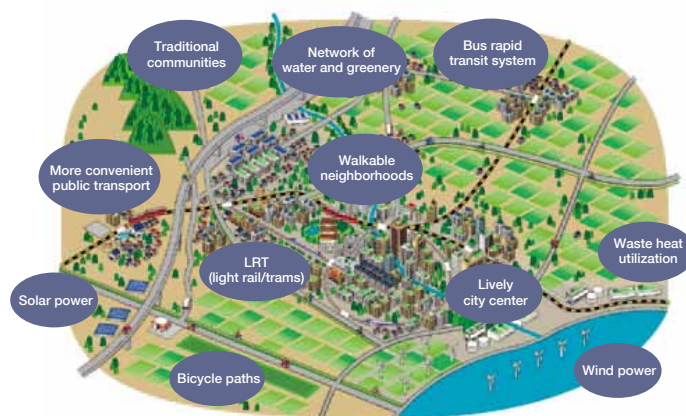
Low carbon regional development as for the domestic issues, the Act on Promotion of Global Warming Countermeasures was revised, which required another Global Warming Countermeasures Plan, to be replaced by the Kyoto Protocol Target Achievement Plan valid until 2012. Moreover, local governments need to formulate their action plans based on the national plan, and the number of local authorities engaging in such plans is steadily

growing. Furthermore, in order to actively provide financial and budgetary support to low carbon regional development projects via the action plans by local governments the Renewable Energy Promotion Project (Green New Deal Fund) was greatly extended in FY 2013, along with other measures to support locally-led global warming countermeasures.

#### Low carbon regional development

Create lively, sustainable regions featuring renewable-energy/low-energy compact cities with enhanced public transport and use of unutilized energy sources. Aim to achieve:

- Lively regional economies
- Greater resilience to disasters
- Greater convenience and amenity for everyday activities
- Lively communities



Source: Ministry of the Environment

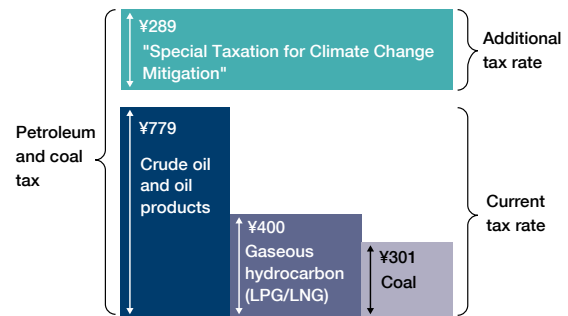
## Greening of the Tax System

Early introduction of taxation to counter climate change is necessary not only to alleviate the burden on future generations, but also to lead the world in establishing a low carbon society and to facilitate the development of environment-related industries by promoting Green Innovation.

"Carbon Dioxide Tax of Climate Change Mitigation" was implemented in October 2012 in order to strengthen climate change mitigation through tax incentives and also to promote energy saving, renewable energy, and low carbon technologies to reduce CO<sub>2</sub> emissions from energy use. The tax rate will be gradually increased by April 2016, while a preferential treatment such as tax exemption and

refund shall be made to some businesses due to the tax system revisions.

### Tax Rates per Ton of CO<sub>2</sub> Emissions under the "Special Taxation for Climate Change Mitigation"



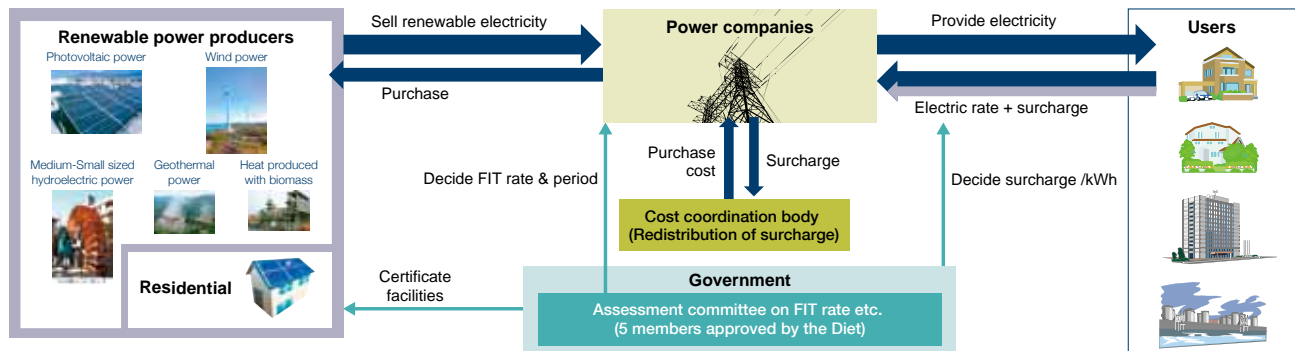
Source: Ministry of the Environment

## The Feed-in Tariff Scheme for Renewable Energy

This is a scheme to foster renewable energy in Japan with the help of all electricity customers. Electric utilities will be obliged to purchase electricity generated from renewable energy sources such as photovoltaic power (PV) and wind power on a fixed-period contract at a fixed price. This will

promote the introduction of renewable energy. Costs of purchased electricity generated from renewable energy shall be transferred to electricity customers all over Japan in the form of a nationwide equal surcharge. They shall pay the surcharge for renewable energy proportional to electricity usage.

### Feed-in Tariff (FIT) from July 2012



Source: Agency for Natural Resources and Energy

## Forest sinks

Forest sinks are one of effective measures for reducing greenhouse gases, as photosynthesis by the trees absorbs and fixes CO<sub>2</sub>. This is significant for a country like Japan that has lots of forested areas. Lack of forest management to give an integrated production infrastructure all the way from upstream to downstream processes and ageing and depopulation of mountain village areas make forestry

unattractive to forest owners. This situation hinders proper management of forests, adversely impacting their ability to adequately absorb carbon dioxide. For this reason, Japan's approach to forest sink measures requires integration of a number of aspects, including forest management, conservation, wood supply, and effective utilization of wood.

### Forest carbon sink

	1962	1990	2012
Afforestation: Planting trees on land that has not been forested for 50 years	Only a few areas eligible		
Reforestation: Planting trees on land that was converted to non-forest uses before 1990	Only a few areas eligible		
<b>Forest management:</b> A system of practices aimed at fulfilling the various roles of forests in a sustainable manner	Issue: How to ensure human intervention		

Source : Forestry Agency, Forest carbon Sink Measures

\* "Forest management" was added to recognize the contribution to global warming measures of countries that have already planted forests, and consequently have little spare land for new planting.

## Low-carbon society created by widespread use of renewable energy

Since the oil crises, Japan has worked continually to save energy, and this joint effort by the public and private sectors has raised energy efficiency (energy supply/GDP) by about 40%. Moreover, in order to

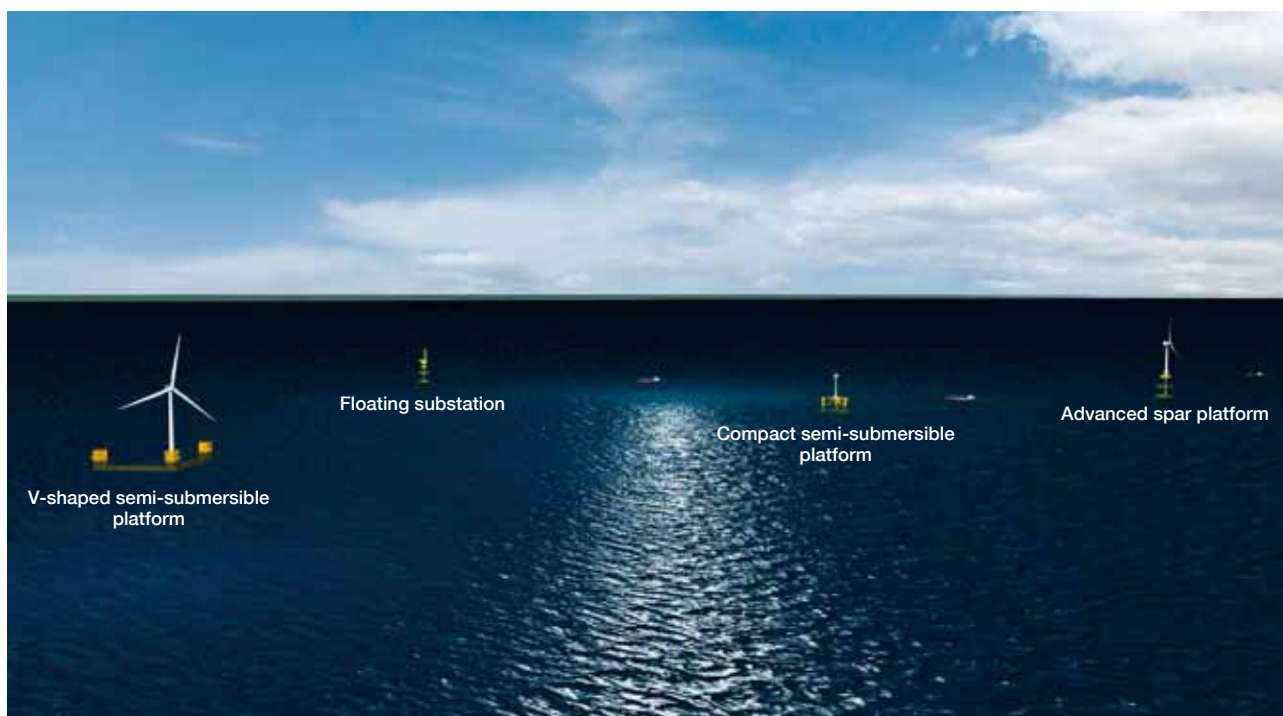
achieve a low-carbon energy supply structure, Japan is actively working on research, development, and deployment of technology for renewable energy sources such as wind and solar power.

### Floating offshore wind farms

Japan's first floating offshore wind turbine (commercial scale (2MW)) was installed and has been in operation since FY2010 as a demonstration project near Kabashima in Goto City, Nagasaki prefecture. A small pilot scale (100kW) experimental turbine installed in the ocean near Kabashima began generating in FY2012. Also, in FY2011, a consor-

tium of ten private-sector companies and one university commenced to create the world's first floating offshore wind farm, at a location 20km off the coast of Fukushima prefecture. This demonstration project has recorded an overall output of 16,000 kW.

### An illustrated image of Floating wind farm



Source : Fukushima Offshore Wind Consortium

### Cool energy

In the heavy snowfall areas of Hokkaido and Tohoku, there is a long history of storing some of the ice and snow in an ice room for later use. Today, there are growing numbers of initiatives utilizing this idea. By storing ice and snow until the summer, it can be used for refrigerating produce or for cooling rooms. At New Chitose Airport, the main airport known as an entrance to Hokkaido, snow falling within the airport perimeter is collected and piled up for a long term stored until the summer. One reason for this approach is to prevent deicing fluids used at the airport from entering the river system when the snow melts. The chilled water produced when part of the snow pile

melts is fed to the terminal building and used as the energy source for summer air-conditioning. This system successfully prevents river pollution as well as reducing carbon dioxide emissions.

### Snow and ice storage at New Chitose Airport



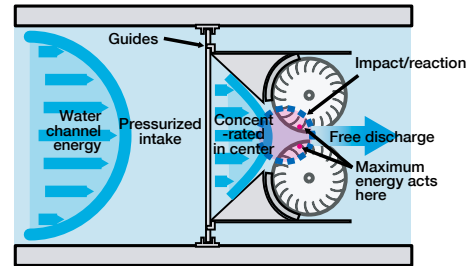
Photo: Hokkaido Bureau of Economy, Trade and Industry, *Cool Energy 5*

## Small company innovations (Ultra-low head hydropower, fuel from microalgae)

Japan's reputation for skilled manufacturing can be seen in the innovations produced by small companies. For example, a Tokyo-based company has produced a micro-hydropower system that can work with only a very low head of water and does not require a dedicated water channel. The system can be fitted to an ordinary agricultural water channel that is close to horizontal, and generates electricity from the water flowing past. Another example is a research lab in Tsukuba, Ibaraki prefecture that is involved in a project to sell biofuel produced using oil derived from microalgae. This project aims to produce biofuel to run diesel generators in 2014, capable of being used

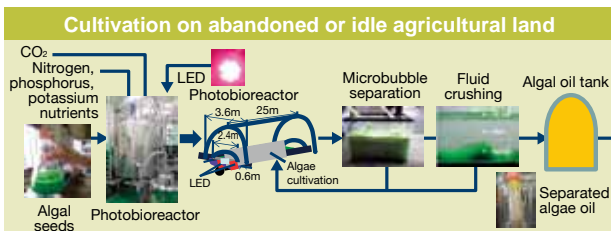
as jet fuel from 2015. Construction of a full-scale manufacturing plant commenced in 2012.

### Ultra-low head micro-hydropower for areas away from electric grid

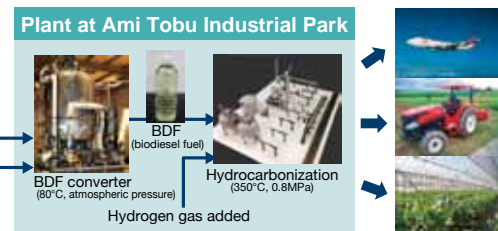


Source: Seabell International Co., Ltd.

### Biofuel production by refining oil from microalgae



Source: Research Institute of Tsukuba Bio-Tech

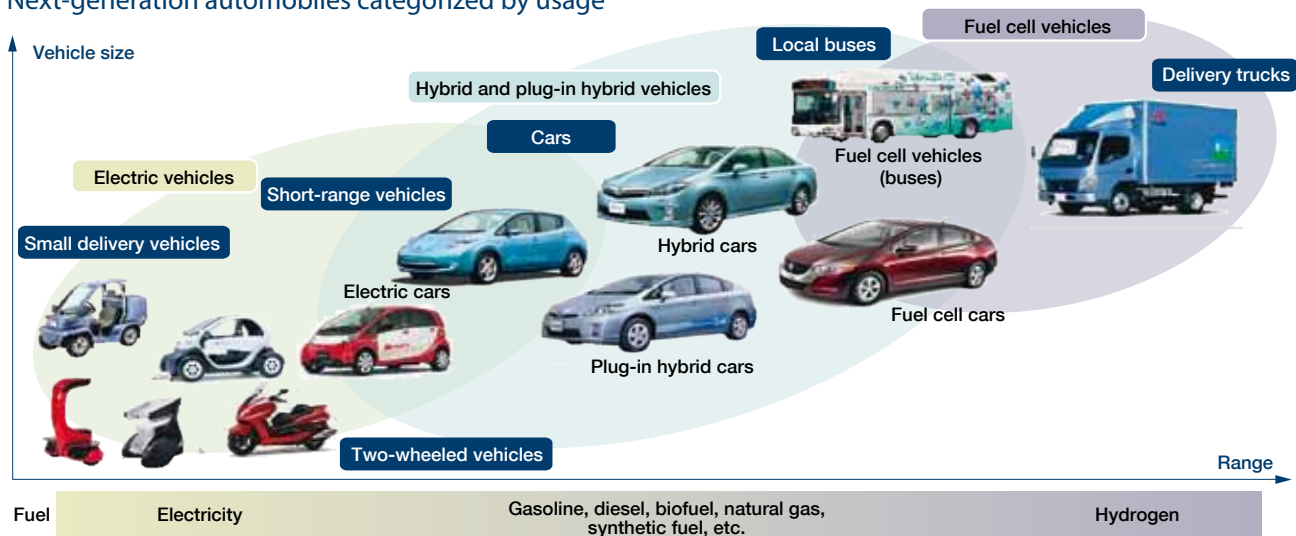


## Next generation vehicles

To target the widespread adoption of next-generation vehicles, along with better fuel economy for conventional vehicles, Japan has used a variety of schemes, including subsidies and tax breaks for eco-cars with high fuel efficiency and other environmental performance benefits. This approach has successfully enhanced the environmental performance of vehicles and facilitated deployment of vehicles using the new technologies. The next-generation vehicles currently used most extensively are hybrid vehicles that are

fueled by both electricity and gasoline. Also becoming popular are plug-in hybrids, which are hybrid cars that can be recharged from an external power supply, and electric cars that do not directly use fossil fuels at all. Fuel cell vehicles that use hydrogen as fuel are currently at the development and demonstration stage in preparation for commercial application. In future, these are expected to play their part as one of the choices for next-generation vehicles.

### Next-generation automobiles categorized by usage



Source: Japan Automobile Manufacturers Association