- 3rd Project Year (17 - 29 April 2016, 17 - 23 April 2016, 24 - 29 April 2016)

JICA Training in Japan for the Kingdom of Thailand

Measures Against Global Warming by Niigata City

Tomedoki
(Niigata City global warming prevention character)

19th April 2016

Niigata City Environmental Section

Profile of Niigata City

Niigata City

[Population]
Japan: about 127 million
Niigata Prefecture: about 2.37 million
Niigata City: about 800,000

[Area]
Japan: 377,900 km^2
Niigata Prefecture: 12,580 km^2
Niigata City: 730 km^2

[Location]
Longitude: 139.04 degrees east
Latitude: 37.92 degrees north

Features of Niigata City

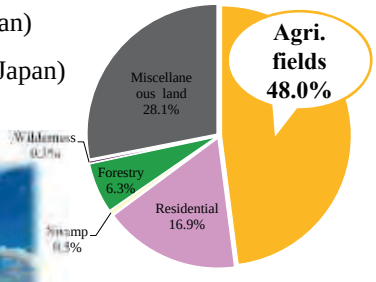
[Main Industries]
Service industries, retail, manufacturing (food production such as rice snacks and fish cake, chemicals, pulp and paper, etc.)

[Land use] Agriculture 48% (28,500 ha)

[Food self-sufficiency rate] 63% (highest among government ordinance cities)

[Yield of paddy-field rice] 145,200 t (largest in Japan)

[Number of authorized farmers] 3,122 (largest in Japan)



■ Land use in Niigata City (2010)

Niigata's City Planning Vision

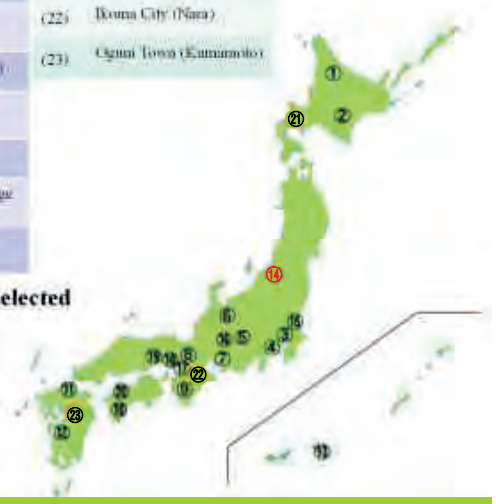
"To be an environmentally healthy city in which the rural and the urban are interwoven"

Aiming to be a rural environmental city, utilizing Niigata's characteristic as Japan's No. 1 rural city, in which people and values such as food, culture, energy, etc., are circulated between the urban and rural areas, for the benefit of all

Selected as "Environmental Model City"

Primary Selected Cities		Secondary Selected Cities		Tertiary Selected Cities	
(1)	Shimokawa Town (Hokkaido)	(14)	Niigata City (Niigata)	(21)	Niseko Town (Hokkaido)
(2)	Obihiro City (Hokkaido)	(15)	Tsukuba City (Ibaraki)	(22)	Kouna City (Nara)
(3)	Chiyoda Ward (Tokyo)	(16)	Mitake Town (Gifu)	(23)	Oguni Town (Kumamoto)
(4)	Yokohama City (Kanagawa)	(17)	Amagasaki City (Hyogo)		
(5)	Iida City (Nagano)	(18)	Kobe City (Hyogo)		
(6)	Toyama City (Toyama)	(19)	Nishiawakura Village (Okayama)		
(7)	Toyota City Aichi)	(20)	Matsuyama City (Ehime)		
(8)	Kyoto City (Kyoto)				
(9)	Sakai City (Osaka)				
(10)	Yusuhara Town (Kochi)				
(11)	Kitakyushu City (Fukuoka)				
(12)	Minamata City (Kumamoto)				
(13)	Miyakojima City (Okinawa)				

Niigata City was selected in March 2013



Niigata City Global Warming Countermeasures Action Plan (Environmental Model City Action Plan)

History of Adoption of the Plan

2009 **Adoption of "Niigata City Global Warming Countermeasures Action Plan"**
Action plan in accordance with the Act on Promotion of Global Warming Countermeasures (Article 20-3)

2009 Establishment of Niigata City Global Warming Countermeasures Local Promotion Committee

Members: Citizens' groups, private sector, climate action promotion officers, administration (Secretariat: Niigata City)
Objective: To achieve targets of the Action Plan
Activities: Provide education to citizens and private companies regarding promotion of global warming prevention activities

2013 Niigata City was selected as Environmental Model City

2014 Adoption of Niigata City Global Warming Countermeasures Action Plan as **"Environmental Model City Action Plan"**

Steps to Adoption of the Plan

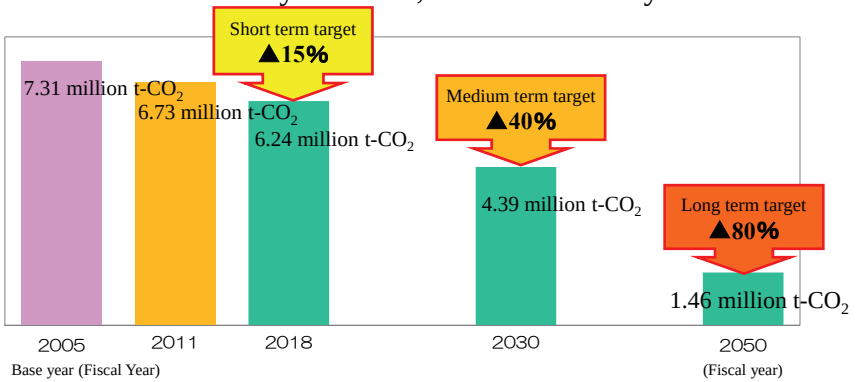
Date	Details
April *2013-*	Survey and analysis of status of global warming within the city
July	Survey and analysis of policies and measures within the City Office
Sept	Organization of Adoption Committee Committee members: Academics, representatives of the energy industry, representatives of the transport industry, residents' organizations, residents
Nov – Feb *2014*	Adoption Committee Meetings (4 times)
Feb	Presentation of draft plan to Niigata City Council Meeting
March	Opinions sought from members of Niigata City Environmental Deliberation Council and Niigata City Global Warming Countermeasures Local Promotion Committee
March – April	Invitation of public comment
April	Report to Niigata City Global Warming Countermeasures Headquarters
April	Adoption and publication of Plan

Overview of the Action Plan

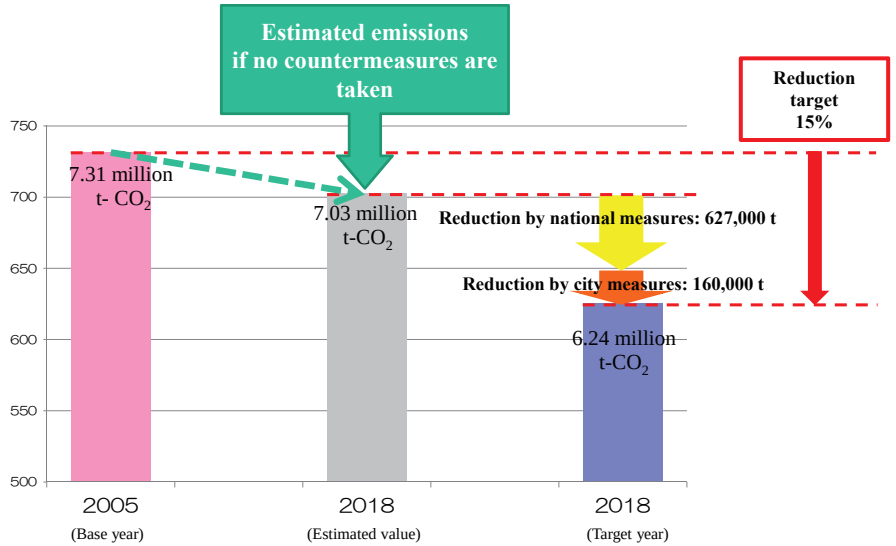
(1) Target period: Fiscal year 2014 to 2018

(2) Scope: CO_2 emissions from Niigata City area

(3) Target values: From FY 2005 level, 15% reduction by FY 2018, 40% reduction by FY 2030, 80% reduction by FY 2050



Short Term Target Setting



Basic Principles for Implementation of the Plan

1 Conservation and sustainable use of rural environment

2 Establishment of smart energy city

3 Shift to low carbon transport

4 Shift to low carbon lifestyle

Summary of Main Countermeasures

1 Conservation and sustainable use of the rural environment

● **Effective utilization of rural resources**
<Focus Measure>
Formation of 'Niigata New Food Valley'

● **Promotion of interaction between urban and rural**
<Focus Measure>
Promotion of Niigata Educational Farm

Agricultural activity center

Agri-park
Experience of agriculture by all elementary school children within the city

Ikutopia Shoku Hana
PR and dissemination base of food and flower brands

Creation of new value in agriculture

Summary of Main Countermeasures

2 Establishment of Smart Energy City

● **Promotion of the use of unused energy**
<Focus Measure>
Utilization of sewage heat and promotion of co-digestion of sewage sludge

Use of sewage heat
Sidewalk snow melting and air conditioning system

Chubu wastewater treatment plant
Power generation using digestion gas (560 kW)

● **Promotion of use of biomass**
<Focus Measure> Promotion of use of plant biomass

Use of plant waste as energy
Pellets, firewood

Pellet boiler
Use of rural resources (biomass) for energy

Summary of Main Countermeasures

3 Shift to low carbon transport

● <Focus Measure> Restructuring the Public Transport Network

Ensuring day-to-day transport within the area
Enhancement of local and residential buses

Smooth movement within the city center
Introduction of BRT (next generation bus system)

● **Shift to Low Carbon Mobility**

Promotion of the spread of EV chargers
Introduction to public facilities

Development of bicycle paths

Promotion of eco-driving

Summary of Main Countermeasures

4 Shift to low carbon lifestyle

● <Focus Measure> Introduction of low carbon lifestyle

Enhance understanding of energy efficiency at home
Training courses to promote energy efficiency

Promotion of 3R, reduction of waste
Development of collection system, thorough waste separation

Incentive for environmental activities
Point award system

● **PR and outreach activities**

Holding events
Niigata City Environmental Fair

Publicity through homepage, etc.
Establish environmental website, use of SB

Promotion System of the Plan

Joint Promotion by Citizens, Companies, and Administration

- Niigata City Global Warming Countermeasures Local Promotion Committee
- Niigata City Biomass Utilization Promotion Council
- Niigata City Smart Energy Promotion Association
- Niigata City Mobility Management Promotion Council

Promotion by Cooperation among Relevant Administrative Organizations and other groups

- National government
- Niigata Prefecture
- Niigata Prefecture Global Warming Prevention Activities Promotion Center

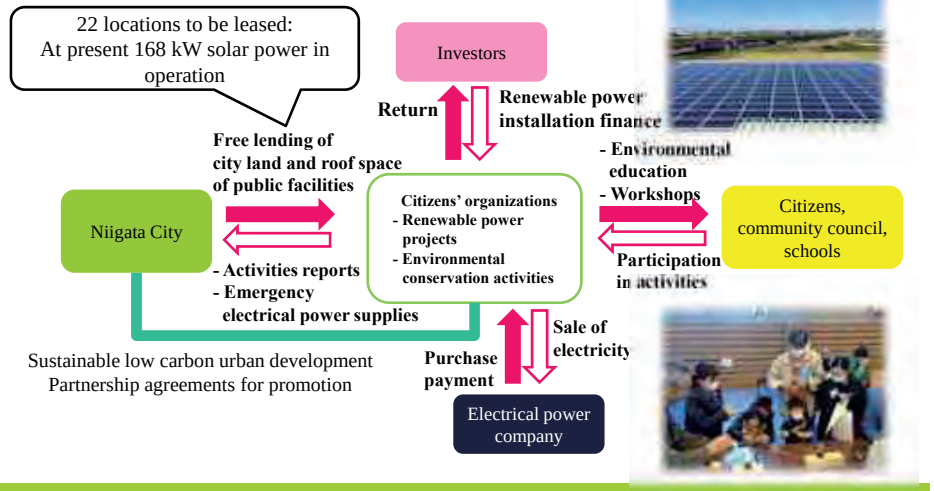
Promotion by Cooperation within the City Government

Global Warming Countermeasures Headquarters (Head: Mayor)

Cooperation with citizens

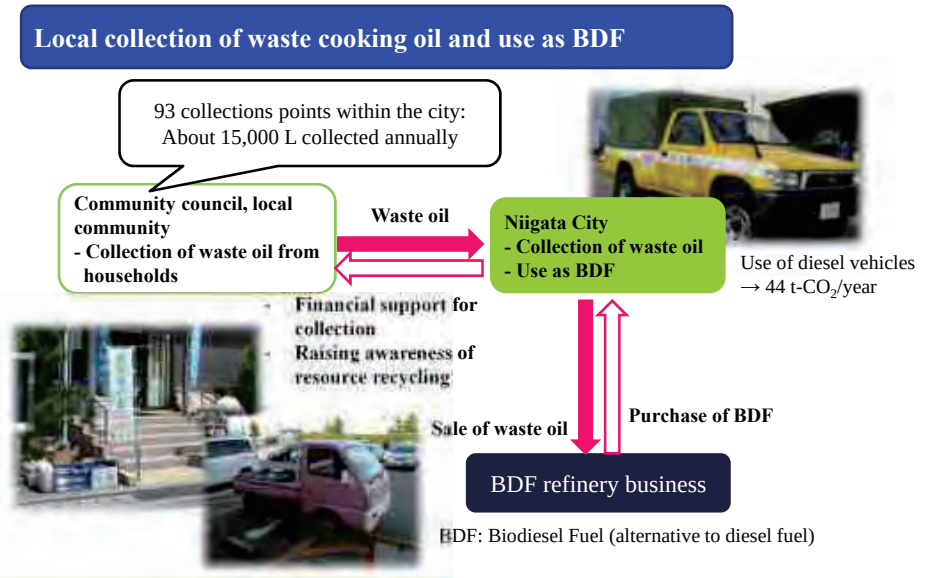
Example of Initiatives in Cooperation with Citizens (1)

Promotion of renewable energy in cooperation with citizens' organizations



Example of Initiatives in Cooperation with Citizens (2)

Local collection of waste cooking oil and use as BDF



環境モデル都市

ありがとうございました。

Thank you very much.

Carbon Offsetting Efforts of Niigata Prefecture

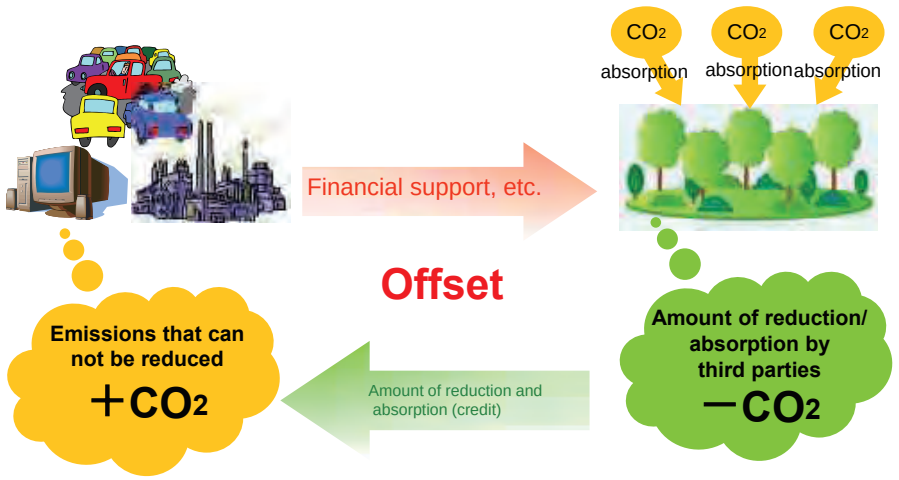
April 19, 2016

JICA Training in Japan

"Project for Capacity Development on Climate Change Mitigation/ Adaptation in the Southeast Asia Region"

Global Environment Office, Environmental Planning Division,
Department of Environmental and Civic Affairs,
Niigata Prefectural Government

What is Carbon Offsetting? (1)



•A carbon offset is a reduction in the carbon dioxide that is emitted by individuals or through business activities in order to compensate (offset), in whole or in part, for the carbon dioxide emissions that cannot be reduced in our daily lives, and are generated by the purchase of reduction and absorption efforts (carbon credit) by other parties.

What is Carbon Offsetting? (2)

Carbon offsetting is:

- ○ Voluntary efforts by companies and individuals
  ※ Different from emissions trading
- ○ Purposes vary such as to differentiate their own products or to contribute to global warming countermeasures

⇩

Voluntary GHG emissions reduction efforts

National government is operating "J-Credit Scheme" in Japan

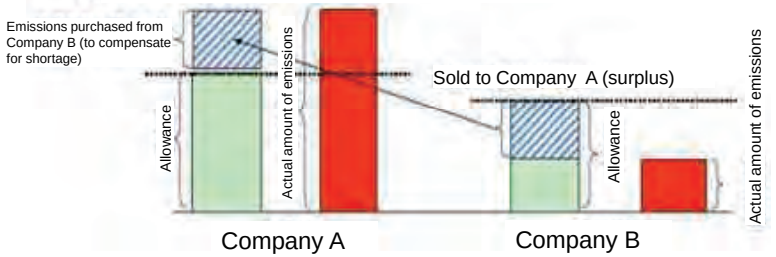
Niigata Prefectural Government operates "Niigata J-Credit Scheme," which is approved by the national government.

※ Niigata Prefecture is working on the promotion of carbon offsetting as a scheme that provides opportunities to take actions against global warming.

Emissions Trading Scheme in Japan

○ GHG emissions caps (maximum allowed amount) are set for companies
○ Companies can trade their caps in addition to making their own reduction efforts.

● Image of Emissions CAP-and-Trade scheme



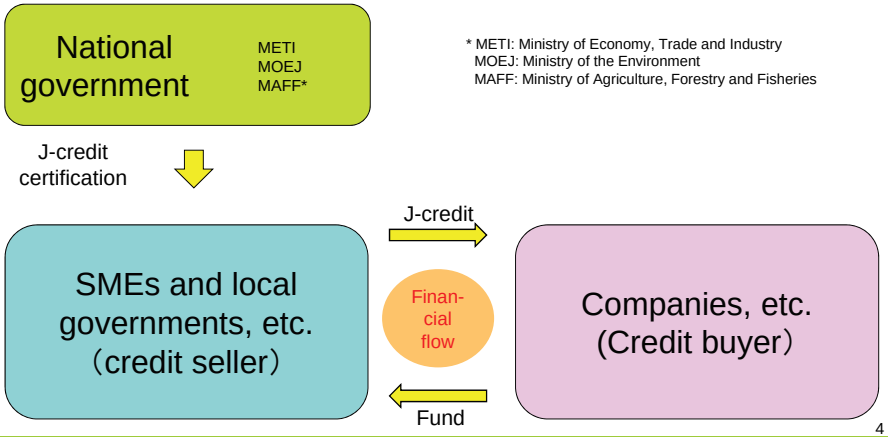
Source: Ministry of the Environment

⇒ Still under consideration by national government

Overview of Niigata J-Credit Scheme (1)

○ A scheme of certifying the amount of GHG emissions reduction as a “credit” through such measures as introduction of energy-efficient facilities and forest management by SMEs, etc.,

○ The scheme aims to promote investment in energy saving and low-carbon investments to SMEs and local governments. It also and the promotion of fund flow in Japan, and it is expected to achieve a good balance between the environment and the economy.



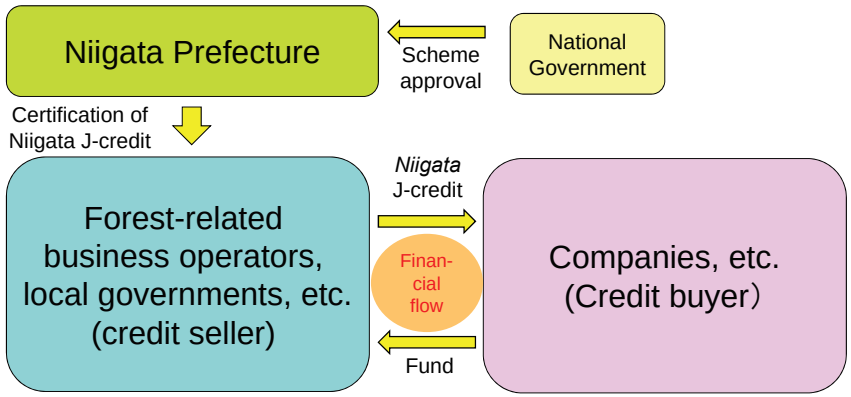
* METI: Ministry of Economy, Trade and Industry
MOEJ: Ministry of the Environment
MAFF: Ministry of Agriculture, Forestry and Fisheries

Overview of Niigata J-Credit Scheme (2)

○ Niigata Prefectural Government certifies and issues credit for the amount of CO_2 reduction and absorption through forest management projects inside the prefecture.

⇒ ***The Niigata J-Credit Scheme focuses on forest management activities***

○ Credit certification and issuance system of Niigata Prefecture has been approved by the national government. The Niigata J-Credit Scheme is ensured for the same credibility as the national J-Credit Scheme.



Certification and Approval of Provincial Schemes by National Government

Certification of provincial J-VER programs and approval of local J-credit schemes

● National government (program administrator) certifies and approves provincial credit-certification and issuance.

In accordance with the national program (2013), these provincial schemes are approved as “provincial J-VER Programs” (from 2009) or as “local J-credit schemes.”

● Credits issued by provincial governments through the above process are registered in the same category as credits issued by the national government.

Jan. 2010: Niigata Offset Credit Scheme was certified by the national government (first case in Japan)
Oct. 2013: Approved as local J-credit scheme (transferred to the new national scheme)

- The entire process from project application to Niigata credit issuance is completed in the prefecture.
  → Promote participation from forest management operators in Niigata
- Register Niigata credit certified by the prefectural government in the national registry
  → Credit can be used by companies across the country

Benefits of Carbon Offset Efforts

Benefits in corporate activities

● Promote global warming prevention measures
  •Reduction of GHG emissions by companies
● Differentiation of products and services
  •Add values of environmental consideration and forest conservation to products and services

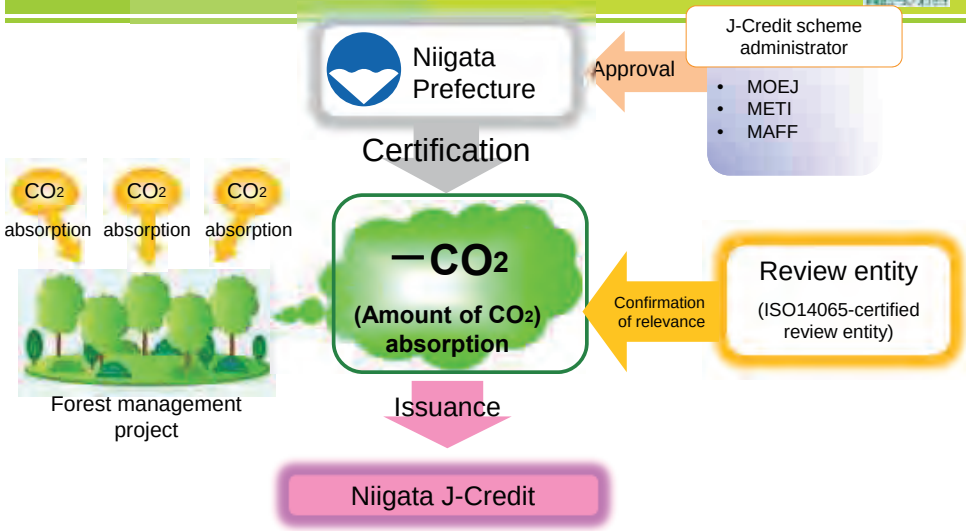
Contribution to local environmental conservation

● Global warming prevention
  •Raise residents’ awareness of global warming prevention through offset products
● Promotion of forest management
  •Promote sound forest management through credit sales revenue

Contribution to local promotion

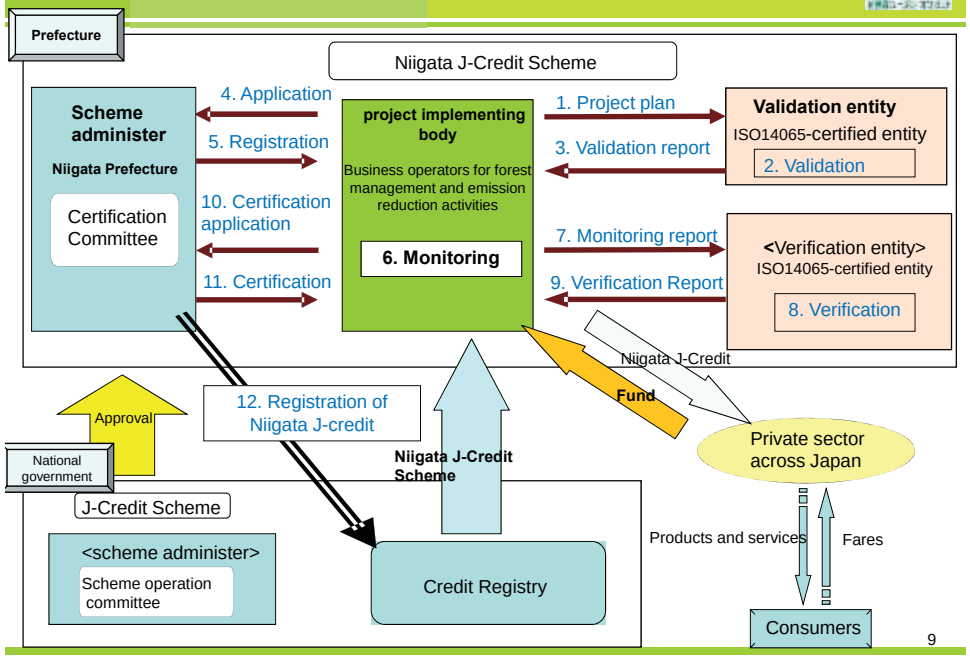
● Expansion of market for local products
  •Add value to local products to establish new markets and outlets.
● PR of local attractiveness
  •Local PR using offsets

Niigata J-Credit Scheme



Niigata J-credits are highly credible and are certified and issued under the Niigata J-Credit scheme, which was approved as a regional scheme under the national J-Credit scheme. As these credits derive from the absorption amount generated through forest management in Niigata, the funds to purchase the credits are restored to the forest management activities in the prefecture.

Mechanism of Niigata J-Credit Scheme



History of Niigata Carbon Offset Scheme

Niigata Carbon Offset Scheme	(Reference) National Scheme
June 2008 A carbon offset model project implemented in Sado City	Oct. National credit scheme (certification of emissions reduction) launched by METI, etc. Nov. Offset credit (J-VER) scheme launched by the Ministry of the Environment
May 2009 Niigata carbon offset scheme launched Aug. Niigata Prefecture Norin Kosha registered Sado ibis forest development project as forest absorption program, the first of its kind in Japan.	
Jan. 2010 Nation's first prefectural J-VER program certified by the national government	
Aug. 2013 Application for approval of regional J-credit scheme filed with the national government Oct. 2013 Nation's first regional J-credit scheme approved by the national government	April J-credit scheme was launched as an integrated version of national credit scheme and offset credit (J-VER) scheme
April 2016 6 projects have been registered in the prefecture. Volume of credit issuance: approx.13,000 tons	As of today, approved provincial J-credit schemes are Niigata and Kochi only.

Features of Niigata Carbon Offset Scheme

Issuance of highly credible credits

○ Obtained "provincial J-VER program certification" and "local J-credit scheme approval" from the national government

→ Credits will be recorded in the registry in the same line as credits issued by the national government.

○Reviewed by local experts and officials who understand the actual local condition

→ Ensure proper forest management and assure its sustainability.

Creation of projects that highlight co-benefits of rich forests

○Focus on " the story" of forest management

・Restoration of local habitat for ibis

・Forest management to protect snow and water which produce special products in the region

Generation of credits that companies across Japan want to use

Methodology of Niigata J-Credit Scheme

Methodology FO-001 Forest Management Activities

[Absorption principle]	Forest management activities are conducted in the forest based on the forest management plan, and the amount of absorption increases with biomass, both above and beneath the ground.
[Applicability conditions]	(1) Activities are conducted in forests stipulated in Articles 5 and 7.2 of the Forest Act. (2) Activities are conducted in line with the principles of the forest management plan by unit. (3) When the stand subject to logging is included in the project site, the total absorption amount during the certification period is below zero. (4) Thinning is planned during the certification period of the forest management plan. (5) Land conversion is not planned in the forest management plan.
[Baseline absorption]	• The absorption amount when proper forest management is not continued.
[Main monitoring items]	• Area where forest management (planting, nursing and feeding damage) is conducted by tree species and age (nursing: weeding, thinning, feeding damage prevention measures) • Location where forest management is conducted (identified by measurement of tree height, etc., indicator of forest productivity) • Status of forest management or protection (including patrol)

Scope of CO_2 absorption

Scope of absorption

- The area of artificial forests where it can be proved that forest management activity (i.e. planting, nursing, weeding, thinning, and insect damage prevention measures) was conducted after April 2013,

  and,

- The area where proper management and protection of forest has been conducted during the certification period after April 2013, based on the forest operation and management plan.

Proof of Management Status

- Proper forest management
  ⇒Confirmed by the forestry registry
- Proper forest protection (including forest patrol)
  ⇒Verified using records such as the work record, with which the target stand, period, method, implementing body and contents of implementation can be checked

Costs and Support for Project Application/ Implementation

Costs for project application and implementation

1. Screening cost (relevance confirmation and validation)
2. Monitoring cost (field survey)

   Expenses for measuring area size of project site, tree height in the plot and diameter of breast
3. Administrative costs

   Administrative work for applications and credit management (sales, cancellation, etc.)

Support system

1. Screening cost

   Full amount of initial cost supported by national and prefectural governments
   (support of verification cost once every two years)
2. Monitoring cost

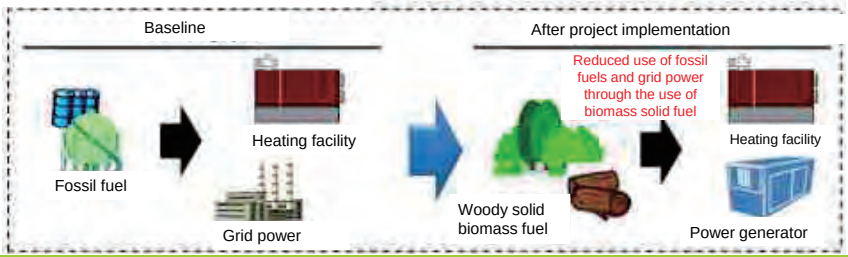
   Handling of measurement figures during forest management
3. Promotion of regional carbon offset

   Prefecture assists the use of carbon offset logo and provides opportunities to sell products

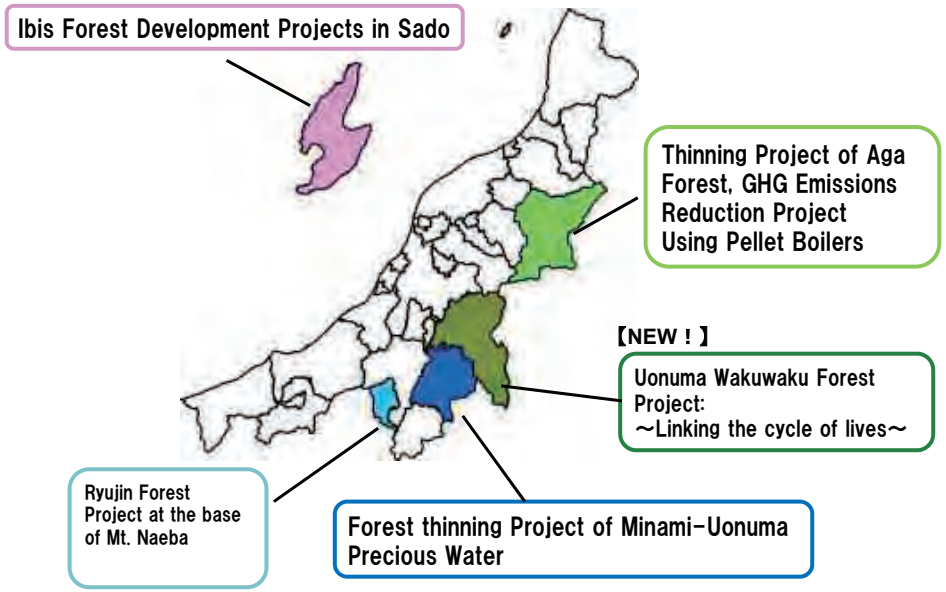
Methodology of Niigata J-Credit Scheme

Methodology EN-R-001: Switch of fossil fuel/ electricity with biomass solid fuel (woody biomass)

[Reduction principle]	Use of biomass solid fuel that is produced from woody biomass in a boiler, power generation unit or cogeneration unit, will displace the use of fossil fuel or grid electricity
[Applicability conditions]	(1) Biomass solid fuel or generated power replaces the use of fossil fuel or grid power (2) Heat or electricity generated at the target facility, which uses biomass solid fuel, is self-consumed in whole or in part as a principle. (3) Biomass solid fuel is made from unused woody biomass. (4) Woody biomass used for home heating devices is not building waste. (5) In case the project involves installation of a facility, it has to meet the applicability conditions specified in the methodology of the facility.
[Baseline emissions]	Amount of CO_2 emissions generated from fossil fuel combustion that would generate equivalent amount of heat value from the target biomass facility in the project case
[Main monitoring items]	• Amount of used biomass solid fuel after project implementation • Amount of heat generated by biomass solid fuel after project implementation • Amount of fuel and electricity consumption used for biomass transportation and producing biomass fuel after project implementation • Energy efficiency of baseline and project facilities when the project involves installation of a facility



Project Sites in Niigata Prefecture



Project in Niigata Prefecture (1) Sado Ibis Forest Development

～Creation of Sago forest as habitat of ibis birds～

Methodology No. R001: Increase in CO_2 absorption amount through forest management (forest thinning promotion)

Project Site	Sado, Niigata Prefecture
Project Target Area	154 ha
Amount of Credit Issued	4,965 t-CO_2

～Features～

- **Achieve CO_2 absorption to promote global warming prevention.**
- **Contribute to an improved living environment for released ibis and conservation of abundant forest ecosystem.**
- **Promote forest thinning and other forest management, and vitalize forestry with the income of carbon offsetting activity.**

Forest management in Sado city is important to make a forest and habitat for returning the ibis to the wild.

～Development of community where people and ibis live in harmony～

【Photo credit: Ministry of the Environment】

■Contact
Yoshio Watanabe, Niigataken Norin Kosha
TEL:025-285-7711 E-MAIL:rinsei@niigata-inet.or.jp
URL:http://www.tokinomori.jp/

Project in Niigata Prefecture (2) Eternal Aga Forest Project

～Creation of forest that can be sustained for 1,000 years～

Methodology FO-001: Forest management activities
EN-R-001: Switch of fossil fuel or grid power with biomass solid fuel (woody biomass)

Project Site	Agamachi, Higashikanbara-gun, Niigata Prefecture
Project Target Area	74.03 ha
Amount of Credit Issued	2,361 t-CO_2

～Features～

- **Create a forest that will be sustained for 1,000 years.**
- **Increase the use of forests for CO_2 absorption and watershed protection, and offer clean air and water to the lower reaches of the Agano River.**
- **Effectively utilize thinned trees from forest development as wood biomass to promote the Agamachi biomass town concept, based on the energy cycle system.**

Creation of eternal forest that offers clean air and water!

"Eternal forest" that nurtures Agano River 【Photo credit: Agamachi Municipal Government】

Agamachi biomass town concept

■Contact:
Masahiko Saito, Agriculture, Forestry and Commerce Section, Agamachi municipal Government TEL:0254-92-5764 E-mail:saito_msh1417@town.aga.niigata.jp

Project in Niigata Prefecture (3) Ryujin Forest Project at Mt. Naeba

～Efforts to keep a snow country for 100 years～

Methodology No.R001: Increase in CO_2 absorption amount through forest management (forest thinning promotion)

Project Site	Tsunanmachi, Nakauonuma-gun, Niigata Prefecture
Project Target Area	165.29ha
Amount of Credit Issued	4,478 t-CO_2

～Features～

- **Contribute to water and soil conservation of mountains and forests in Tsunan town, one of the most snowy areas in the world, and one of 100 Exquisite and Well-Conserved water places.**
- **Increase CO_2 absorption amount to tackle global warming, sustaining the snowy region even 100 years from now, as it is for the next generations.**
- **Work on prevalence of carbon offset in collaboration with local NPOs, etc.**

Leave the snow and water nurtured by the forest for the next generations in Ryujin forest!

Snow-covered Mount Naeba

Ryugakubo water, one of 100 Exquisite and Well-Conserved Waters

【Photo credit: Paradox】

■Contact: Toshiro Hayakawa, Tsunanmachi Forest Cooperative
TEL:025-765-2510 E-MALL:shinrin155@tsunan-fa.or.jp

Project in Niigata Prefecture (4) Forest Thinning Minami-Uonuma's Precious Water

~To protect water nurtured by snow and forest~

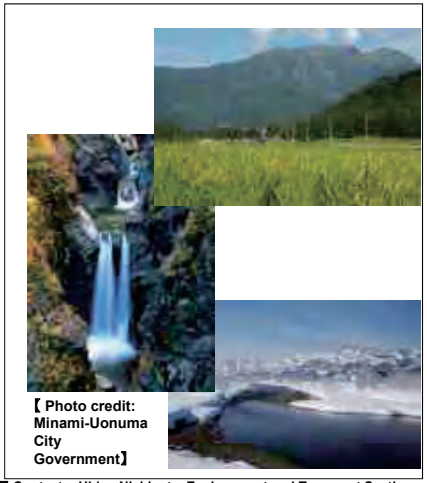
Methodology No. R001: Increase in CO_2 absorption amount through forest management (forest thinning promotion)

Project Site	Minami-Uonuma, Niigata Prefecture
Project Target Area	82.27 ha
Amount of Credit Issued	1,482 t-CO_2

~ Features ~

- Increase CO_2 absorption by proper thinning to avoid the impacts of global warming on local industries.
- Increase the forest function of watershed protection and protect water, on which Koshihikari brand rice from Minami-Uonuma is grown and Japanese Sake is made.
- Promote use of wood pellet and effectively use forest thinning's that cannot be used as timber.

Forest management nurtures local water that is used to grow Minami-Uonuma brand rice and make Japanese sake!



【Photo credit: Minami-Uonuma City Government】

■ Contact: Hideo Nishigata, Environment and Transport Section, Civil Life Department, Minami-Uonuma Citt Government
TEL:025-773-6666 E-MALL:h-nishikata@city.minamiuonuma.lg.jp

Project in Niigata Prefecture (5) Uonuma Wakuwaku Forest Project

~To develop an exciting and thrilled forest that has many potentials~

Methodology No. R001: Increase in CO_2 absorption amount through forest management (forest thinning promotion)

Project Site	Uonuma, Niigata Prefecture
Project Target Area	93.30 ha
Amount of Credit Issued	N/A ※ to be issued from FY2016

~ Features ~

- Promote development of exciting and thrilled forest so that its original functions as a forest are fulfilled 100 years later, where cycle of various lives is nurtured, and where people interact with nature.
- Promote use of thinned woods and create the system of timber use for local vitalization.
- Accelerate local vitalization through enhanced interaction and collaboration between urban and rural areas, by enhancing environmental education and nature experience programs.

Develop a forest that thrills people, that provides a place for interaction between nature and people!

Cedar forest in Uonuma

Nature experience and education

【Photo credit: Uonuma City Government】

■ Contact: Miki Konno, Environmental Planning Group, Environmental Measure Office, Environment Section, Uonuma City Government TEL:025-792-9766 E-MALL:konno-miki@city.uonuma.niigata.jp

Example of Carbon Offsetting under Niigata scheme

JA* Uonumaminami

http://www.ja-uonuma.or.jp/ *Japan Agricultural Cooperatives

【Donation-type offset】

Every 1 yen from the sales of 1 pack of mushroom is used to purchase "Ibis Forest Credit" (which was generated from "Sado Ibis Forest Development").
The mushroom, 'Uonuma Yairo Shiitake Kazoku shiitake mushrooms,' is shipped mainly to the Kanto and Chubu regions in Japan. The activity helps forests to be restored as the natural habitat of ibis birds, which are the symbol of the environmental conservation of Niigata Prefecture.

(We are supporting forest development for ibis.)

Thank you for your attention.

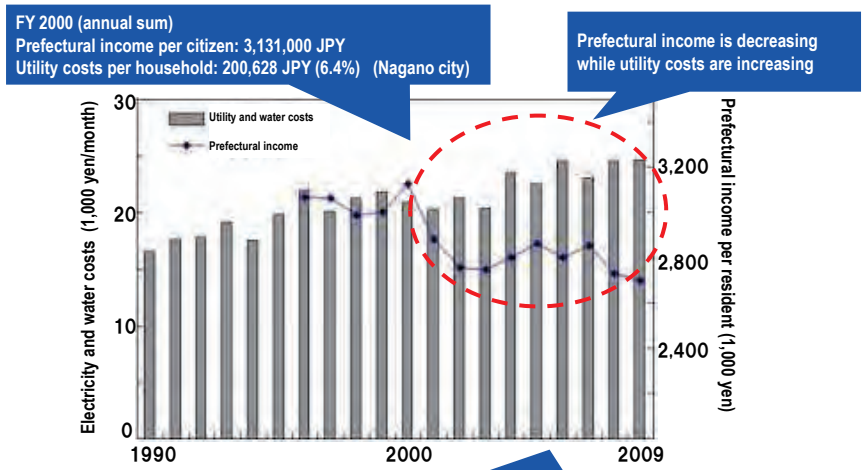
Nagano Prefecture's Sustainable Energy Strategy

Sustainable Energy Division, Environment Department
Nagano Prefecture

http://www.pref.nagano.lg.jp/ontai/kensei/soshiki/soshiki/kencho/kankyoene/index.html

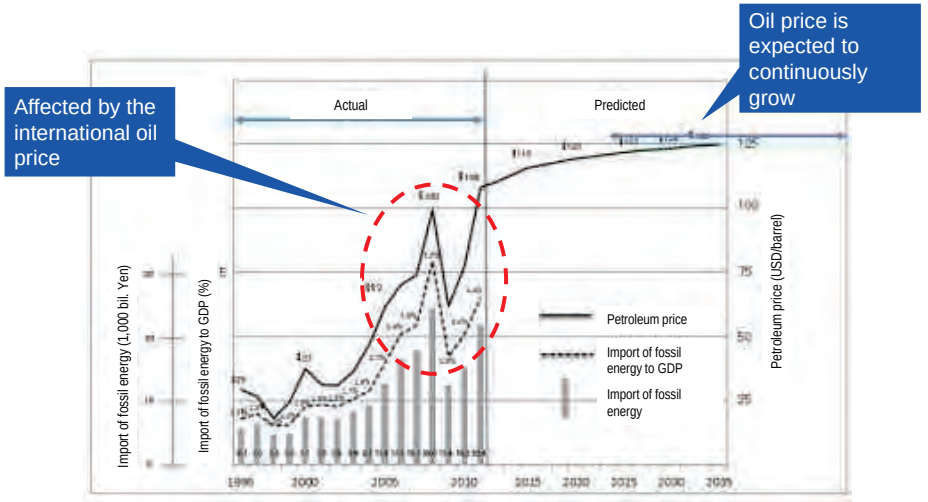
Why Nagano Prefecture promotes natural energy and energy saving?

Cost of utilities is suppressing citizen's life



*Source: Proposal of strategic working group for Nagano Prefecture Climate Change Policy

Impact from international oil



*Source: "Nagano Prefecture Environment and Energy Strategy"

Economic conditions of Nagano Prefecture

- Total Gross Prefectural Product (FY2008) 505,016 billion yen
- Gross Prefectural Product in Nagano (FY2008) 8,035 billion yen
  (1.59% of Japan's GDP)
- Total import of fossil fuels (FY2008) 25,983 billion yen
- Import expense of Nagano Pref.(FY2008) 415.7 billion yen (GDP proportion)
  (5.14% of Prefectural GDP)

Financial outflow to overseas from Nagano Pref.

- Gross product of wholesale and retail in Nagano Pref. (FY2008) 540.7 billion yen
- Gross product of construction in Nagano Pref. (FY2008) 370.9 billion yen
- Gross product of agriculture, forestry and fisheries in Nagano Pref. FY(2008) 157.3 billion yen

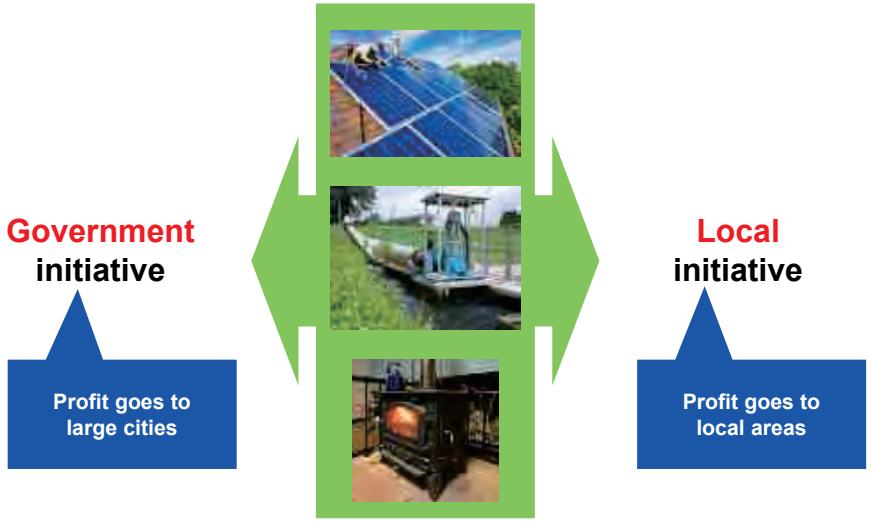
Equivalent to production amount of major industries in Nagano Pref.

Why Nagano Prefecture promotes natural energy and energy saving?

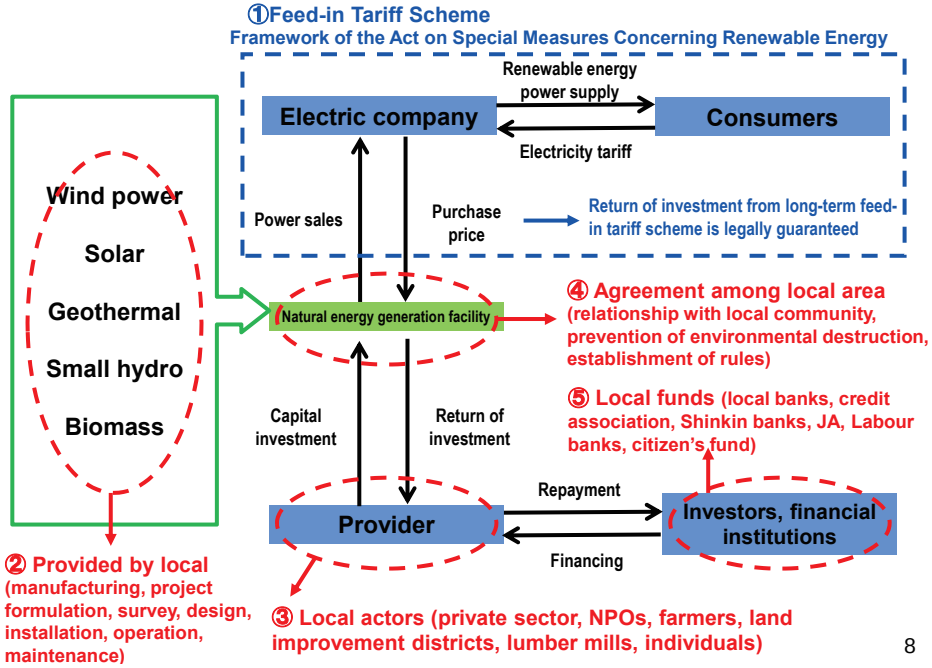
1. **Environment**
   (Greenhouse gas emission reduction)
2. **Economy**
   (Shift from financial outflow to local investment)
3. **Local contribution**
   (Source of vitality and creation)

How to link natural energy With local revitalization?

2 types of natural energy



5 keys to local initiative



How to link natural energy With local revitalization?

Renewable Energy Act (Feed-in-Tariff) is a necessary condition

It is important to maintain sufficient conditions at a local level

Natural Energy Promotion Measures as a Package

Use of fixed-price purchase scheme to promote natural energy led by local governments

1. Establish a base to promote natural energy use led by local governments.

Promote information sharing and knowledge dissemination on natural energy in wider area in collaboration with Shinshu Natural Energy Network. Also promote activities of local council.

Promote experiences of local natural energy projects through '1-village 1-natural-energy' project and work on risk reduction efforts that include information provision and dispatch of experts.

Use prefectural facilities and unused land to promote creation of highly public business models led by local governments. Also promote human resources development involved in natural energy projects which include development of local environmental energy office and finance schemes and accumulation of related know-how to create and improve knowledge on such projects.

1st roof lease of prefectural facility

Toyoda final wastewater treatment center

2. Take promotion measures by natural energy type.

〈Solar power generation〉
- Program to study natural energy installation
- Development of roof lease model
- Project formulation support

〈Small hydro power generation〉
- Small hydroelectric generation caravan
- Water right consultation
- Support for project development

〈Biomass〉
- Shinshu F-POWER project
- Support for project development
- Promotion of advanced forestry

〈Green heat〉
(solar heat, geothermal, hot-spring heat, etc.)
- Scheme to study natural energy installation
- Support for survey and facility costs

Support measure 1 Natural energy power generation led by local project entities

(Project to promote local natural energy power generation)

1) Non-construction project (basic plan, detailed design, planning, implementation design, etc.)

Target: City governments, NPOs, SMEs and citizens' groups (legal entities)
Subsidy amount: Up to 50%/ 5 million yen
Profit payment: Payment from the following year with income from power sales (10 years)
* payment by water flow survey of small hydroelectric project is exempted

2) Construction project (construction cost, etc., for facility introduction)

Target : NPOs, SMEs and citizens' groups (legal entities)
Subsidy amount (PV installation): up to 25%/ 15 million yen
(other than PV) : up to 30%/ 90 million yen
Profit payment: payment from three years after start generating income by power sales (total 13 years)

※Budget (FY2016): 358.81 million yen

Support measure 2 Natural energy heat use led by local project entities

(Support project for natural energy creation led by local government)

Target is a local heat supply and projects that involve use of solar heat, hot-spring heat, geothermal, snow and ice heat, wood biomass, etc., implemented by city governments and private entities.
(power generation projects and demonstrative projects are not covered.)

1) Planning (planning, feasibility study, design, etc.)

Subsidy rate: Up to 50%
Maximum amount: 5 million yen

2) Facility project (equipment introduction, etc.)

Subsidy rate: Up to 50% (municipal government), up to 1/3 (private company)
Maximum amount: 5 million yen

※ Budget (FY2016): 24.75 million yen

Support measure 3 Use of natural-energy-based disaster prevention by city governments and private sector (Nagano-ken Green "New Deal" Fund Program)

1) For city governments

Support for a project that involves installation of natural energy at disaster prevention facilities, etc.
(projects include local disaster reduction functions such as securing winter heating and telecommunications, and use of various local energy)

Subsidy rate: up to 100%

2) For private sector

Support for a project that introduces natural energy to private facilities that can serve as local disaster management center at the time of such disaster
(projects that are more likely to serve as model projects will be selected through public application)

Subsidy rate: up to 1/3 (up to 50% for projects in Sakaemachi-town and Nozawaonsen-mura village)

Maximum amount: 5 million yen (up to 75 million yen for projects in Sakaemachi and Nozawaonsen-mura)

※ FY2016 budget: 315.67 million yen

Support measure 4 Natural energy HR bank and information database

1) Human resource database related to natural energy projects

Provision of information on person who have technical and management knowledge and skills related to project planning, implementation and maintenance
(* Consultation fee may be incurred. Need to coordinate with them individually.)

2) Information database on natural-energy-related schemes, etc.

Provision of information on laws and regulations, and support programs related to natural energy project from planning, implementation and maintenance.

http://www.database.shin-ene.net

Support measure 5 Small hydroelectric generation support-group, water right consultation and guidance

1) Small hydroelectric generation support-group ('caravan')

Support group consists of officers of Nagano prefecture's relevant departments and concerned organizations who provide consultation, seminars and onsite advices.

- Environment department (overall coordination)
- Agriculture department (agricultural water)
- Construction department (landslide dam)
- Corporate bureau (power generation technology)
- Nagano association of land improvement project organizations) (agricultural water)

Consultation

Seminar for selecting proper site

2) Consultation on small hydroelectric generation and water right

The environment and construction departments serve as contact points for consultation of water right of small hydroelectric generation in collaboration with small hydroelectric generation caravan.

3)Guidance on introduction of small hydroelectric generation
(including financial performance calculation template)

http://www.pref.nagano.lg.jp/ontai/kurashi/ondanka/shizen/susumekata.html

Support measure 6 1-village 1-natural energy project

Solar power 【Ainori-kun】 Ueda

Small hydroelectric power 【Maguse river power plant】 Kujimadaira

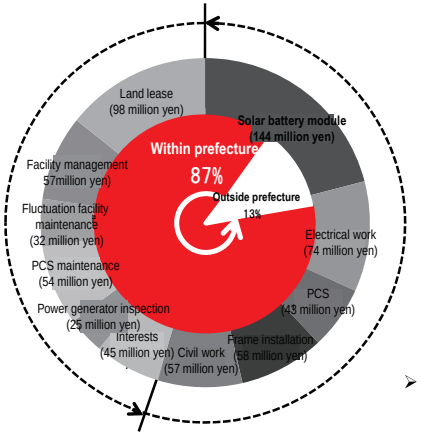
Wood stove 【Kokuho Asama hospital】 Saku

http://www.pref.nagano.lg.jp/ontai/kurashi/ondanka/shizen/jire.html

103 projects are registered.

Case 1: Ohisama BUN/SUN mega-solar project (Suwa city) ☆

An action to disseminate know-hows acquired in renting roof of prefecture's public facilities



Direct economic effect value 597 million yen + Spinoff effects 352 million yen

= Economic impact (for 20 years) 949 million yen

Toyota final treatment facility with solar panels lined on the roof

- **Mega solar of roof rental of prefecture's public facilities (1MW)+ roof rental of local facilities (city hall) (6kW)**
- **Joint project of prefecture, Okayasanso Co., Ltd. and Shizen Energy Shinshu Net**
- **Aims to make gained know-hows open to the public to diffuse them in the prefecture.**

Case 2: Citizens' joint solar power plant (iida city)

Citizen-funded joint power plant funded by Ohisama Shinpo Energy Co., Ltd.

Kanae Mitsuba nursery

House with 0-yen system

1. Citizens' joint solar power generation (from 2004)

➢Funded by citizens
➢Rent roof of Iida city and other public facilities and private entities (for 20 years)
➢162kW in total
➢Generated power is purchased by various facilities at the similar price as that of power company.

2. Ohisama 0-yen system (for private residence) (from 2009)

- Funded by citizens
- Surplus power purchase scheme
- No initial cost borne by house owner
- Owner pays fixed power rate for 9 years to business operator and transfers the panel from it to the owner in the 10th year.

3. Mega sanpo project (for large facilities)(from 2012)

- Funded by citizens and loan from financial institutions
- Fixed-price purchase scheme
- Rent roof of public facilities and private entities mainly in southern Shinshu area and install solar panels of 15 to 50kW to be a total of approx.1MW.

Case 3: Joint use of megawatt solar (Saku city)

Japan's first local new energy LLP established by 14 companies, 1 university and chamber of commerce of Saku

Limited liability partnership (LLP)
Saku Himawari

Cowbell engineering Co., Ltd.
100kW

Nagano Yoshida Industry Corp.
100kW

Kashiyama Kanagata Industry Corp.
80kW

Soshin Electric Co., Ltd.
140kW

Nakagawa Denki Seisakujo Co., Ltd.
50kW

Yoshida Inudstry Co., Ltd.
100kW

Sasaki Kougyu Co., Ltd.
30kW

Panels installed on the roof of LLP office building

Marushin
50kW

Tadekita Metal Co., Ltd.
50kW

Pascal Corp.
30kW

Asama Piston Co., Ltd.
70kW

AOB Keioh Group Corp.
100kW

Sawai
40kW

Saku University
30kW

Saku Chamber of Commerce and Industry
30kW

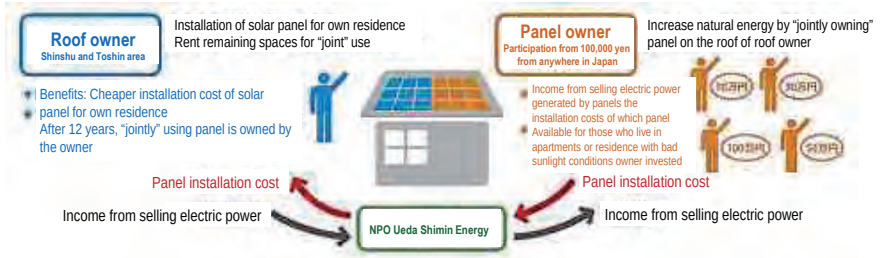
- 1MW in total
- Ministry of the Environment project
- used for local environment education

Case 4: Solar panel Ainorikun (Ueda city)

An action funded by roof owners and panel owners aiming to promote solar panels

Roof owners and panel owners

- Project of NPO (Ueda Citizens' Energy)
- Panel owners pay panel installation cost and receive income from power sales for the first 10 years.
- For the next 2 years, Ueda Citizens' Energy receives the income as operation cost.
- Roof owners receive the income from the 13th year.
- A panel owner with a minimum payment of 100,000 yen can participate.



*Reproduced from the website of NPO Ueda Shimin Energy

Case 5: Solar power generation using leased roof of private companies (Azumino city)

Roof lease project among private companies mainly conducted by cooperative of SMEs

〈lease acceptance〉
Cooperative Chuo-Keiyukai

協同組合 中央経友会

Cooperative with more than 2,000 SME members
(head office: Azumino in Nagano Prefecture)

Lease of power generation facility ↓ ↑ Pay lease

〈power generation and selling company〉
Clean Energy Shinshu

クリーンエネジー信州

Fully funded by Chuo Keiyukai
(head office: Chuo Keiyukai)

FIT-based power selling ↓ ↑ Income from power sales

〈power company〉
Chubu Electric

Pay installation fee →
← Delivery of facility

〈partner installation company〉
Registered entity (member company)

Pay rent →
← Roof lease

〈roof lessor〉
Cooperative member company

Installed at 8 locations in the prefecture (390kW in total) as of April 2015

Case 6: Magase River Hydropower Plant (Kijima-daira village)

Supply electricity to Magase hot spring and sell surplus electricity.

Agricultural water taken

Water sent ↓

Dust removal using electricity by small hydroelectric power generation

Water sent →

Surplus power sold →

Power transmission ↓

Magase River Hydropower Plant
- 95kW/ effective drop 65m
- 1jet turgo impulse waterwheel
- 3-phase synchronized Francis power generator
- Use of agricultural water

- Kijimadaira-villaage's public project
- Managed by Kijimadaira Kanko Co., Ltd. (semi-public sector) as part of its business
- Surplus power sold to Chubu Electric based on RPS law

Used for pumps, boiler room, administration building and external light of Magase hot spring

※ Photos of Magase hot spring from its website

Case 7: Komagane natural-energy-based small hydroelectric power plant No. 1 (Komagane city) ☆

Secure profitability by selling all power generated at the micro hydroelectric power plant

Conduit in the center, power generator at center bottom, and power conditioner in the building on the right

Komagane natural-energy-based small hydroelectric power plant No. 1

- 5.5kW / effective drop15m
- Crossflow waterwheel
- 3-phase permanent-magnet power generator
- Use of agricultural water
- Project of Komagane Shizen Energy Hatsuden Co., Ltd. established by local companies and residents
- First small hydroelectric power generation plant in fixed-price purchase scheme in the prefecture

Komagane natural-energy-based small hydroelectric power plant No. 2 (planned)

- No. 2 plant is under plan
- Will construct by Godo Kaisha Shimodaira Zenigamedo Small Hydro power plant
- Planned site on right-side photo (Zenigamedo River)

Case 8: Shinshu F-POWER Project (Shiojiri city) ☆

Power generation using biomass resources

Thinnings, etc.

Rendering

Locally produced timber

Floor wood, construction material, etc.

Listings

Selling power

Heat supply

Development of a system for sustainable use of forest resources

Remaining forest resources not used for construction

Intensive timber processing facility (lumber mill, completed in April 2015) and wood biomass power generation plant (co-generation) development (in Shiojiri)

Heat use

- Main business operator: Soyano Kenzai Co., Ltd.
- Power generation 10MW
- Use of timber for power generation: 180,000m^3 (listings75,000m^3+unused timber 105,000m^3)

Case 9: Binary power generation with hot-spring heat (Takayama village) ☆

First binary power generation in the prefecture using hot-spring heat

※Above photo from Shichimi onsen website

Shichimi-onsen hotel Keizantei, Shinshu Takayama ho-spring resort

- Known for cloudy sulfurous hot water from the sources
- Binary power generation with 9 spring sources of its own
- It also has introduced hot-spring heating system

Binary power generation facility at Shichimi onsen hotel

Binary power generation facility

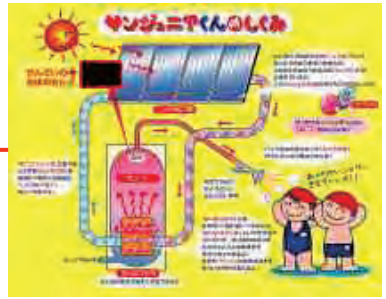
20kW small domestically produced binary power generation unit (manufactured by IHI)

※Above phot from IHI website

Case 10: use of solar power for showers of school swimming pools (Suzaka city)

Supply solar-heated water to showers at school swimming pools

Suzaka Moriue primary school



Explanation about solar power water heating system

Suzaka Nirei primary school

※Photos and figure from Sunjunior website

- Collaboration project of local company, Sun-Junior, and local government
- Hot water (35˚C) supply system for showers/storage of 460 liters of hot water
- Students can warm up their body after being in the swimming pool with solar-power generated hot water shower and learn about solar power system.

Case 11: Wooden chip boiler for onsen facility (Sakae village)

Wood biomass to generate energy locally, and to use during emergency after disasters

Wooden chip boiler

Kitano Tenman hot spring

Public bath

※Above photo from Kitano Tenman hot spring website

Chip pit

- Project of Sakaemura, Sakaemura forestry association and Sakaemura promotion corporation
- Use of Ministry of the Environment (green new deal) GND fund
- Wooden chip boiler (output 200kW) is introduced and it is operated with locally produced chips from curved wood whose use was hard to find
- Emphasis placed on evacuation in winter, based on experience of earthquake disaster on March 12, 2011
- Heavy snow-covered area → with accumulation of 2 to 4 meters

Case 12: Wood stove at hospital daycare center (Saku city)

Secure heating of daycare center by wood stove

Wood fuel supplied by Saku forestry association

Daycare center of Asama General Hospital

Appearance of daycare center of Asama General Hospital

Kosumosu daycare center (hospital daycare center)

Capacity: 40 persons, aged between 56 days and 2 years

※above photo from the hospital website

- As it is a daycare center for hospital employees' children, they can work without worrying even in power outage during disaster occurrences.
- Wood fuel stored in the storage next to the daycare center to cope with power outage for a few days
- The wood stove is locally produced by a local manufacturer.
- Use of Environment Ministry's GND fund

Case 13: Introduction of geo-heat facility to day-care centers (Asahi village)

Day-care center with evacuation system of infants in summer and winter

Appearance of Asahimura integrated cay-care center

- Installed at Asahimura integrated day-care center (serves as local evacuation center in disasters) (capacity: 150 persons)
- Use of locally produced larch tree
- Ministry of the Environment GND fund is used
- Solar panels (20kW) installed on the roof (non GND)

Room with geo-heat air-conditioning system for children aged 1 or younger

Geo-heat sent to air-conditioning facility

Geo-heat pump control panel

Geo-heat pump heat exchanger

Case 14: Development of heating device that uses hot-spring water (Shonosuwa town)

Heating device that uses hot-spring water

Hot-spring heater ORAE-eja

- Developed by Project X-ONE group (local industry-university-government group)
- Heater using hot water heat
- Use of surplus hot spring water supplied to homes (Shimo-suwa town has 2.6 million kl of hot water spring every minute and it is supplied to many households. However, only 800,000kl of it used for bathing.)
- No fuel cost, 540 yen of power consumption per month
- No ventilation required and no CO_2 from combustion
- Can be heated 24 hours a day
- Installation at elderly people's centers and residences started in 2014

Project X-ONE group

Yamaneko Quality & Design co., Ltd.

D・R Pocket Co., Ltd.

Tokyo University of Science, Suwa

Monozukuri Shien Center Shimosuwa

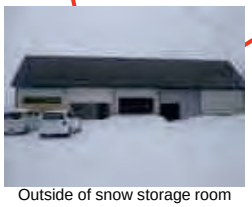
Case 15 Agricultural produce storage using snow and ice heat (Yamanouchi town)

Use of abundant snow to store local agricultural products to reduce environmental load

Agricultural products storage

Send cold wind by fan.

Snow storage
(snow is stored inside a rack)



Outside of snow storage room
(renovated old JA storage house)

In addition to keep freshness, new taste as a result of low-temperature maturation is expected.

How to convert energy/ electricity saving to local benefits?

2 types of energy/ electricity saving

Patient
Blind
Diligent

Depends on motivation and spirit

Benefit
Smart
Mechanism

Established in daily life

What is Benefit

For a company with 100 million yen of annual sales, when annual utility cost is 3% of sales,
100 million x 0.03 = 3 million yen

When reducing 10% of annual utility cost,
3 million yen x 0.1 = 300,000 yen

When operating profit rate is 2%,
Equal effect to attain 15 million yen of sales
(300,000 yen / 2% = 15 million yen)

*Source: "Shittoku BOOK" Kanto Bureau of Economy, Trade and Industry, METI

How to save Smart

How to determine contracted power

(In a case of high-voltage power over 50kW and below 500kW)

By recognizing the max. power demand* over the last 1 year as contracted power, **basic tariff is determined**.
*Maximum power demand: the monthly max. value of average consumption (kW) in 30 min.

The peak in August will be the contracted power for 1 year until the next July at longest if max. power demand in each month does not exceed the peak.

Suppression of peak demand (max. power demand) is a Key!!

If 100kW of the maximum power demand is reduced to 90kW (-10%), the basic tariff is also reduced.

1,638 yen × 10 kW × 12 months = 196,560 yen

(Unit price of basic tariff) (Reduced contracted power) (Reduction of annual basic tariff)

* TEPCO: Unit price of basic power tariff for operation using high-voltage power

***Source: "Shittoku BOOK" Kanto Bureau of Economy, Trade and Industry, METI**

<Mechanism 1> Package of Household Energy Conservation Measures

Increase energy efficiency and save energy at home

[1] Appliance Energy Efficiency Labeling System

Uniform energy efficiency label (for electric toilet seats)

Uniform energy efficiency label (for fluorescent lights)

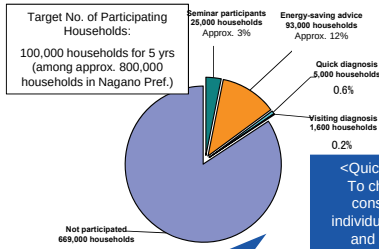
In Nagano, retailers are required to put energy efficiency labels on all appliances.
In addition to air conditioners, televisions, and refrigerators, electric toilet seats and fluorescent lights have become subject to labeling.

[2] Home Energy Saving Support System

<Energy Saving Seminar>
To disseminate knowledge on energy conservation at home

<Energy Saving Advice>
To provide energy conservation information to individual households

Target No. of Participating Households:
100,000 households for 5 yrs (among approx. 800,000 households in Nagano Pref.)



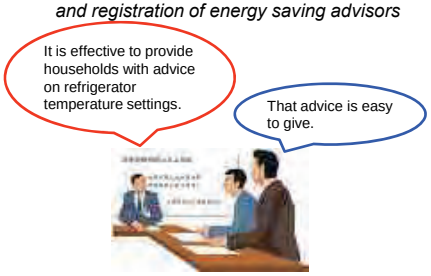
<Quick Diagnosis>
To check energy conservation at individual households and give advice

<Visiting Diagnosis>
To visit individual households to check energy conservation and give advice

Encouraging individuals to shift to more energy-efficient appliances and take energy saving measures at home

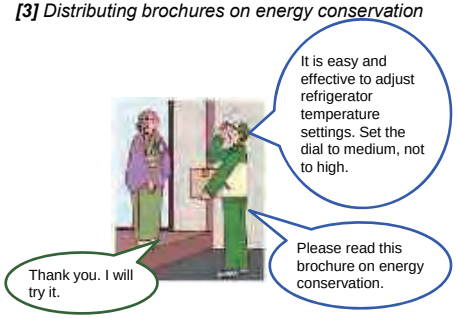
How does the Home Energy Saving Support system work?

[1] Public-private partnership agreements & training and registration of energy saving advisors



[2] Providing energy saving advice when contacting consumers

[3] Distributing brochures on energy conservation



[4] Activity report

Promotion of Energy Saving at Home

The Shinshu Energy Saving Campaign is carried out across Nagano Prefecture in summer and winter by setting numerical targets.

Search for "Cool/Warm Share" spots and events (JP only)

http://www.pref.nagano.lg.jp/ontai/kurashi/ondanka/setsuden/hotshare/index.html

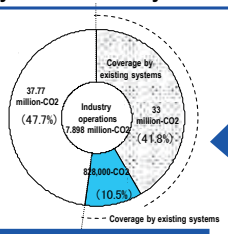
Search for energy saving measures (JP only)

http://www.pref.nagano.lg.jp/ontai/kurashi/ondanka/setsuden/shoene/documents/26katei.pdf

<Mechanism 2> Package of Industrial Energy Conservation Measures

Increase energy efficiency and save energy in industry

[1] Anti-global warming planning and reporting system for industry



Target unit will change from business establishments to business operators, which will increase the number of businesses subject to the system from about 200 to about 300.

The prefectural government gives companies advice and guidance and evaluates and awards them. Cost reduction is used as an incentive to promote their efforts to increase operational efficiency and shift to more energy-efficient equipment.

This system also works as commuter & passenger transport, vehicle use, and logistics planning systems. This system accepts the voluntary submission of plans from small- and medium-size companies.

[2] Public-private partnership agreement system

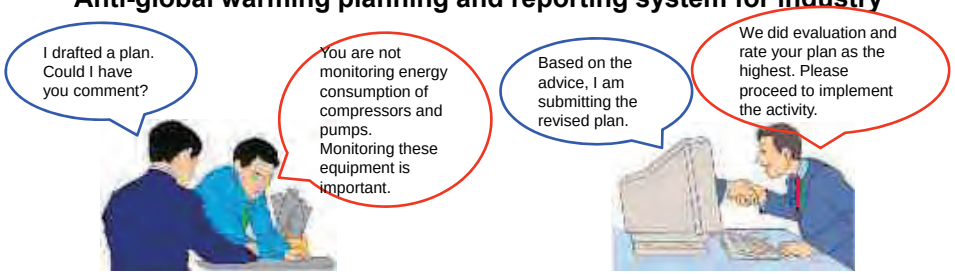
The prefectural government makes partnership agreements with companies which set ambitious targets on energy conservation and GHG emissions reduction and assists them with their efforts to meet the targets.

[3] Promotion of cooperation and collaboration between businesses

The prefectural government support the activities of Shinshu Energy-saving Patrol Team, promote the introduction of the environment management system, and facilitate the organization and activation of business associations.

➡ Providing multifaceted support to companies in their energy management and conservation efforts.

Anti-global warming planning and reporting system for industry



① Advice on developing a draft plan

② Acceptance and evaluation of proposal

③ Confirmation, advice and supervision of activities

④ Evaluation and award for the three-year activity

National government's support on energy-saving for businesses

1) Free energy audit
Dispatch experts and propose improvement measures to small- and mid-size business operators.

2) Subsidy to energy-saving facility
Subsidize part of the costs to introduce and update energy-saving facility in factory and office.

3) Subsidy to energy-saving building
Subsidize part of the costs for introduce equipment and construction materials needed for building with high energy-saving performance.

For more details, please make inquiry to General Energy Public Relation Office in Kanto Bureau of Economy, Trade and Industry.

http://www.kanto.meti.go.jp/seisaku/shiene/index_enekoho.html

Nagano Prefecture's support on energy-saving for businesses

1) Free energy audit by Shinshu energy-saving patrol squad
Voluntary activity by enterprises in prefecture. Application should be made to the secretariat.
The Prefecture support its activity cost.

2) Low-interest loan for energy-saving facility
A low-interest loan for introducing and updating energy-saving facility in factory and office, etc.

For other information, please visit Nagano Prefecture Energy/ Electricity Saving Portal Site.

http://www.pref.nagano.lg.jp/ontai/kurashi/ondanka/setsuden/shoene/index.html

〈Mechanism System to promote sustainable energy performance and natural energy to buildings

① Sustainable energy performance of building

A building owner consider sustainable energy performance (insulation, etc.) before starting building work.

② Introduction of natural energy to buildings

A building owner consider introduction of natural energy facility before starting building work.

Detached house is also included. For a large building (>2,000m³), building plan and result of consideration should be submitted to Prefecture

Sustainable energy evaluation tools and introduction consideration manual are disseminated at seminars. Through Nagano Prefecture Housing Promotion Council, dissemination of energy-saving technology is also disseminated.

	System for consideration of sustainable energy performance of buildings			System for consideration of introducing natural energy to buildings			
	Sustainable energy performance consideration (Building owner)	Sustainable energy performance presentation (Building owner)	Submission of sustainable energy performance (Building owner)	Consideration of possibility of national energy introduction (Building owner)	Natural energy facility information presentation (Building owner)	Submission of result of natural energy introduction (Building owner)	Submission of result of consideration of utilizing unused energy
≥ 10,000m²	○	○ Obligation to make efforts	○	○	○ Obligation to make efforts	○	○
10,000m² ≥ 2,000m²	○	○ Obligation to make efforts	○	○	○ Obligation to make efforts	○	×
2,000m² ≥ 300m²	○	○ Obligation to make efforts	○	○	○ Obligation to make efforts	×	×
300m² ≥ 10m²	○ (Obligation to make efforts during transition period)	×	×	○ (Obligation to make efforts during transition period)	×	×	×
10m² or less Temporary buildings Cultural heritages No need for air conditioning	×	×	×	×	×	×	×
Remarks	• Information is provided upon requested by building owner	• Present at entrance/exit, etc. • Detached house excluded	• Submission to Prefecture • Prefecture can publish and advice	• Information is provided upon requested by building owner	• Present at entrance/exit, etc. • Detached house excluded	• Submission to Prefecture • Prefecture can publish and advice	• Submission to Prefecture • Prefecture can publish and advice

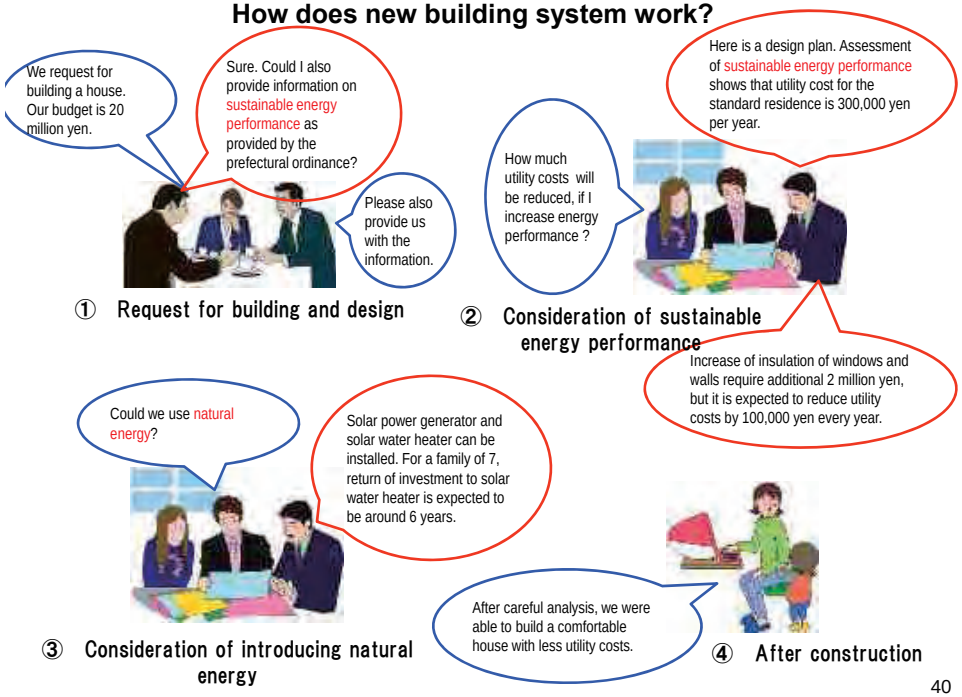
For particularly large building (>10,000m²), utilization of unused energy (exhaust heat, etc.) is also considered.

Approx. 30,000 buildings will be the target in 5 years.

➡ Construction of buildings with high energy efficiency performance and that utilizing natural energy is promoted.

The system covered buildings over 300m² (since April 2014) buildings less than 300m² (from April 2015)

How does new building system work?



How to introduce natural energy to buildings

To make building "more comfortable and economical," prioritize insulation and air sealing of building

Basic concept

Insufficient insulation and air sealing
⇒excessive equipment and costs

Sufficient insulation and airtight
⇒proper equipment and costs

Natural energy introduction manual for buildings

Free download on the website (the whole pages are available)

http://www.pref.nagano.lg.jp/ontai/jourei26/kentiku/manual.html

How to link energy/ electricity saving to local advantage?

Structuralize energy cost saving

to realize robust local economy

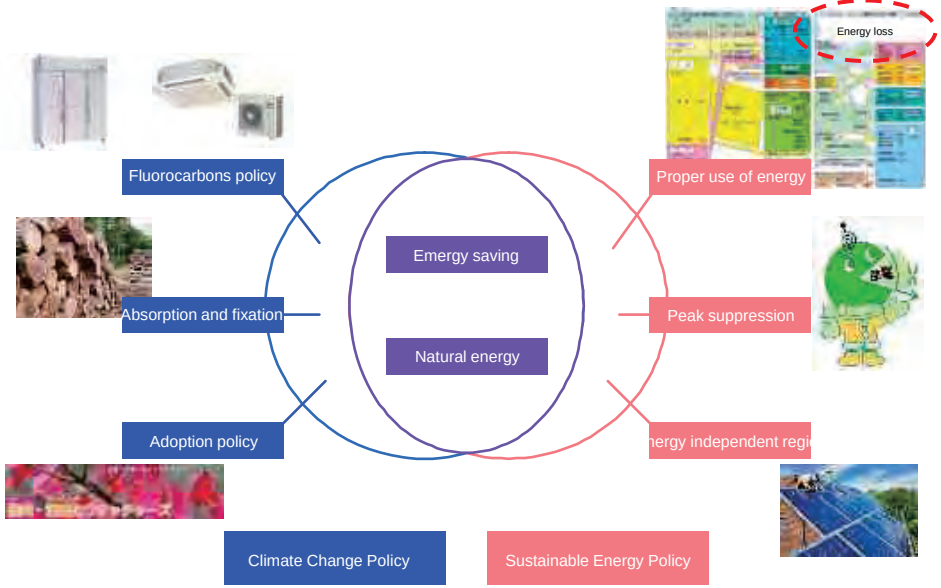
How to strongly initiate natural energy and energy saving?

Nagano Prefecture Environment and Energy Strategy

～ Resident's Plan for the Third Nagano Prefecture Climate Change Policy～

Nagano Prefecture Environment and Energy Strategy

～ Resident's Plan for the Third Nagano Prefecture Climate Change Policy～



➡ New plan integrating Climate Change Policy and Sustainable Energy Policy

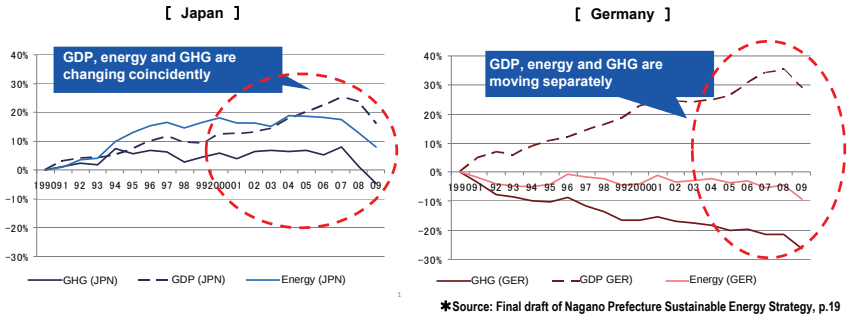
Basic goal of the Strategy

[Basic goal] Building low-carbon local society with sustainable energy

While attaining economic growth,

Reduce energy consumption and GHG emissions

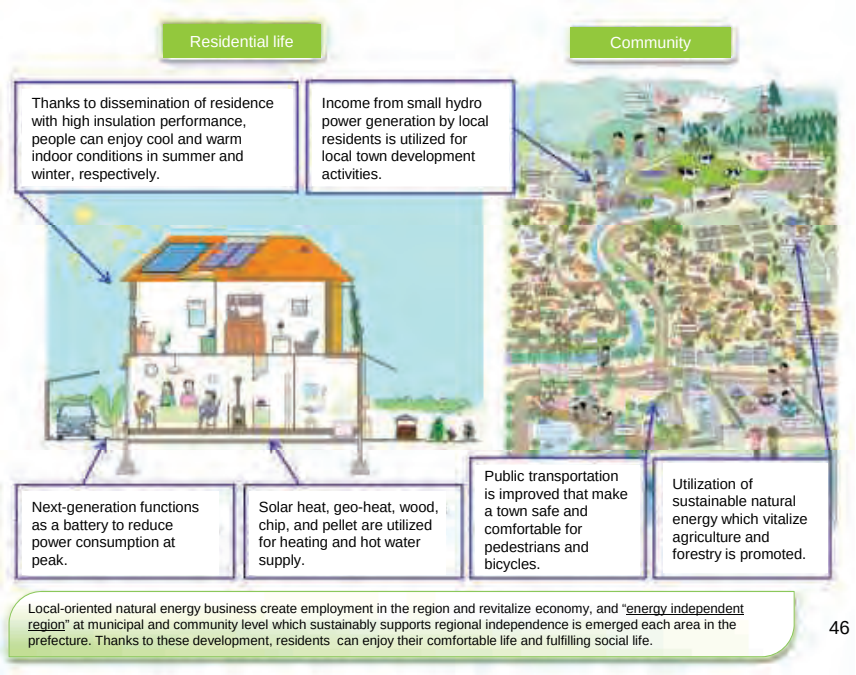
Comparison of GDP, energy consumption, GHG emissions between Japan and Germany (1990-2009)



✱Source: Final draft of Nagano Prefecture Sustainable Energy Strategy, p.19

➡ Decoupling of economic growth and energy consumption is possible.

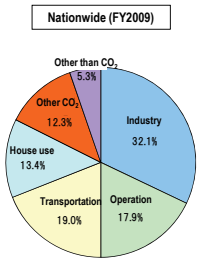
Future vision

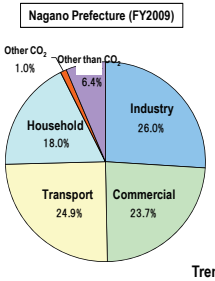


Local-oriented natural energy business create employment in the region and revitalize economy, and "energy independent region" at municipal and community level which sustainably supports regional independence is emerged each area in the prefecture. Thanks to these development, residents can enjoy their comfortable life and fulfilling social life.

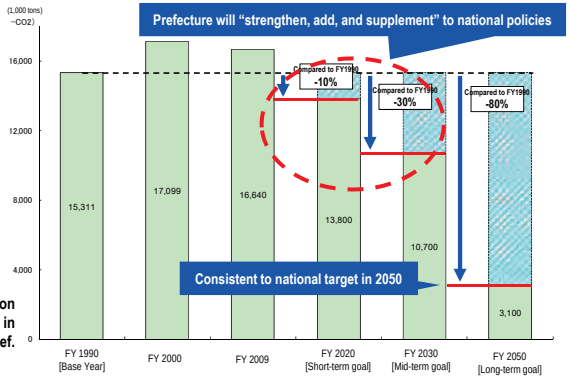
GHG emissions reduction target

Composition of GHG emissions by sector in Nagano Pref. and nationwide (2009)

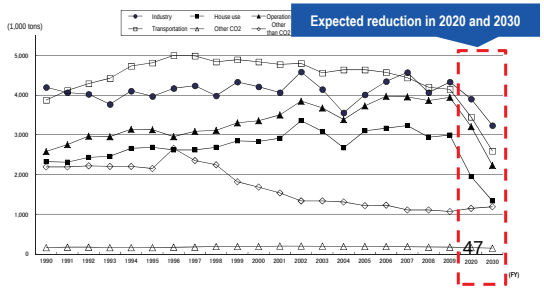




Trends of GHG emissions by sector in Nagano Pref.

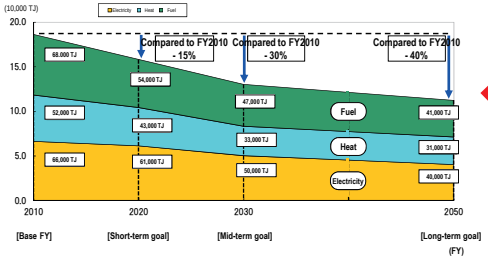


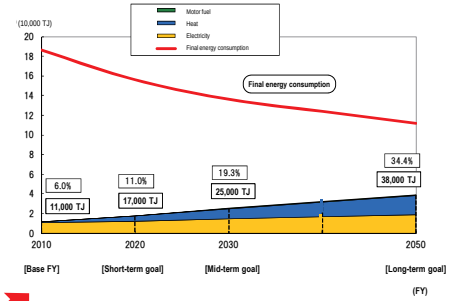
Trends and reduction target of GHG emissions in Nagano Pref.



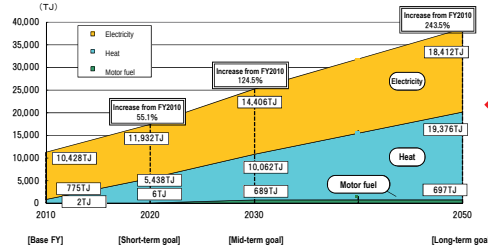
Target of final energy consumption and natural energy introduction

Target of final energy consumption





Target of natural energy introduction



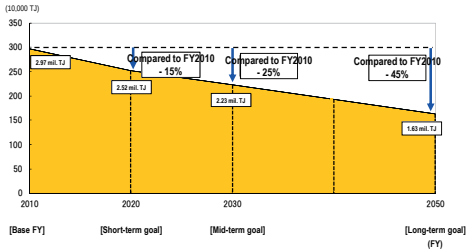
Energy self-sufficiency

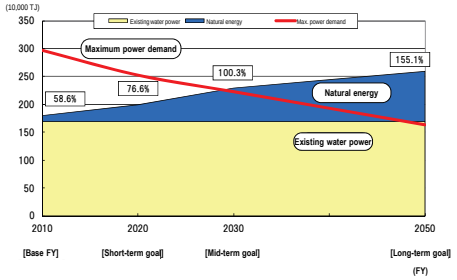
(Case of energy introduction)

Ratio of generating volume of renewable energy in prefecture to annual energy consumption in prefecture

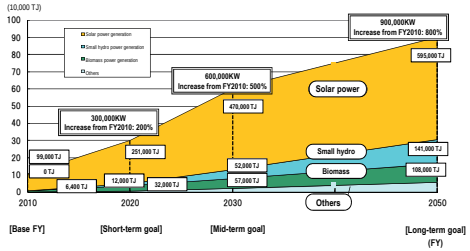
Target of maximum electricity demand and the capacity of natural energy generation facility

Target of the max. power demand





Target of the capacity of natural energy generation facility



Energy self-sufficiency

(Case of capacity of power generation facility)

Ratio of existing generation capacity of renewable energy generation facility in prefecture to the annual maximum power demand (at peak) in prefecture

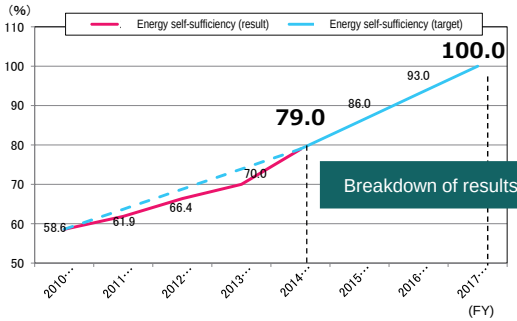
Target of energy self-sufficiency

100% in FY2017

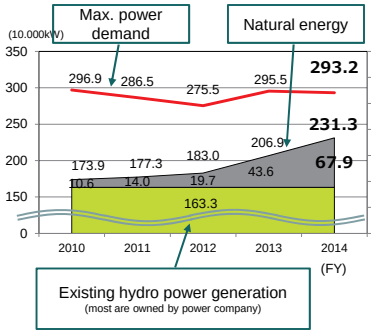
(Self-sufficiency =
existing generation capacity corresponding to power peak in prefecture)

Trends of energy self-sufficiency in Nagano Pref.

(Generation facility capacity)



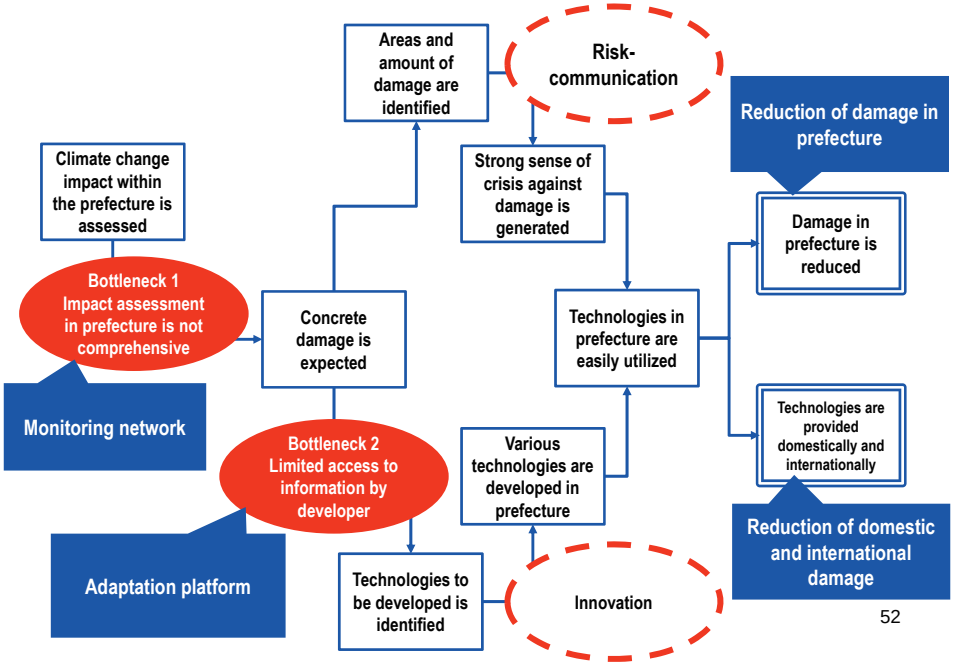
Breakdown of results



Promotion of natural energy and energy saving

How to create adaptation technologies and disseminate in the area?

Bottlenecks of adaptation



"Monitoring" and "Platform"

Climate Change Monitoring Network

Aims to establish a highly-accurate measurement system to predict impacts in wide range of sectors.

- Data required for measuring climate change impact is collected by various organizations, associations and individuals in prefecture for their purposes.
  → Need to use those data for understanding and predicting climate change impacts.

- Research on prediction of climate change impact is conducted by various organizations, associations and individuals in prefecture for their purposes.

→ Need to develop those researches in terms of understanding and predicting climate change impacts

Measurement and research system that enables to share and adopt measured data and research outcomes constantly among related organizations and researchers, etc.

Shinshu Climate Change Adoption Platform

Aims to share impact prediction with developers to revitalize development of technology, production and service for adoption

- Research and development likely to link to adaptation of climate change are conducted by various organizations, associations and individuals in prefecture for their purposes.

→ Need to develop those researches in terms of climate change adaptation policy

- Seeds likely to link to climate change adaptation policy are researched and developed by various organizations, associations and individuals in prefecture for their purposes.
  → Need to utilize those seeds as climate change adoption policy.

Platform that enables to promote information sharing and research and development concerning climate change impact among related organizations and researchers, etc.

Expected technology, products and service

System and device that predict and monitor new diseases and pests

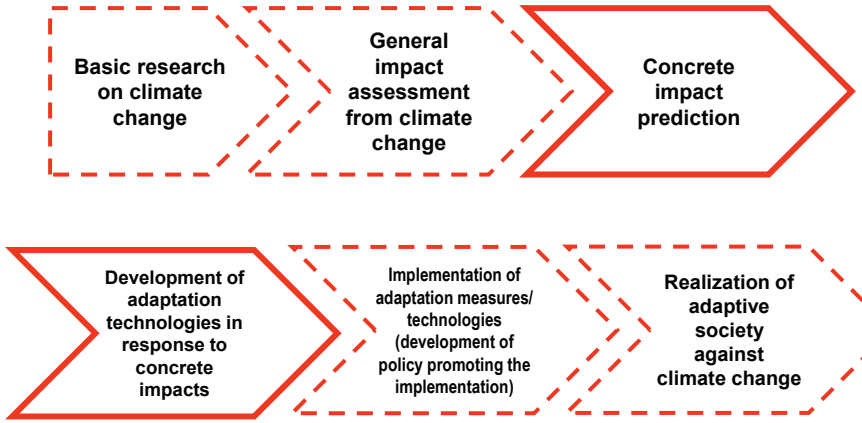
Medicines and medical equipment that prevent and cure infectious disease unseen in Japan

Construction materials, building technology and building reform technology resilient to strong wind and typhoons

Service that forecast and notify real-time meteorological information at each village

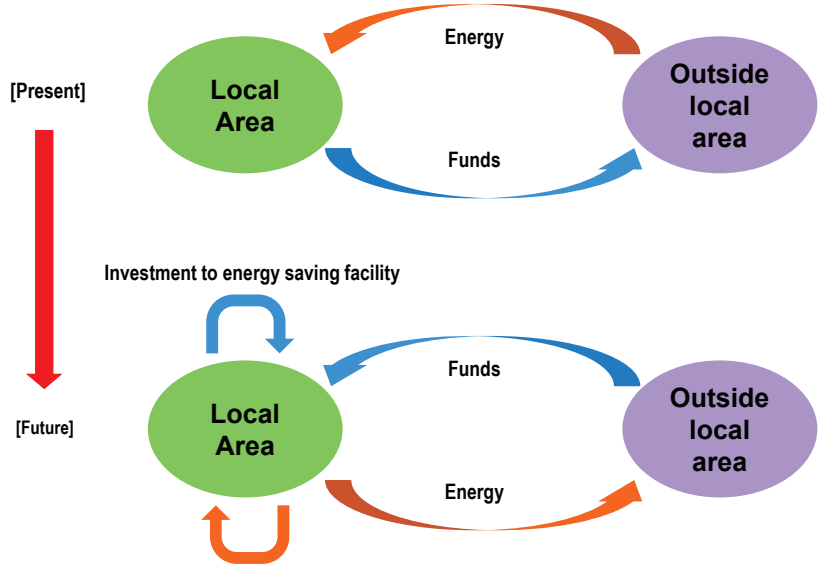
These technologies, products and services (technical and policy seeds) are needed for planned and effective adaptation policy at a local level

Overall adaptation policy

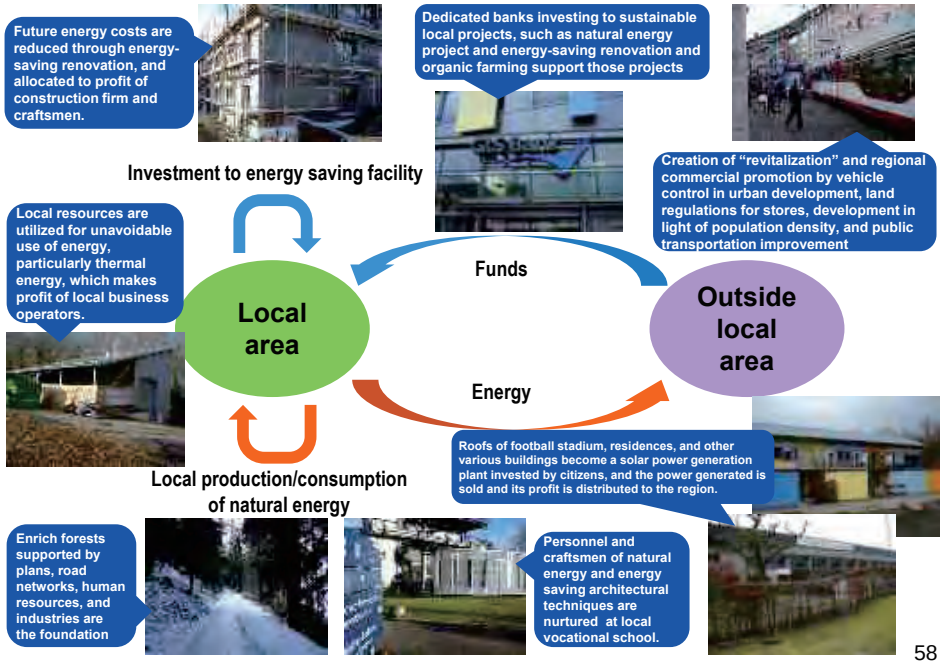


Principles that
“Nagano Prefecture Environment and Energy Strategy”
referred to in its planning process

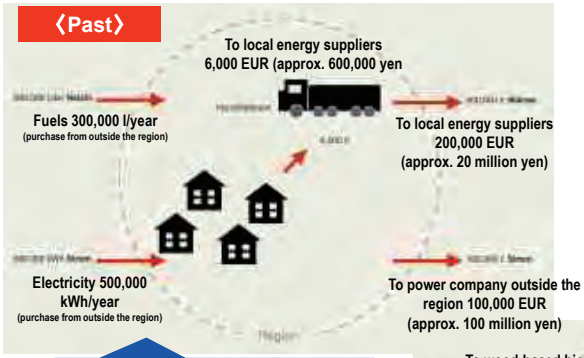
Local energy policy in Germany



Linkage between local energy policy and regional economic policy

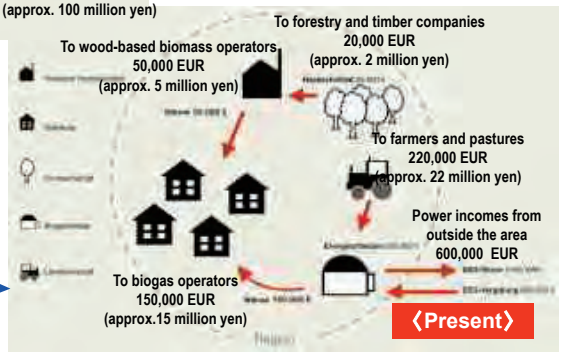


Local energy and regional economy: the case of Mauenheim village



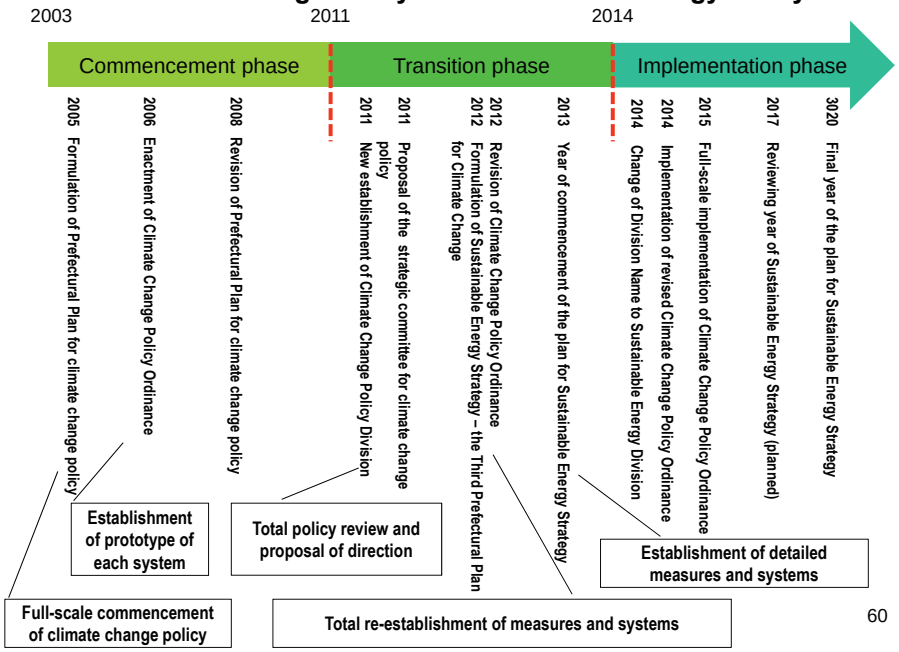
For the purpose of life and production activities, the village has purchased lots of energy from outside the region. This is the structure that the village funds outflows

A 400-population village located in Southern Germany. A local energy company (Solar Complex) implements a joint project with residents



Locally produce energy and sell to outside the region as well as supply to the region and the expenses are paid to local operators. This is the structure that money inflows into the region and circulates.

Footsteps of Nagano Prefecture's Climate Change Policy and Sustainable Energy Policy



Thank you very much for your attention.

Search

Sustainable Energy Division
Nagano Prefecture

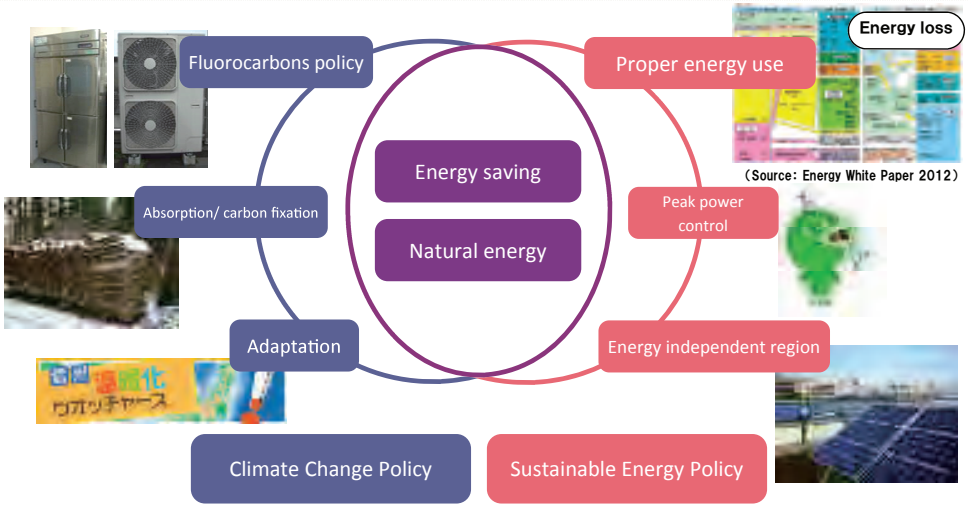
(Slide 39)	System for consideration of sustainable energy performance of buildings			System for consideration of introducing natural energy to buildings			
	Sustainable energy performance consideration (Building owner)	Sustainable energy performance presentation (Building owner)	Submission of sustainable energy performance (Building owner)	Consideration of possibility of national energy introduction (Building owner)	Natural energy facility information presentation (Building owner)	Submission of result of natural energy introduction (Building owner)	Submission of result of consideration of utilizing unused energy
≥ 10,000m²	○	○ Obligation to make efforts	○	○	○ Obligation to make efforts	○	○
10,000m² ≥ 2,000m²	○	○ Obligation to make efforts	○	○	○ Obligation to make efforts	○	×
2,000m² ≥ 300m²	○	○ Obligation to make efforts	○	○	○ Obligation to make efforts	×	×
300m² ≥ 10m²	○ (Obligation to make efforts at transition period)	×	×	○ (Obligation to make efforts at transition period)	×	×	×
10m² or less Temporary buildings Cultural heritages No need for AC	×	×	×	×	×	×	×
Remarks	• Information is provided upon requested by building owner	• Present at entrance/exit, etc. • Detached house excluded	• Submission to Prefecture • Prefecture can publish and advice	• Information is provided upon requested by building owner	• Present at entrance/exit, etc. • Detached house excluded	• Submission to Prefecture • Prefecture can publish and advice	• Submission to Prefecture • Prefecture can publish and advice

Nagano Prefecture Sustainable Energy Strategy

～ Residenti's Plan for the Third Nagano Prefecture Climate Change Policy ～

Executive Summary

Overview of Strategy



(Source: Energy White Paper 2012)

Integrate Climate Change Policy and Sustainable Energy Policy

In accordance with Act on Promotion of Global Warming Countermeasures and Nagano Prefecture Climate Change Policy Ordinance

8-year plan from FY2013 to FY2020

Background of Strategy Formulation

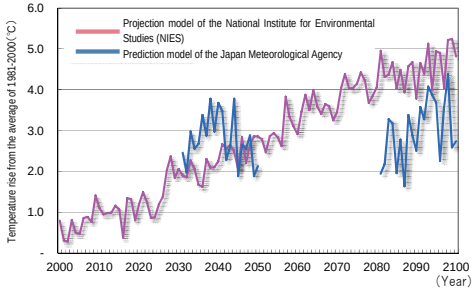
1 Climate change impacts

◇ There are growing concerns over impacts of climate change on biodiversity, agriculture and forestry, tourism, water use, disaster, human health and so on.

◇ Nagano prefecture is facing impacts of climate change.

Biological system in alpine zones being affected by climate change (Beaticola moshkarareppus comes to alpine plants)

【Future projection of temperature rise in Nagano Prefecture】



〈Source: prepared by Yasuaki Hijioka, NIES Chief Researcher〉

2 International energy trends

Energy price is expected to keep rising and remain high.

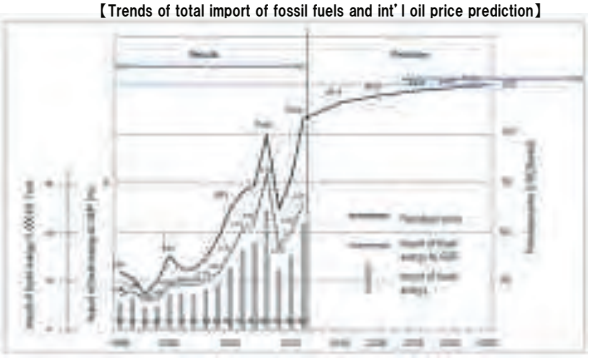
3 Drastic energy policy change

Due to the Great East Japan Earthquake and the nuclear power plant accidents, a drastic review of the current energy policies is needed.

4 Regional effects by Climate Change Policy

By Climate Change Policy, following major effects are expected in addition to environmental conservation.

【Trends of total import of fossil fuels and int' l oil price prediction】



【7 expected effects by local climate change policy】

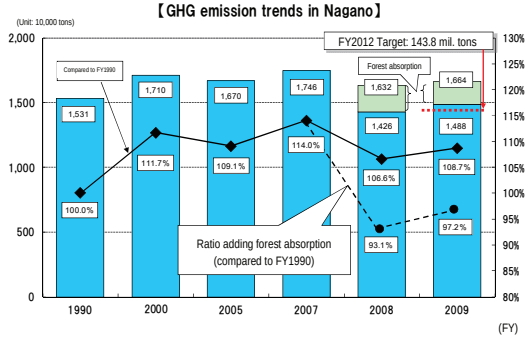
	Direct effects of climate change policy to the area		Expected ripple effect to the area
1	Prevention of outflow of local finance to overseas	⇒	Increase of funds of investment and consumption
2	Increase of investment to energy-saving/natural energy facilities	⇒	Expansion of investment and consumption
3	Natural energy supply to inside and outside the area	⇒	Increase of financial inflow to the region
4	Efficient energy use and increase of energy supply capacity	⇒	Enhance durability against overseas risks
5	Building of low-carbon and comfortable town	⇒	Increase of attractiveness of the region
6	Problem solution through collaboration with various actors	⇒	Stimulation of innovation
7	Strength of self-determination in the energy sector	⇒	Enrichment of local pride

5 Prefecture's initiatives

◇GHG emissions in Nagano prefecture in FY2009 increased by 8.4% compared to base year (FY1990) while the national figure showed 4.4% decrease.

◇Since reduction of GHG emissions has not been significantly progressed, it is necessary to shift conventional measures that focuses on awareness raising activities to highly effective initiatives to promote steady reduction.

【GHG emission trends in Nagano】



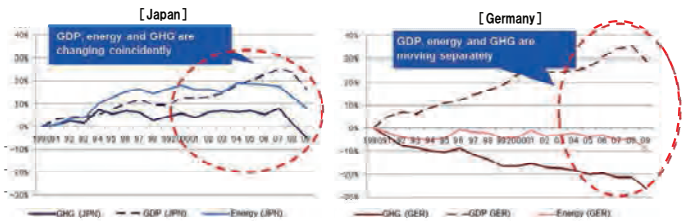
Vision and Goals

Basic goals To build a regional low-carbon and sustainable energy society

◇Aim to achieve economic and social structure which promotes reduction of total GHG emissions and energy consumption ("decoupling").

◇Germany and other European countries have realized such economic and social structure.

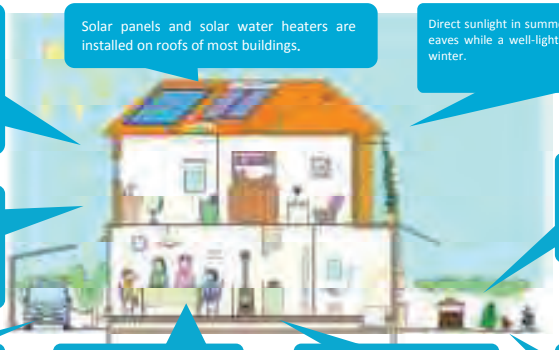
【Trends of GDP, Energy Consumption, GHG Emissions in Japan and Germany (1990-2009)】



〈Source: prepared by Ikuma Kurita, KIER Researcher〉

Visions in 2030

Residential life



Due to dissemination of houses with high insulation performance, residents can enjoy cool and warm indoor conditions in summer and winter, respectively.

Solar panels and solar water heaters are installed on roofs of most buildings.

Direct sunlight in summer can be prevented by installing eaves while a well-lighted condition can be enjoyed in winter.

High insulation mitigates the gap of indoor temperature so as to reduce the risk of heat-shock.

Woodshed and vegetable garden in a garden where residents enjoy agriculture and nature that is a lifestyle of Shinshu.

Next-generation car functions as a battery to reduce power consumption at peak.

A stove is located in wide living space which warms the whole house as well as creates a place for family members to sit together.

Solar heat, geo-heat, wood chip, and pellets are utilized for heating and hot water supply.

Kitchen waste is reused as compost for a farm which grows fresh and tasty vegetables supporting healthy life.

Community

Natural energy attracts many tourists.

Utilization of sustainable natural energy which vitalize agriculture and forestry is promoted. Livestock biomass and wood-based biomass⇒power generation⇒supply and selling of heat locally produced

Income from small hydro power generation by local residents is utilized for local town development activities.

Energy-saving houses utilizing woods of local origin are disseminated and house renovation is also promoted.

Public transportation is improved that make a town safer and more comfortable for pedestrians and bicycles.

Many houses, apartments, and buildings utilize natural energy and become a place for learning natural energy.

Increase of energy self-sufficiency contributes to develop disaster resilient town.

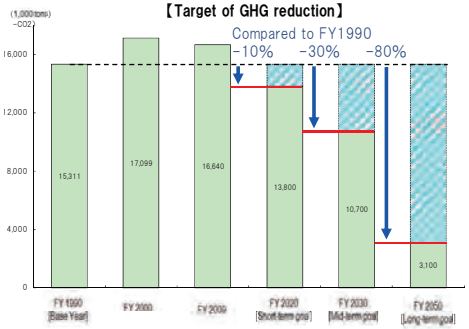
The number of users of low-carbon next generation vehicles is increasing. Car-sharing and park and ride is widely used.

Many business operators implement energy-saving and environmental business and natural energy project.

Locally-oriented natural energy business creates employment in the area and revitalizes local economy, and "energy independent area" at city and community level, which sustainably supports local independence, is emerged in the prefecture. Thanks to these development, residents can enjoy their comfortable life and fulfill social life.

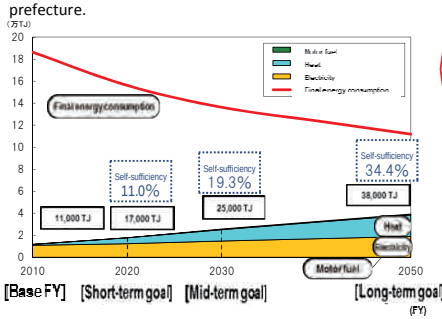
Targets

【Target of GHG reduction】

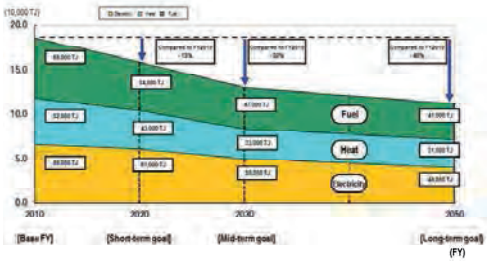


【Energy self-sufficiency (energy consumption)】

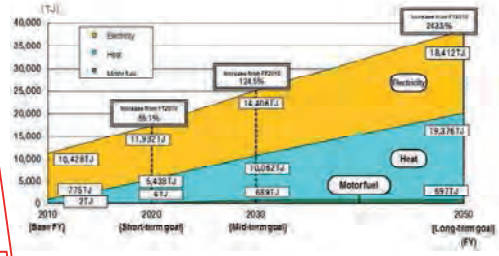
The indicator to understand the volume of renewable energy generated in prefecture to the annual energy consumption in prefecture.



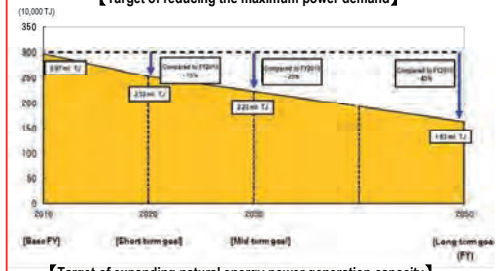
【Target of reducing final energy consumption】



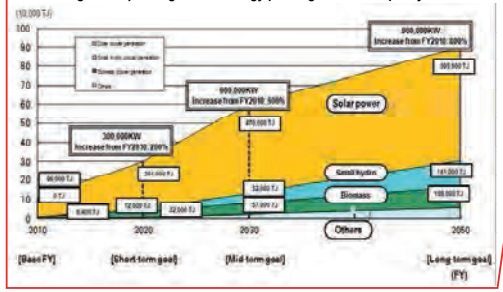
【Target of expanding natural energy introduction】



【Target of reducing the maximum power demand】

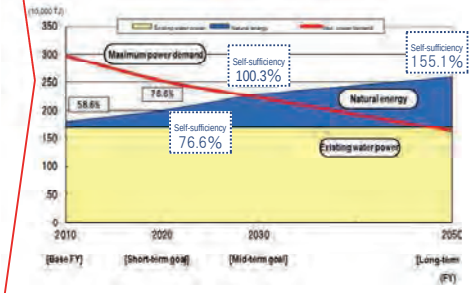


【Target of expanding natural energy power generation capacity】



【Energy self-sufficiency (power generation capacity)】

Indicator to understand the ratio of renewable energy power generation capacity to the maximum power demand in prefecture.



Policy

Household Energy Conservation Measures

Appliance Energy Efficiency Labelling System

In Nagano, retailers are required to put energy efficiency labels on all appliances.
In addition to air conditioners, televisions, and refrigerators, electric toilet seats and fluorescent lights have become subject to labelling.

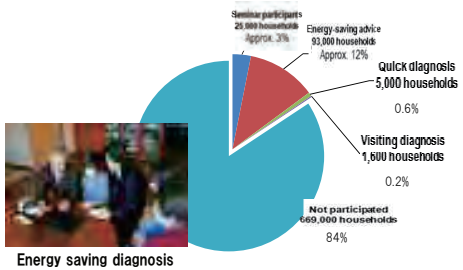
For electric toilet seats

For fluorescent lights

Home Energy Saving Support System

In addition to provide energy saving advice to each house (visiting diagnosis by experts, energy saving information provision, etc.) by dispatching energy saving advisors in collaboration with enterprises and organizations, energy saving seminars are organized.

Energy saving diagnosis



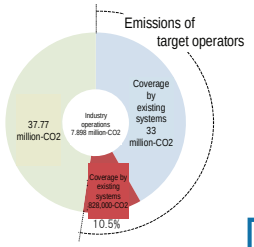
About 100,000 households in Nagano prefecture will be supported in 5 years (total number of households: 800,000)

➡ **Promote energy efficiency at home by encouraging individuals to shift to more energy-efficient appliances**

Industrial Energy Conservation Measures

Anti-global warming measures planning system for industry

◇Scope of the target operators of the planning system that promotes GHG emissions reductions, etc. associated with business activities is extended.



◇The prefectural government gives companies advice and guidance, and evaluates and awards them. This system also works as commuter & passenger transport, vehicle use, and logistics planning systems. This system accepts the voluntary submission of plans from small- and medium-size companies.

Energy saving diagnosis

Public-private partnership agreement system

The prefectural government makes partnership agreements with companies which set ambitious targets on energy conservation and GHG emissions reduction and assists them with their efforts to meet the targets.

Promotion of cooperation and collaboration between businesses

The prefectural government supports the activities of Shinshu Energy-saving Patrol Team, promotes the introduction of the environment management system, and facilitates business associations.

Hospital council for climate change policy

➡ **Providing multifaceted support to companies in their energy management and conservation efforts.**

Building Energy Conservation Measures

Environmental energy performance system for buildings

A building owner consider sustainable energy performance (insulation, etc.) before starting building work.

Natural energy installation system for buildings

A building owner consider introduction of natural energy facility before starting building work.

Detached house is also included. For a large building (>2,000m³), building plan and result of consideration should be submitted to Prefecture.

	Environmental energy performance system for buildings			Natural energy installation system for buildings			
	Performance analysis	Performance disclosure	Performance reporting	Energy analysis	Energy disclosure	Energy installation reporting	Energy utilization reporting
≥ 10,000m²	○	○ Obligation to make efforts	○	○	○ Obligation to make efforts	○	○
10,000m² ≥ 2,000m²	○	○ Obligation to make efforts	○	○	○ Obligation to make efforts	○	×
2,000m² ≥ 300m²	○	○ Obligation to make efforts	○	○	○ Obligation to make efforts	×	×
300m² ≥ 30m²	○ (Obligation to make efforts at transition period)	×	×	○ (Obligation to make efforts at transition period)	×	×	×
10m² or less. Temporary buildings Cultural heritages No need for AC	×	×	×	×	×	×	×
Remarks	• Information is provided upon requested by building owner	• Display at entrance • Detached house excluded	• Submission to Prefecture • Prefecture can publish and advice	• Information is provided upon requested by building owner	• Display at entrance • Detached house excluded	• Submission to Prefecture • Prefecture can publish and advice	• Submission to Prefecture • Prefecture can publish and advice

For particularly large building (>10,000m²), utilization of unused energy (exhaust heat, etc.) is also considered.

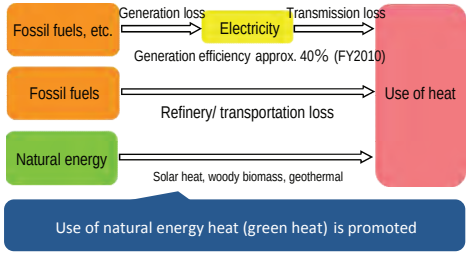
Target approximately 30,000 buildings in 5 years

Financial evaluation tools and installation manual are disseminated at seminars. Through Nagano Prefecture Housing Promotion Council, energy-saving technologies are also promoted.

➡ **Promote construction of buildings that have high performance of sustainable energy (insulation, energy efficiency, etc.) and that utilize natural energy**

Power Demand Control

Heat loss is covered by green heat

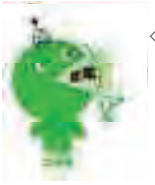


Use of natural energy heat (green heat) is promoted

Energy supplier climate change planning system

Energy supplier, etc. reports their initiative against climate change.

Shinshu Energy Saving Campaign (cut, shift, and change)



◇Prefectural residents altogether initiate energy/electricity saving in summer and winter.

◇Advance initiative of Shinshu Cool Share & Warm Share Spot which promotes residents to avoid using home air-conditioning system and visit warm (cool) place to share warmness (coolness) with others.

➡ **Aim to establish energy saving structure.**

Natural Energy Policy Package

Build bases for local natural-energy dissemination

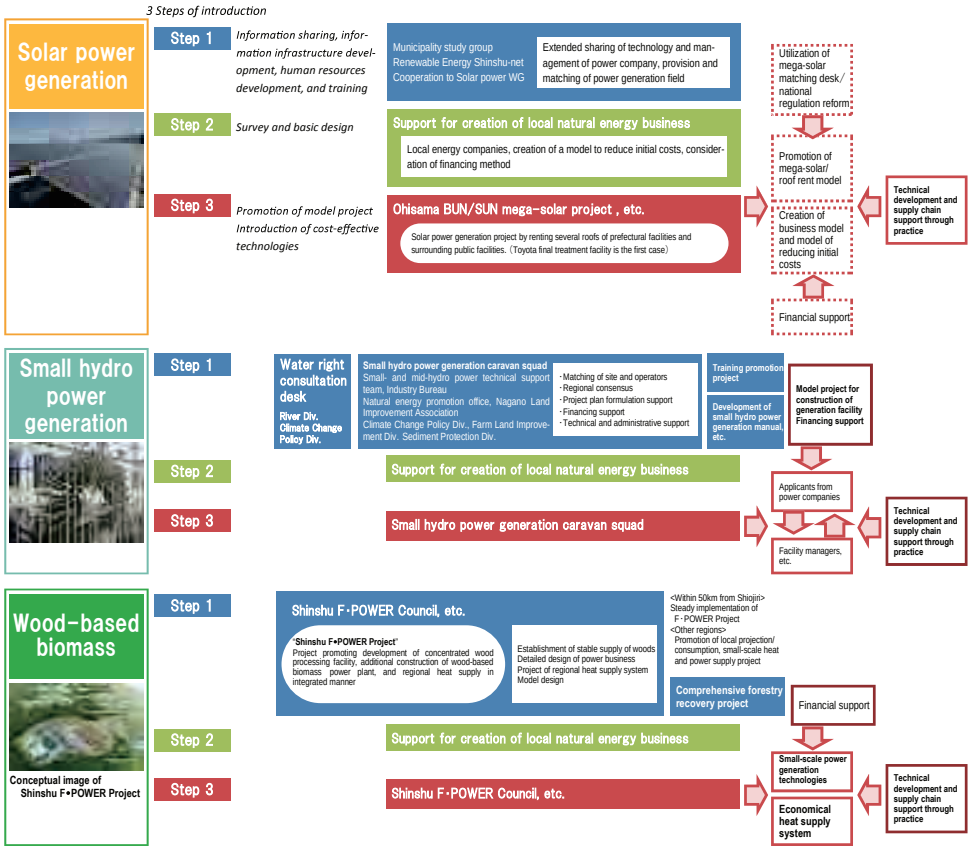
In collaboration with Renewable Energy Shinshu-network and regional councils, sharing of information and knowledge of natural energy is promoted.
Creation of the Regional Sustainable Energy Office" that provides know-how on natural energy projects is also accelerated.

Ohisama BUN/SUN mega-solar project
(Suwa Lake basin sewerage, Toyota final treatment facility, etc.)

Use prefectural facilities to promote creation of local business models with high publicness as well as promote human resource development and accumulation of know-how.

Through 1 Village 1 Natural Energy Project, accumulation of regional experience is supported so as to promote project formulation and reduce risks.

Promotion of natural energy type

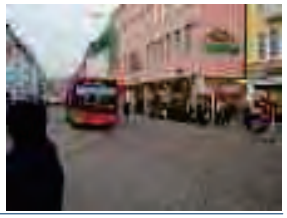


Promote local initiative to disseminate natural energy by using the Feed-in-Tariff scheme

Implementation

Expectation to prefecturl residents

[Living]
Energy saving at home, bring a reusable bag to shopping, try to select environmentally-considered eco-products.



[Mobility]
Use public transportation or bicycle, or go out on foot.
Purchase environmentally-friendly bicycle.
Try eco-drive.

[Houses]
Renovation of houses through insulation performance and energy efficiency improvement as well as natural energy

[Business]
Identify and reduce energy and environmental burden occurred in production, logistics, and delivery.
Proactive development of environmental business.

Residents' broad participation and activities are need-

Implementation structure in Prefecture

- ◇ Implementation organization is "Nagano Prefecture Headquarters of Energy-Saving and Natural Energy Promotion" led by the Governor.
- ◇ Coordination with cities, related organizations, residents and business operators.
- ◇ Monitor and publish the progress every year.
- ◇ Report the progress to the Environment Council (external experts) and obtain comments. Feed-back the comments to the Prefecture.
- ◇ The plan will be reviewed in the fifth year (FY 2107) and update as needed.

長野県 環境部 温暖化対策課
〒380-8570　長野市大字南長野字幅下692-2
TEL：026-235-7022　FAX：026-235-7491
長野県公式ホームページ：http://www.pref.nagano.lg.jp/
Eメール：ontai@pref.nagano.lg.jp

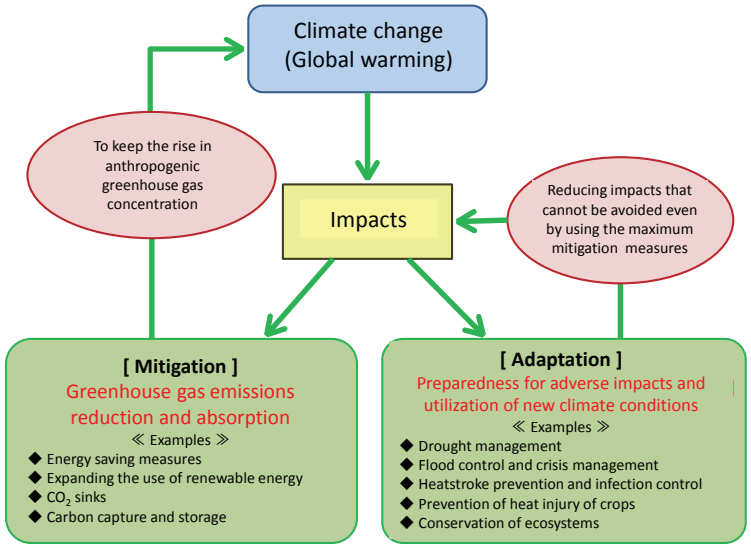
長野県　温暖化対策課　検索

2016 JICA Training in Japan for the Kingdom of Thailand
"Training course on climate change management for climate-resilient society development in Japan"

Nagano Prefecture's Approach to Promote Climate Change Adaptation

Takashi Hamada, Nagano Environmental Conservation Research Institute
April 21, 2016

Relationship between Mitigation and Adaptation



Source: Ministry of Education, Culture, Sports, Science and Technology; Meteorological Agency; Ministry of the Environment (2013): "Climate Change and Its Impact in Japan (Fiscal Year 2012 Version)

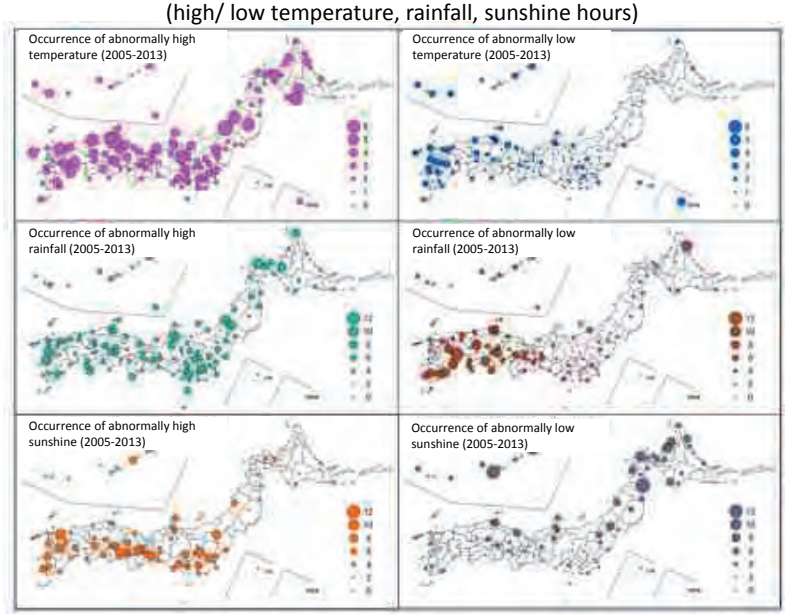
Impact of Climate Change and Adaptation Measures

- Mitigation is a global action
  - Contributing to the reduction of greenhouse gases to the atmosphere

- Adaptation is a local action
  - Contributing to the development of community's resilience to climate change

Regional Differences of Climate Change Impacts

(high/ low temperature, rainfall, sunshine hours)



Source: Meteorological Agency (2015): Report of Abnormal Weather 2014

Local Governments are the Main Actors in Climate Change Adaptation

- But...
- Many issues remain
  - Lack of information on how climate change is actually affecting the area
    - Insufficient number of observation points
  - Limitations of climate change projection
    - Global projects are too coarse

    → Downscaling to kilometers becomes possible only recently
  - Unable to provide communities with concrete information on climate change

Climate Change Adaptation in Nagano Prefecture

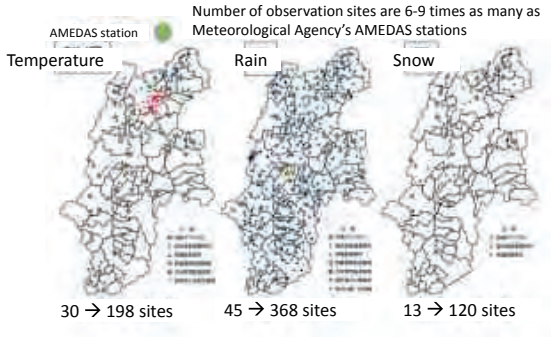
Presented in detail in the following slides

Observation and monitoring of climate change (to understand actual situation)	Since 2014
Projection of climate change impacts	Since 2015
Sharing of impact projection and other information, consider adaptation measures	Since 2016
Development of adaptation technologies	
Implementation of adaptation measures/ technologies	

Realization of a resilient society adapting to climate change

Observation and Monitoring of Climate Change

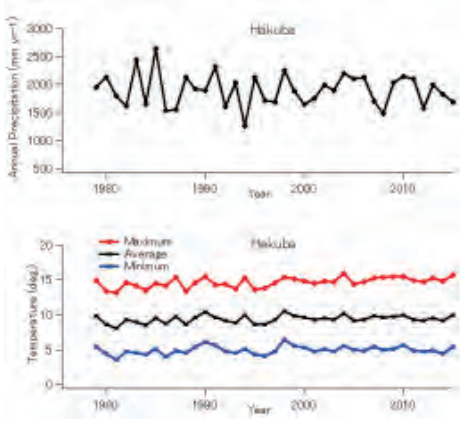
- Establishment of "Shinshu Climate Change Monitoring Network" (November 2014)
  - Centralized collection and compilation of meteorological data in Nagano Prefecture
  - Analysis of actual climate change using collected data
  - Participation of about 50 organizations in the Prefecture



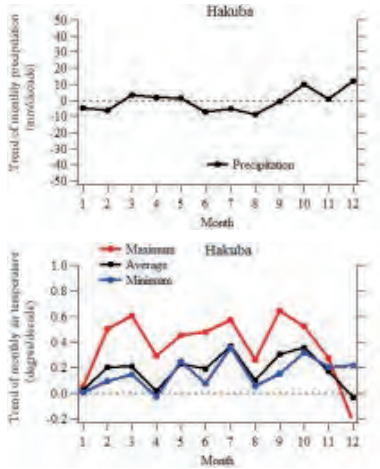
AMEDAS: Automated Meteorological Data Acquisition System

Analysis on Actual Situation (1)

Temperature and Precipitation over Years



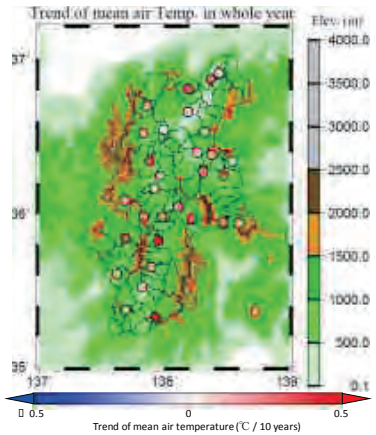
10-Year Changes in Temperature and Precipitation by Month



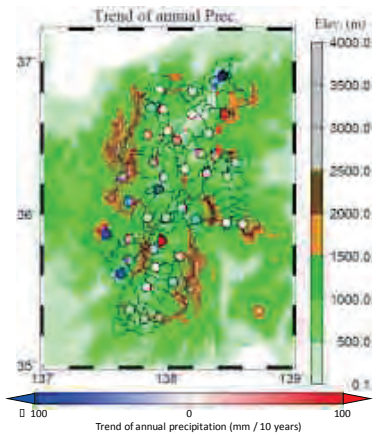
- Temperature shows increasing tendencies, particularly in March, July, and September.
- Precipitation shows no clear tendencies.

Analysis on Actual Situation (2)

Change in Annual Mean Temperature

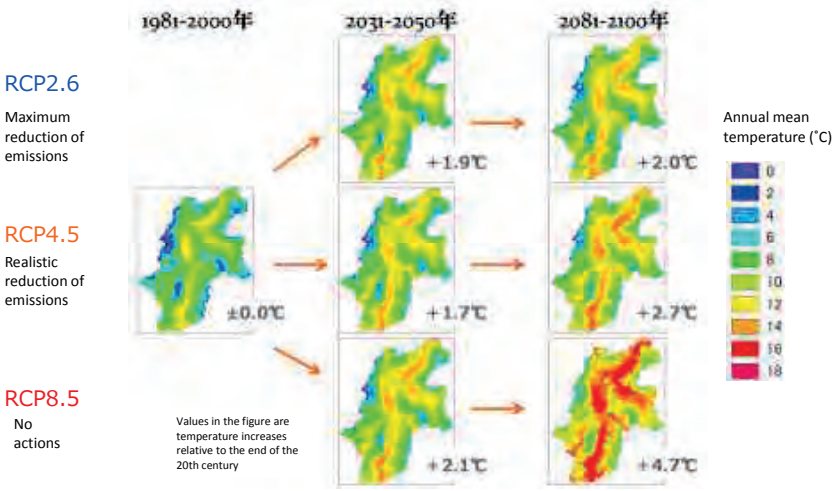


Change in Annual Precipitation



- Temperature tends to increase at all sites.
- Precipitation is increasing at some sites and decreasing at other sites.

Climate Change Projections



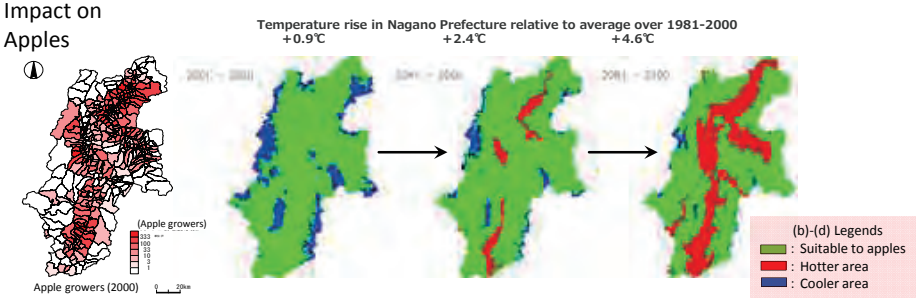
Mapped by Center for Environmental Science in Saitama and Nagano Environmental Conservation Research Institute based on the results of Environmental Research and Technology Developing Fund Project S-8 of Ministry of the Environment

- Climate change prediction data containing probability information are in the process of preparation (planned for release with the assistance of MEXT SI-CAT)

Evaluation and Assessment of Climate Change Impacts

*** Prediction from the model with relatively large temperature rise (MIROC) using the scenario with continuing high economic growth (A1B)** (Taking only temperature conditions into consideration)

Impact on Apples



(a) Actual distribution Number of apple growers (as of 2000)

(b) Areas suitable to apple growing in 2001-2020 (present state)

(c) Areas suitable to apple growing in 2041-2060 (projected)

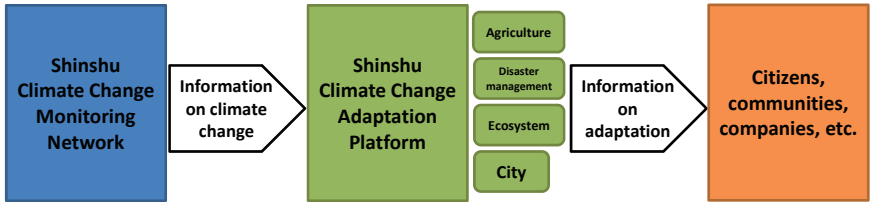
(d) Areas suitable to apple growing in 2081-2100 (projected)

Data from Center for Environmental Science in Saitama and Nagano Environmental Conservation Research Institute

- To be recalculated using a new impact evaluation model in the future (to be released with the assistance of MEXT SI-CAT)

Adaptation Information Sharing and Discussion

- Establishment of “Shinshu Climate Change Adaptation Platform” (planned for 2016)
  - A place to share and discuss climate change impact assessment and issues on adaptation
  - Consists of administrative organizations, research institutes, companies, etc.
  - Promotes the development of technologies and services for climate change adaptation



Thank you very much for attention.

Acknowledgement

Part of this material has been produced with the assistance of
“Social Implementation Program on Climate Change Adaptation Technology (SI-CAT)”
of Ministry of Education, Culture, Sports, Science and Technology (MEXT), Japan.

Using Cultivars to Counter the Spread of Wheat Yellow Mosaic under Climate Warming

Department of Breeding, Nagano Agricultural Experiment Station

1. Wheat Yellow Mosaic

(1) Overview

Wheat yellow mosaic is a soilborne viral disease typically occurring in winter wheat. The pathogen, wheat yellow mosaic virus (WYMV), is transmitted by the soilborne fungus *Polymyxa graminis* to cause infection. Because the virus-carrying soilborne fungus survives long in soil and this disease is generally very difficult to control using cultivation techniques, the employment of resistant cultivars is considered the most effective control strategy.

In Nagano Prefecture, the disease was detected first in the Nanshin region in 2008, and was confirmed to spread into major wheat production areas of the Prefecture by 2010, suggesting the expansion of disease with the warming of climate.

In response, Nagano Agricultural Experiment Station has been conducting studies on “Monitoring of Wheat Yellow Mosaic in Nagano Prefecture,” “Establishment of a Cultural Control Method,” and “Selection and Adoption of a Resistant Cultivar.”

(2) Symptoms and Damage

Wheat yellow mosaic infection manifests symptoms including yellow discoloration of bottom leaves after winter, and severely affected fields suffer yield losses. Different cultivars show different degrees of resistance to this disease. Resistant cultivars do not develop symptoms even after infection, and do not suffer yield losses.

A condition that seems to stimulate infection is long fall weather with relatively high temperatures, while relatively cool temperatures in spring appears to increase the severity of disease.

Despite recent warming trends causing warmer fall seasons, the timing of seeding remains as before. This is considered to have elongated the period of exposure to temperatures suitable to infection, resulting in the increase in damage.

2. Breeding of a Resistant Cultivar

Conventionally, the main cultivar planted in the Prefecture has been “Shirane Wheat.” Its resistance to wheat yellow mosaic is rated “weak,” and the frequent cases of yield losses due to the spread of this disease made it an urgent priority to create a resistant cultivar.

A field for the testing of this disease was set up in 2010 in an urgent project to establish the system to test the resistance of bred strains to this disease. As a result, we succeeded in the early breeding and popularization of a resistant cultivar “Yumekirari.”

We plan to continue the work aiming at higher stability of resistance and better quality through the use of multiple resistance genes.

Breeding of “Kazesayaka,” a New Rice Cultivar with Less Susceptibility to Heat Injury

Department of Breeding, Nagano Agricultural Experiment Station

Deterioration of product quality due to high temperatures during the ripening of grains is a matter of concern in the low-altitude (300-400 m), warm areas in the southern and northern parts of Nagano Prefecture. In 2010, when the mean temperature during the ripening period (August to September) was about 3°C higher than the 24°C in normal years, deterioration of the quality of brown rice emerged as a problem in these areas, as white immature grains occurred at a rate of about 20%. The effect of high temperatures on paddy-rice plants is known to cause deterioration of brown rice due to the occurrence of white immature grains when the daily mean temperature during 20 days after heading rises to about 26°C or more.

On the other hand, paddy-rice cultivation in Nagano Prefecture predominantly depends on the cultivar “Koshihikari,” which represents 75% of all crops of nonglutinous rice cultivars. As a result, the concentration of harvesting work in a short period tends to cause delays in harvesting, resulting in the problem of cracked rice kernels.

In this situation, Nagano Agricultural Experiment Station has developed a new cultivar “Kazesayaka” and is promoting its popularization. As this cultivar produces heads several days later than “Koshihikari,” it can avoid the risk of ripening during the hot period, and is less likely to produce white immature grains as a form of heat injury.

1. Breeding of “Kazesayaka”

This strain was produced in 2000 by the crossbreeding of “Hokuriku No. 178” as the mother and “Shinko No. 485” (later called “Yumeshinano”) as the father aiming at the goals of good taste, strong blast resistance, high yield, and labor saving. As the productivity and characteristics study starting from 2004 gave promising results, the strain was entered into the study to determine recommended cultivars, and the feasibility of cultivation in the Prefecture was assessed.

Although the high temperatures during the ripening period of 2010 caused deterioration of the quality of brown rice in general, “Kazesayala” showed little deterioration of the quality of brown rice, and its superiority was recognized.

It was applied for crop variety registration in 2011, and was registered in 2013.

2. Characteristics of “Kazesayaka”

- As compared with “Kinuhikari,” it is 3 days later in heading and 6 days later in ripening, making its earliness rating “medium-maturing, late-ripening.”
- Yield is high, producing 8% more than “Kinuhikari.”
- Stems are short and resistant to lodging.
- It is more resistant to rice head blast than “Kinuhikari.”
- It shows less occurrence of white immature grains due to high temperatures after heading than “Koshihikari.”

Because “Kazesayaka shows a higher rate of complete grains than “Koshihikari” and “Kinuhikari” and a lower rate of immature grains (percentage of brown rice grains with heat injury), it is classified as “strong” in the high-temperature ripening property. This is interpreted as the “ability to avoid high temperatures” in the sense that the plant produces heads after temperature has started to decrease and hence it is less likely to experience high temperature during the ripening period.

3. On the Cultivar Development Responding to Warming of Climate

While we need both cultivar development and cultivation techniques to cope with the warming of climate, future progression of the warming of climate is expected to increase the importance of cultivar development. We are working to breed cultivars that can withstand high temperatures and do not produce white immature grains (high-temperature resistant varieties).

Theme: Bleeding of an Apple Cultivar Responding to the Warming of Climate
Breeding of an Early-Ripening Apple Cultivar "Apple Choka 25"

1. Background and Purpose

While "Tsugaru" is the second most widely-cultivated early-ripening apple variety in Nagano Prefecture next to "Fuji," it is affected by the problem of poor color development mainly in low-altitude, warm areas as a consequence of the recent warming of climate. In addition, delayed harvesting after allowing more time for color development is also causing the problem of soft flesh and poor keeping quality.

Therefore, producers and distributors strongly want the breeding of early-ripening cultivars with good color development and long life under high-temperature conditions.

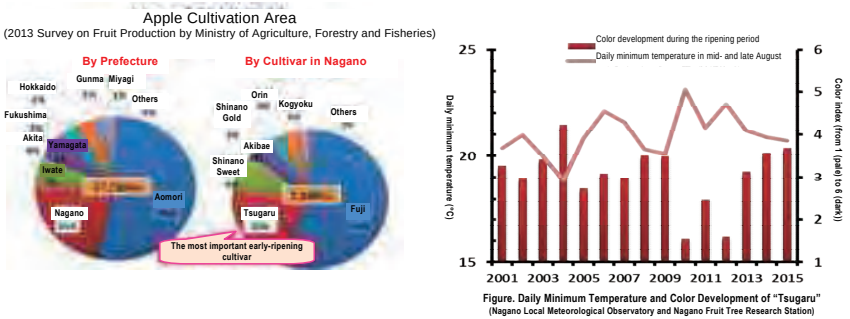


Figure. Daily Minimum Temperature and Color Development of "Tsugaru"
(Nagano Local Meteorological Observatory and Nagano Fruit Tree Research Station)

2. Description of Achievements

(1) "Apple Choka 25" is an early-ripening variety with good color development and taste, produced by the crossbreeding of "Senshu" and "Shinano Red."

(2) The time of flowering and the time of budding are largely the same as those of "Tsugaru." The time or ripening in the test orchard (Suzaka City) is mid-August, and is 5-10 days earlier than that of "Tsugaru." The time needed from full bloom to maturation is about 111 days.

(3) The fruit has a prolate shape and weighs about 300 g. It is colored almost overall in purplish red. Sugar content is about 14-15%, and acidity is about 0.4%. It has fuller coloration and richer taste than "Tsugaru." Storage life is about 7 days at room temperature and about 1 month under refrigeration.

3. Problems for the Future (Apple Choka 25)

(1) Because temperature is high during the harvest season, the practice of color management involves a risk of sunburn on the fruit surface. An appropriate color management method needs to be developed.

(2) Because color development occurs early, there is a risk of picking unripe fruits. The appropriate timing of harvest needs to be established considering the period of storage.

4. Future Directions of Cultivar Development Responding to the Warming of Climate

(1) Breeding of early-ripening cultivars with good color development under the conditions of even higher temperatures.

(2) Breeding of medium- and late-ripening cultivars with good color development under high-temperature conditions.

(3) Breeding of cultivars with good keeping quality under high-temperature conditions.

Overview of
Kochi Prefecture Action Plan against
Global Warming

Kochi Prefecture

Basic data

Area: 7,103.93 km^2

Population: 728,461

Annual daylight hours: 2,066 hours

Gross Prefectural Product: 2,158.4 billion yen

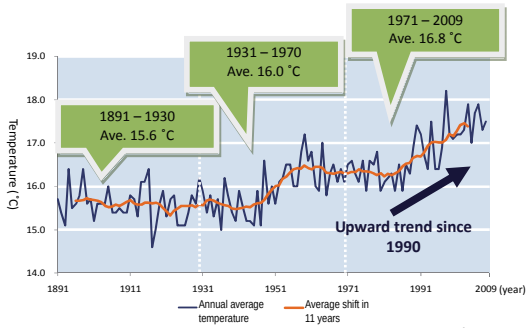
Ratio of forest area: 84%

Average temperatures: 16.8˚C

Annual precipitation: 2,985 mm

Current climate

[Increase of average temperature]

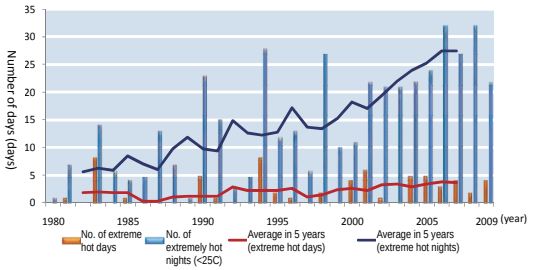


◆The average temperature of Kochi city has increased by 1.43˚C over the last 100 years

◆The average temperature of Tosashimizu city has increased by 1.34˚C while that of Muroto city has increased by 0.96˚C

* Not only global warming but urbanization is also considered as a factor of increasing temperature.

[Increase of the number of extremely hot days/ nights]



◆In accordance with the increase of average temperature, the number of extremely hot days and hot nights has also increased

◆Increase of the number of hot nights shows particularly remarkable trend.

[Source] Kochi Local Meteorological Observatory

Impact and damage

[Opacification of rice]

Opacified rice

◆Rice is “opacified” due to high temperatures, etc. in summer

◆It is regarded as a problem as it causes deterioration of brown rice quality

◆It is often found in warm, early crop rice areas

[Watercourse disorder of Nitaka pear]

Watercourse disorder of Nitaka pear

◆The case of “watercourse disorder” which fruit becomes water-soaked and its taste is degraded due to abnormal high temperature or desiccation of soil in summer has been increasing.

◆Unstable state, such as decrease of production and quality has been lasting.

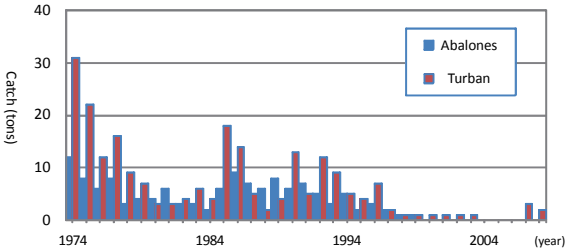
[Impact on fishery]

◆Due to the rising seawater temperature, withered seashore phenomena (decrease or disappearance of seaweed inhabiting area) have been broadened in the coast area of Kochi prefecture.

◆When withered seashore is broadened, the number of abalones and seashell such as turban which eat seaweeds decreases.

◆Since the high water temperature in 1998, the volume of caught abalones and turban has not reached to the market distribution volume, which could not maintain as fishery business.

Trend of catch volume of abalones and turban in Kochi prefecture



[Source] Annual statistics of Agriculture, Forestry and Fisheries in Kochi

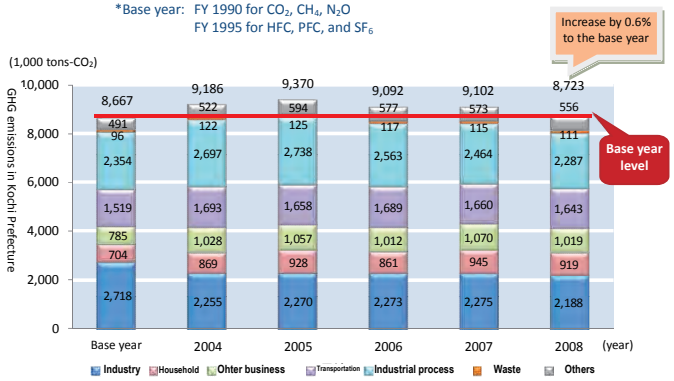
GHG emission trends

◆Emissions in 2008 were 8,723,000 tons-CO_2 which were 0.6% higher than the base year*.

◆After the emissions peaked in 2005, which were about 8% higher than the base year, the emissions have been declining in the subsequent years.

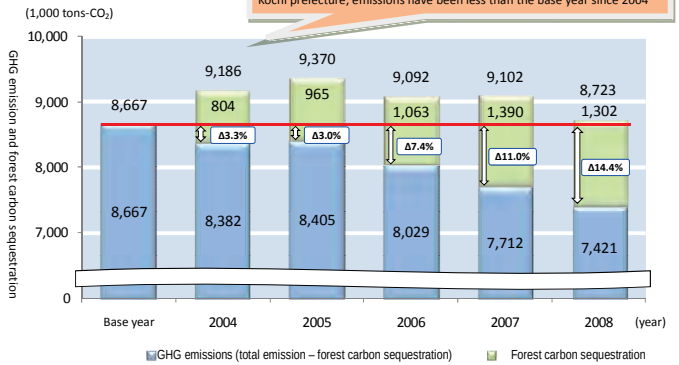
◆GHG emissions in Kochi prefecture account for approx. 0.7% of Japan's total GHG emissions in 2008 (1,281 million thousand tons-CO_2).

*Base year: FY 1990 for CO_2, CH_4, N_2O
FY 1995 for HFC, PFC, and SF_6



Forest carbon sequestration

Counting the amount of forest carbon sequestration into GHG emissions of Kochi prefecture, emissions have been less than the base year since 2004



◆Every single tree consisting of a forest performs photosynthesis by absorbing CO_2 in the atmosphere and accumulates carbon as organic matter in its trunk, branch, etc. to grow.

◆Followings are counted as forest carbon sequestration (according to the Kyoto Protocol)

1) Afforestation (planting of trees in an area where there had been no forest for the past 50 years)

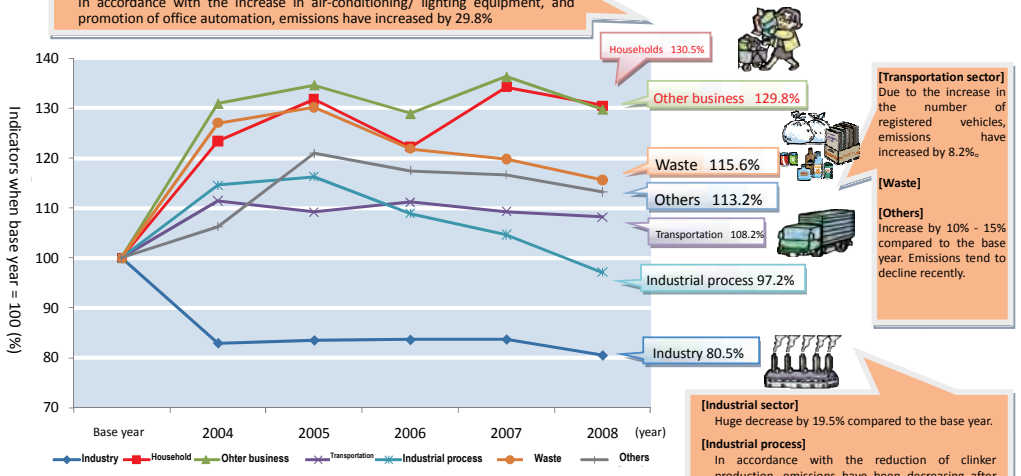
2) Reforestation (planting of trees in an area where there had been no forest as of 1990)

3) Forest Management (Artificial activities that allow forests to appropriately perform various forest functions in sustainable manners (such as management and conservation of forests))

Emission trends by sector

[Household sector]
In accordance with the increase in the number of households and the increasing size of household appliances, emissions have increased by 30.5% since base year

[Other business sectors]
In accordance with the increase in air-conditioning/ lighting equipment, and promotion of office automation, emissions have increased by 29.8%



[Transportation sector]
Due to the increase in the number of registered vehicles, emissions have increased by 8.2%。

[Waste]

[Others]
Increase by 10% - 15% compared to the base year. Emissions tend to decline recently.

[Industrial sector]
Huge decrease by 19.5% compared to the base year.

[Industrial process]
In accordance with the reduction of clinker production, emissions have been decreasing after the peak in 2005.

Target of GHG emissions reduction

GHG emissions reduction by 31% in 2020 from the base year.

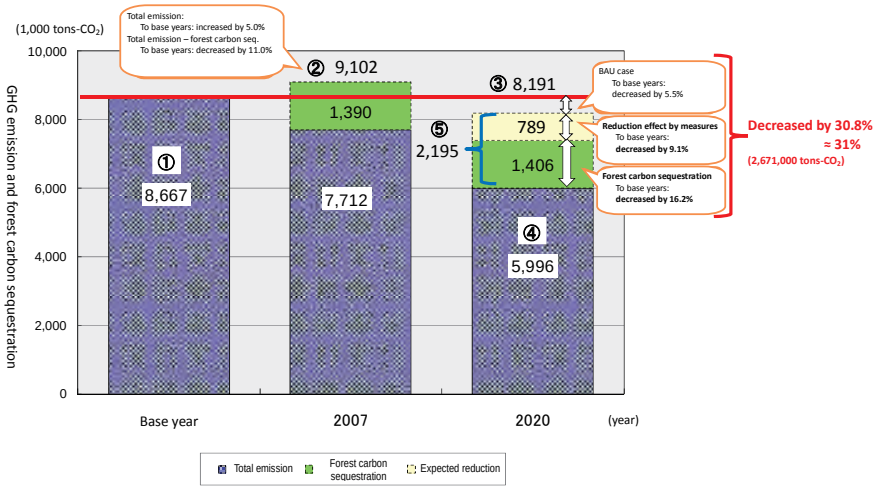
Base year: FY 1990 for CO_2, methane, and dinitrogen oxide, and FY 1995 for HFC, PFC, and SF_6

Emissions from the case where global warming countermeasures are not taken (business-as-usual: BAU case) are **expected to be reduced by 5.5% (8,191,000 tons-CO_2) from the base year in 2020**, due to the expected decrease in cement business activities, and reduced population and household numbers.

By adding **expected GHG reduction volume after taking global warming countermeasures (789,000 tons-CO_2)** and **forest carbon sequestration (1,406,000 tons-CO_2)** to the above reduction volume in the BAU case, (476,000 tons-CO_2), we aim to achieve **the goal of reducing GHG emission by 31% (2,671,000 tons-CO_2) from the base year.**

	Emissions (1,000 t-CO_2)				2020	Compared to base year
	Base year	2007	BAU case in 2020	Project case in 2020	Expected reduction volume (1,000t-CO_2)	Reduction rate (%)
Total emissions	① 8,667	② 9,102	③ 8,191	④ 5,996	⑤ 2,195	31

*BAU case refers to those not taking specific global warming measures from the current status

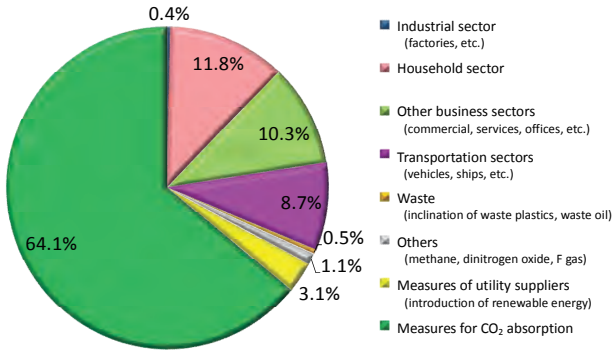


Expected reduction and reduction rate by sector

Sector	Expected reduction (1,000 tons-CO_2)	Ratio (%)
Industrial sector (factories, etc.)	9	0.4%
Household sector	260	11.8%
Other business sectors (commercial, services, offices, etc.)	226	10.3%
Transportation sectors (vehicles, ships, etc.)	192	8.7%
Waste (inclination of plastic wastes, waste oil)	10	0.5%
Others (methane, dinitrogen oxide, F-gas)	25	1.1%
Measures of utility suppliers (introduction of renewable energy)	68	3.1%
Measures for CO_2 absorption	1,406	64.1%
Total	2,195	100%

Note: the total of each item may not match exactly with the figure in the total because those figures are rounded

Reduction rate by sector



GHG Inventory of Kochi Prefecture

Calculated greenhouse gas emissions (GHG Inventory)

(1) Result of calculation

Calculation result of greenhouse gas (GHG) emissions in Kochi prefecture is shown in Graph 1 below.

Graph 1 Calculated greenhouse gas emissions

* Red figures show provisional value

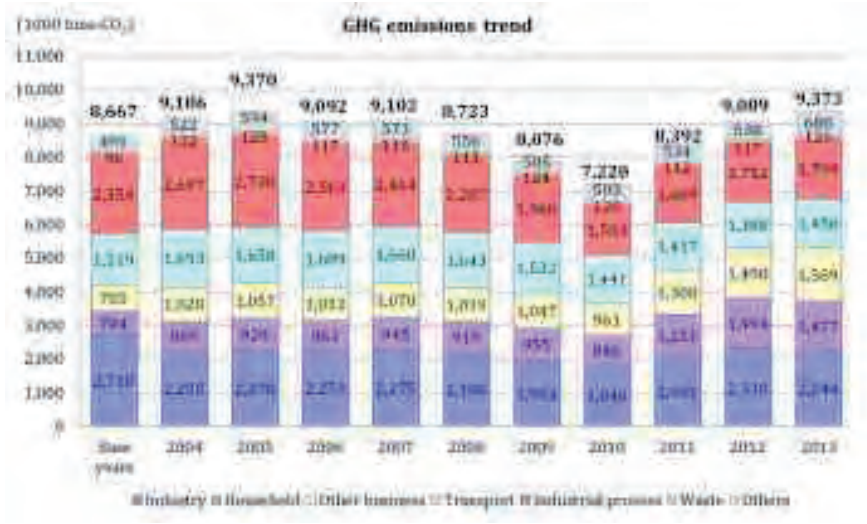
(Unit: 1,000 tons-CO_2)	1990 Base year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total emissions	8,667	9,186	9,370	9,092	9,102	8,723	8,076	7,220	8,392	9,089	9,373
Total emissions - Sequestration	8,667	8,382	8,405	8,029	7,712	7,392	6,745	5,797	7,145	8,488	8,185
Energy-related CO_2 emissions	5,726	5,845	5,913	5,835	5,950	5,769	5,487	5,094	6,057	6,682	6,760
Industry	2,718	2,255	2,270	2,273	2,275	2,188	1,953	1,846	2,081	2,310	2,244
Agriculture, forestry & fisheries	711	409	391	382	461	485	438	438	454	540	495
Construction and mining	169	146	141	155	112	104	93	105	126	130	119
Manufacturing	1,838	1,700	1,738	1,736	1,702	1,599	1,422	1,303	1,501	1,640	1,630
Household	704	869	928	861	945	919	955	846	1,251	1,494	1,477
Other business	785	1,028	1,057	1,012	1,070	1,019	1,047	961	1,308	1,490	1,589
Transport	1,519	1,693	1,658	1,689	1,660	1,643	1,532	1,441	1,417	1,388	1,450
Vehicles	1,193	1,545	1,506	1,533	1,500	1,501	1,399	1,297	1,280	1,260	1,307
Railways	24	19	21	21	21	20	20	19	19	20	22
Domestic vessels	253	77	71	71	75	62	59	66	60	55	58
Domestic airlines	49	52	60	64	64	60	54	59	58	53	63
Industrial process	2,354	2,697	2,738	2,563	2,464	2,287	1,960	1,503	1,689	1,752	1,799
Clinker production	2,282	2,568	2,613	2,428	2,338	2,173	1,862	1,395	1,578	1,652	1,693
Others	72	129	125	135	126	114	98	108	111	100	106
Waste	96	122	125	117	115	111	124	120	112	117	126
General wastes	65	72	76	71	68	72	78	78	70	79	85
Industrial wastes	31	50	49	46	47	39	46	42	42	38	41
Others	491	522	594	577	573	556	505	503	534	538	688
Methane	197	136	127	124	125	126	118	119	119	121	238
Dinitrogen monoxide	156	259	327	320	314	306	278	263	283	283	277
Hydrofluorocarbon	18	56	58	61	70	78	90	96	106	117	160
Perfluorocarbon	105	45	50	40	32	21	7	8	8	8	9
Sulfur hexafluoride	15	26	32	32	32	25	12	17	18	9	4
Sequestration	0	804	965	1,063	1,390	1,331	1,331	1,423	1,247	601	1,188

(2) Emission trend

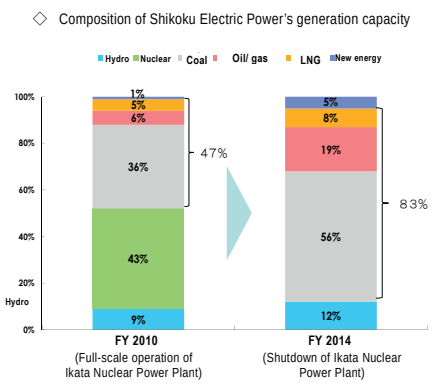
GHG emissions in Kochi prefecture for FY2013 were 9,373,000 tons CO2, 8.1% above the base year (FY1990) emissions (8,667,000 tons CO2).

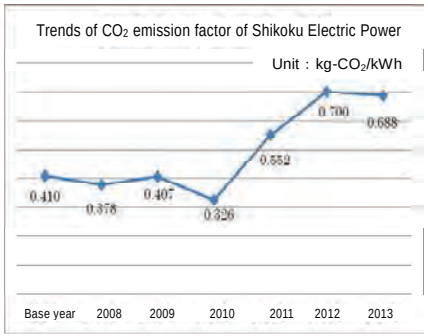
Emissions have followed a declining trend since 2005 before it began to rise in 2011. Emissions increased by 286,000 tons CO2 (3.1%) in 2013 compared to the previous year (FY2012). (See Graph 2)

Graph 2 GHG emission trend



* An upward trend in GHG emissions since 2011 is mainly due to increased dependency on thermal power generation after shut-down of all nuclear power plants across Japan following the Fukushima Daiichi nuclear power plant accident, posing a significantly negative impact to the CO_2 emission factor of electricity grid.



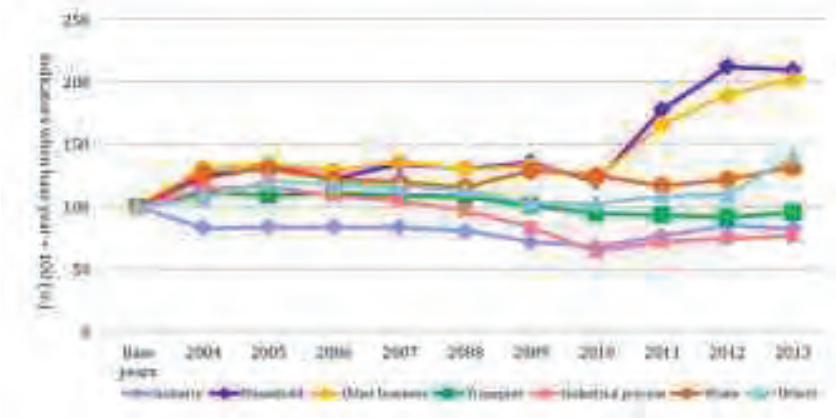


(3) GHG emissions by sector

Across sectors, industry, transportation and industrial process sectors are seeing a decline in emissions compared to the base year (FY1990), while emissions in the household sector, operation and others sector, waste sector, and others have increased from the base year, with a significant increase particularly in the household sector and operations and others sector.

Furthermore, in terms of changes in emissions levels from the previous year (FY2012), there has been an increase in the industry sector as well as non-household sectors (transportation sector, operation and others sector, industrial process sector, waste sector, and others sector). (See Graph 3)

Graph 3 Emission trend by sectors



Summary of Emissions

(1) GHG emissions

Graph 4 provides an overview of GHG emissions.

Observing the trend for GHG emissions, FY2004 through FY2008 saw increased levels compared to the based year (FY1990) before starting to decline in FY2009. However, emissions exceeded the base year level once again in 2012, with an 8.1% increase against the base year in FY2013, up 3.1% from the previous year (FY2012).

Higher emissions in recent years can be mainly attributed to the increased use of thermal power plants as the electricity sources due to the ceased operations in nuclear power plants, posing a significant negative impact on grid emission factors.

Graph 4 Summary of GHG emissions

	1990 (Base year)	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total emissions (1,000t-CO_2)	8,667	9,186	9,370	9,092	9,102	8,723	8,076	7,220	8,392	9,089	9,373
Compared to 1990 (%)	－	+6.0%	+8.1%	+4.9%	+5.0%	+0.6%	△6.8%	△16.7%	△3.2%	+4.9%	+8.1%
Compared to the previous year (%)	－	－	+2.0%	△3.0%	+0.1%	△4.2%	△7.4%	△10.6%	+16.2%	+8.3%	+3.1%

Emission tendency is summarized below for major emission sectors in Kochi prefecture that account for more than 10% of total emissions in FY2013.

[Summary of major sectors]

- **Industry sector**: Hit by the economic downturn arising from the global financial crisis in late FY2008, the sector's emissions have been affected by declining production activities and falling energy demand as well as proactive energy-saving measures, seeing emissions decline during FY2008 through FY2010. The trend of GHG emission decrease reversed in FY2011 due to the increase in electricity emission factor.

- **Household sector**: In addition to the increased number of households and increased size and varieties of home appliances, which have led to the increase in household electricity consumption, grid emission factor has worsened since FY2011 due to the increased dependency on thermal power generation, all contributing to the hike in emissions. While FY2013 saw emissions fall by 1.1% from the previous year (FY2012) thanks to the diffusion of energy-saving measures, it remained a 109.8% increase compared to the base year (FY1990).

- **Other business sector**: Emissions are on an upward trend due to increased energy consumption from increased numbers of air conditioning and lighting equipment to accommodate larger floor space for office and retail shops as well as the advancement in office automation. While electricity consumption in FY2013 was lower than the previous year (FY2012), emissions rose by 6.6% from the previous year (FY2012), up 102.4% when compared to the base year (FY1990).

- **Transportation sector**: As 90% of total emissions in the sector come from automobiles, number of vehicles owned and car usage have a significant impact on sector-wide emissions trends. In FY2013, the rise in automobile ownership contributed to increased fuel consumption, seeing emissions go up by 4.6% from the previous year (FY2012).

- In industrial processes, the majority of emissions come from cement production process. In FY2010, emissions fell due to economic downturn and closure of cement plants. From 2011 onwards, rising demand in the private sector including redevelopment projects and construction of apartment buildings in city areas mostly in the Kanto region has triggered a boost in cement manufacturing, followed by increased clinker production, prompting emissions to go up by 2.7% in FY2013 from the previous year (FY2012), while it was down 23.6% compared to the base year (FY1990).

(2) GHG emissions taking into account forest carbon sequestration

In order to be qualified as the “source of forest carbon sequestration” under Kyoto Protocol, forest has to meet the following criteria in addition to being subject to artificial work which took place in 1990 or onwards.

- Afforestation: trees were planted in an area where there had been no forest for the past 50 years
- Reforestation: trees were planted in an area where there had been no forest as of 1990
- Forest Management: human activities to appropriately perform various forest functions in sustainable manners (such as development and conservation of forests)

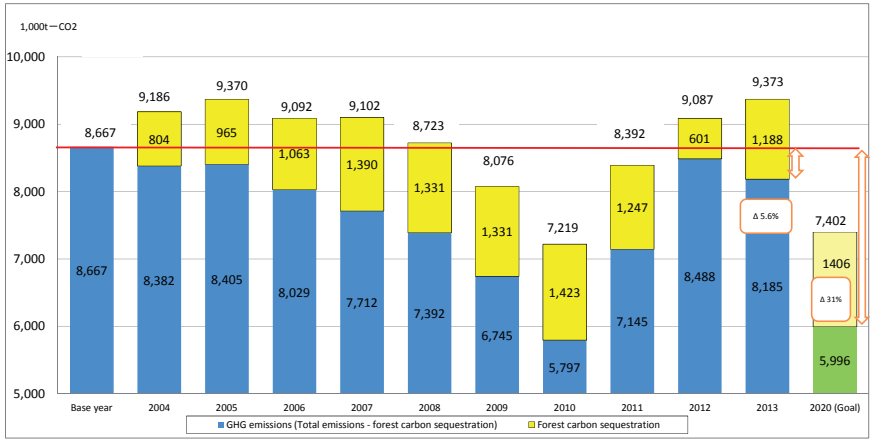
Graph 5 indicates GHG emissions for the base year in Kochi prefecture as well as emissions taking into account forest carbon sequestration (total emissions – forest carbon sequestration levels) from 2004 onwards.

Since 2004, GHG emissions taking into account forest carbon sequestration have consistently fallen below the base year level, with 2013 emissions down 5.6% compared to the base year, also down 3.5% from the previous year (FY2012).

Looking at figures since 2004, forest carbon sequestration levels peaked in FY2010 at 1,423,000 tons CO_2, however have been on a decline since due to factors including a significant decline in sequestration levels of nationally owned forests, down to 1,188,000 tons CO_2 in FY2013.

Graph 5 GHG emissions and forest carbon sequestration levels

(Unit: 1,000t-CO_2)	1990 (Base year)	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total GHG emissions	8,667	9,186	9,370	9,092	9,102	8,723	8,076	7,220	8,392	9,089	9,373
Forest carbon sequestration	0	804	965	1,063	1,390	1,331	1,331	1,423	1,247	601	1,188
GHG emissions (Total emissions - forest carbon sequestration)	8,667	8,382	8,405	8,029	7,712	7,392	6,745	5,797	7,145	8,488	8,185
Reduction rate (to base year)	-	△3.3%	△3.0%	△7.4%	△11.0%	△14.7%	△22.2%	△33.1%	△17.6%	△2.1%	△5.6%



(3) Progress against GHG emissions reduction target

“Kochi Prefecture Action Plan against Global Warming” sets out a goal to cut GHG emissions by 31% compared to the base year (FY1990) by FY2020.

- Action plan goal: –31.0% compared to FY1990 by FY2020
- Achievement status: –5.6% compared to FY1990 (as of FY2013)

Project for promotion of global warming prevention efforts by citizens in Kochi Prefecture (New Energy Promotion Division)

○Initiative overview

1. Kochi prefectural assembly on global warming prevention for promotion of global warming prevention measures

The prefectural assembly was launched in September 2008 for key stakeholders e.g. business operators, NPOs and the government to collaborate and cooperate in setting out a prefectural initiative for global warming prevention fully engaged by residents in the prefecture.

The assembly was originally composed by five groups: “group for residents’ initiatives promotion,” “group for plastic bags reduction activities promotion,” “group for encouragement of public transportation use,” and “group for carbon sink measures”; In May 2010, the assembly was restructured into following three groups, and as of the end of August 2015 involves 257 member bodies.

(1) Major activities by groups in JFY2015

[Residents’ initiative group]

The group facilitates household efforts for CO2 emissions reduction by making results visible and grasping opportunities to increase the number of residents who take on global warming prevention activities.

Main activity themes

- Efforts to reduce carrier bags
- Host moon night concerts
- Redistribute public transportation eco-point to the society and build public awareness
- Other projects as proposed

[Businesses Group]

The group facilitates efforts including reducing CO2 emission levels related to business operations whilst making results visible, and sets out a framework for sustainably increasing the number of businesses and employees that engage in global warming prevention activities.

Main activity themes

- Publicize and increase popularity of projects promoting businesses committed to stopping global warming
- Promote wider recognition of eco-friendly management through environmental forums
- Promote efforts on environment management such as Eco-action 21
- Publicize and dispatch energy-saving advisors
- Promote introduction of energy-saving equipment
- Other projects as proposed

[Administrative Group]

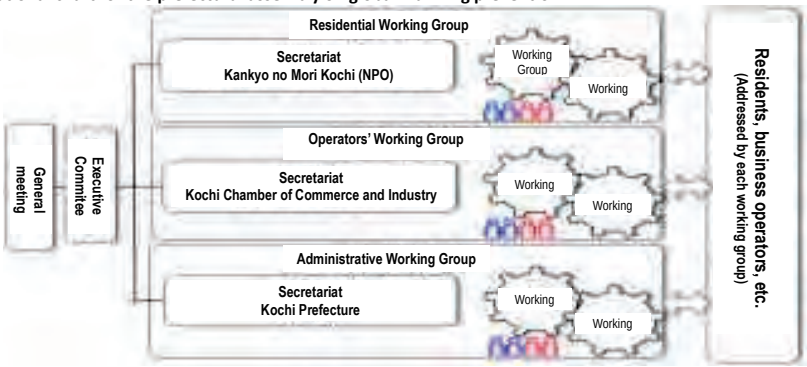
The government directly engages in global warming measures and promotes regional efforts through enhanced coordination with residents, businesses and other stakeholders in the prefecture.

グリーン購入

Main activity themes

- Develop and promote action plans in local public bodies
- Promote eco-friendly office activities
- Promote green purchases
- Utilize and coordinate with global warming prevention activity facilitators
- Educate residents on global warming prevention
- Foster use of renewable energy in public facilities

Organizational chart for the prefectural assembly on global warming prevention



(2) Achievements by the 3 groups in 2014

[Prefectural Group]

The group held four meetings in 2014.

Detailed anti-global warming measures involving residents were proposed through platforms such as a project monitoring committee for giving back to society with transportation eco-point utilization and a working group for reducing carrier bags.

The group made efforts to promote utilization of eco-bookkeeping in households by distributing leaflets for families, also offering in-school classes in elementary schools throughout Kochi to familiarize the idea of eco-bookkeeping for children.

In addition, as part of the “Moon Night SHIKOKU” light down campaign event, which is implemented through coordinated efforts by the four Shikoku prefectures, a “moon night concert” was held wherein audiences could enjoy the performance under the moonlight as well as increase awareness of CO2 emission reduction.

Eco-bookkeeping for households

Eco-bookkeeping for children

Moon Night Concert advertisement

- WG for reducing carrier bags (3 meetings)

The group reached out to businesses / bodies in the prefecture and set out the “Men (and women) should use my-bags too! campaign.”

During the two-month campaign period, 1,417 participants said no to unnecessary carrier bags, contributing to a total reduction of 2.67 tons CO2.

It also held a “supermarket competition challenge 2014 for least carrier bags” where 61 stores from 8 major supermarkets participated to compete which store had the highest percentage of customers not using carrier bags.

Campaign 2014 poster

Campaign 2014 sticker

- Transportation eco-point utilization and redistribution project monitoring committee (2 meetings)

As part of the project to redistribute eco-points generated through the “Desuka” IC card, a free “Desuka” card for grade-schoolers is lent out to elementary school students using trams and buses for external school activities, fostering awareness building on global warming prevention through use of public transportation.

In FY2014, the committee called on prefectural assembly bodies for donations to the project, successfully gathering 770,000JPY from 33 bodies as funding for project operations. As of March 2015, it consisted of 3,023 users.

External school activities using free Desuka cards

[Businesses Group]

The group held one meeting during 2014.

An environmental committee held one meeting as a working group, which decided on a policy to address environmental issues according to industry.

As part of publicizing and popularizing projects that promote businesses committed to stopping global warming, 15 businesses declared their commitment to unique efforts to prevent global warming.

In promoting wider recognition of environmentally friendly management, the “environment management forum” was held where 63 participants took part in keynote lectures and presentations on challenges in sustaining Eco-action 21 measures.

Regarding energy-saving advisors, they were dispatched free of charge to 6 corporations on 8 occasions, offering support on energy-saving measures.

In promoting efforts towards environment management systems such as Eco-action 21, the group held an elementary seminar with 14 participants for disseminating Eco-action 21.

Flier for the environment management forum

Flier for the Eco-action 21 elementary seminar

Flier for dispatching energy-saving advisors

[Administrative Group]

In FY2014, the group held two panel meetings and one working group meeting aimed at supporting the development of action plans by local municipal public bodies (concerning administrative projects).

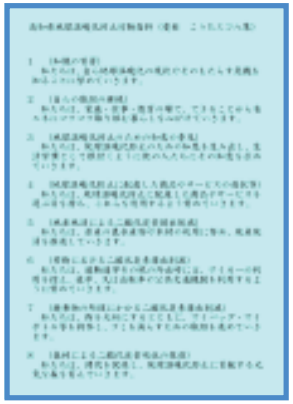
There were also efforts towards promoting environmentally friendly office activities and facilitating the development of basic policies for green purchases.

Regarding the utilization of and coordination with global warming prevention activity facilitators, 20 facilitators participated in events hosted by 3 municipalities and the prefecture that provided a wider platform for cooperation with such facilitators, in which they engaged in building public awareness on global warming prevention.

In enhancing awareness towards preventing global warming among residents in the prefecture, the group engaged in electricity/energy-saving efforts, calling for cutting down on electricity in 20 municipalities through PR magazines and implementing further energy-saving measures at public offices and facilities in 33 municipalities. Also, as an on-going effort from 2011, it encouraged participation in the campaign to reduce carrier bags through municipal PR magazines, which attracted 497 participants from 4 municipalities and prefectural office in the use-fewer-carrier-bags campaign, successfully cutting 0.652 tons CO2.

[Action agenda on global warming prevention in Kochi prefecture AKA Kochi’s 8 eco-plans]

To realize a low-carbon society capable of sustainable development with less burden on the environment, the action agenda on global warming prevention in Kochi was set out on May 21, 2010 in the general meeting of the prefectural assembly, promoting initiatives taken on by residents to prevent global warming.



2 Promotion of Cool-Biz Shikoku

[Jointly executed by the 4 Shikoku prefectures]

The Cool-Biz campaign encourages workers to dress lightly and keep air conditioning settings at 28˚C, in the aim of using less electricity and reducing greenhouse gas emissions.

In FY2015, the campaign was rolled out from May to October, and awareness-building flyers were provided to participating organizations.

3 Promotion of Warm-Biz

[Jointly executed by the 4 Shikoku prefectures]

The Warm-Biz campaign aims to cut greenhouse gas emissions from energy consumption by keeping indoor heating settings during winter at 20℃ (19℃ for the prefectural office).

In FY2014, the campaign was rolled out from November 2014 to March 2015, and awareness-building flyers were distributed.

FY2015 Cool-biz Shikoku poster

FY2014 Warm-biz poster

4 Promotion of Moon Night SHIKOKU

[Jointly executed by the 4 Shikoku prefectures]

During September 24 through 30, the week of harvest moon, a light down event “Moon Night SHIKOKU” was held as part of global warming measures, encouraging people to turn off unnecessary lighting.

September 28 was particularly designated as a special light down day, which called for lit up facilities to switch off their illumination simultaneously and households to turn off unnecessary lighting for the duration of two hours between 8pm and 10pm.

In FY2015, the campaign gained participation of 76 facilities and 34 bodies, successfully reducing energy consumption by 6,488KWH.

5 Promoting development of EV charging infrastructure

In terms of furthering penetration of electric vehicles, Kochi set out its “vision for developing next-generation EV charging infrastructure” in July 2013, facilitating the development of infrastructure for charging electric vehicles in the prefecture. As of March 2015, registration documents for EV charging equipment based on the vision have been issued in 19 municipalities for 53 rapid chargers and 42 regular chargers.

Forest sequestration and emissions reduction efforts in Kochi

(Division for Coexisting with the Environment)

1 Alternative fuel utilizing timber resources

(1) Overview

Kochi prefecture has worked on a regional model project for emissions trading from the perspective of effectively utilizing forest resources and tackling global warming. The project involves a power generation facility at the Kochi plant of Sumitomo Osaka Cement Co., Ltd. where blend fuel from left over timber is used as an alternative to coal fuel, the CO2 reduction levels from which are then monitored and assessed. Its aim is to effectively utilize forest resources and circulate funds by using the Offset Credit (J-VER) Scheme ※1 launched in 2008.

(2) Progress

(i) Development of facilities

In line with the "sun and forest" clean energy generation plan set out by Susaki city and from the viewpoint of contributing to global warming measures and promoting utilization of unused regional resources (thinning wood etc.), a power generation facility at the Kochi plant of Sumitomo Osaka Cement Co., Ltd. installed equipment for shredding, selection, storage and supply in order to use thinning wood for blend fuel as an alternative to coal. The project subsidized by the Ministry of the Environment entitled "FY2006 project for developing advanced regional introduction of renewable energy" was utilized.

(ii) Delegation of the timber resource energy utilization project

With the development of facilities using blend fuel from resources including thinning wood, the timber resource energy utilization project was delegated to Sumitomo Osaka Cement Co., Ltd. Kochi plant in October 2007. The objective was to become the forerunner of future domestic emissions trading where the prefecture undertakes the task of checking and certifying CO2 emission levels achieved through the use of timber biomass fuel and transacts with environmentally progressive corporations in the form of issuing emission reduction certificates on a negotiation basis.

In June 2008, the project was designated as a VER certified / managed pilot project of the domestic emission reduction initiative by the Ministry of the Environment, making it the first ever domestic Offset Credit (J-VER) project enabling issuance of tradable credits.

Specifically, utilization of unused timber in the region including thinning wood and leftover forest wood which are cyclic resources as timber-based biomass (5,000t of timber utilized in both 2011 and 2012, 5,700t in 2010, 3,300t in 2009, 2,200t in 2008, and 1,100t in 2007) contributes to reduced usage of coal, a type of fossil energy.

Timber offcuts remained in forest

Crushing and chipping timber offcuts

(3) Offset Credit (J-VER) Scheme

CO2 reduction at Sumitomo Osaka Cement Co., Ltd. Kochi plant are strictly monitored within the plant and reported to the prefecture. The prefecture then creates a monitoring report based on such results and submits this to a third party verification organization approved by the Scheme. The verification organization performs an on-site assessment, which result will be submitted as a report to the certifying organization, Certification Center on Climate Change. The prefecture will submit a certification request to the Certification Center on Climate Change, where the J-VER certification committee will make the evaluation. Credit issuance will take place upon approval.

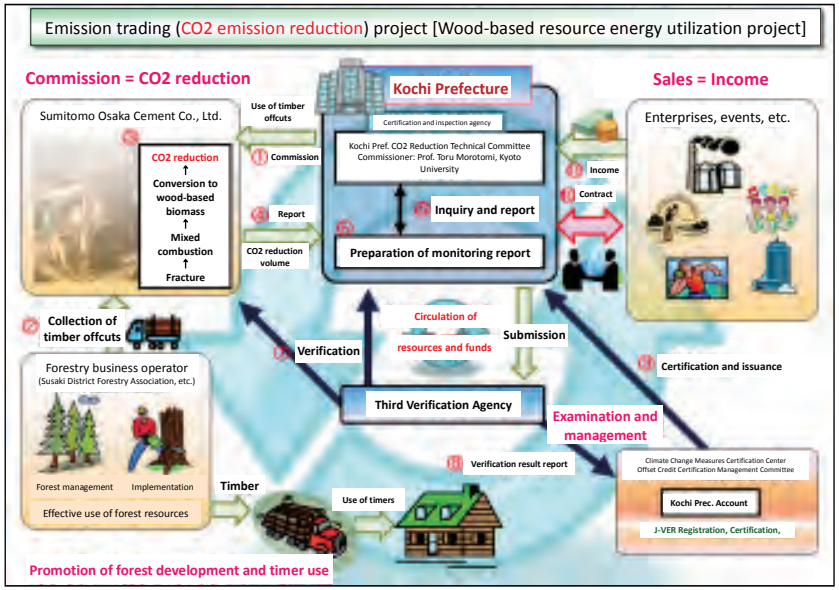
―Glossary―

*1 Offset Credit (J-VER) Scheme

The Scheme established by the Ministry of Environment. "J-VER" refers to Verified Emission Reduction (VER) in Japan. Unlike emission reduction credits of the Kyoto Protocol, J-VER is the voluntary right which meets a certain criteria and utilized for Carbon Offset*2.

*2 Carbon Offset

Carbon Offset is the idea concerning to unavoidable GHG emission including CO2 in daily life and economic activities to make up for GHG emissions by [1] making as much effort as possible on reducing emission volume, at first, [2] estimating GHG emissions despite of the effort, and [3] investing GHG reduction activities equivalent to the emission volume. In terms of promoting reducing effort of entities themselves performing offset, Carbon Offset is expected to promote initiatives of business and household sectors in which GHG emission have been increasing.



2 Efforts utilizing forest carbon sequestration

(1) Overview

Kochi is among the prefectures with the richest of forests, where woodland makes for 84% of its total area. Forest accumulation is as high as 180.08 million m3 (2013).

However, fewer numbers of caretakers and stagnating wood price levels have led to the degradation of artificial forests. In order to contain this problem and to increase forest carbon sequestration levels as a means to tackle global warming, further forest management is necessary.

In dealing with the issue, Kochi is working on a model project concerning forest carbon sequestration trading, wherein increased levels of forest carbon sequestration resulting from forest maintenance can be converted into credits.

In the project, additional levels of forest carbon sequestration from thinning prefecture-owned forests are monitored and verified through on-site surveys, which are converted into credits through the Offset Credit (J-VER) Scheme. This facilitates the circulation of funds into forest management.

Forests without thinning

Thinned forests

3 years after thinning

(2) Progress and effort

Since 2006, Kochi has been working on a forest-planning project in coordination with environmentally progressive corporations, implementing forest resource surveys for forest areas maintained through thinning and issuing CO2 sequestration certificates based on the prefecture's unique scheme design. On a national level, the Offset Credit (J-VER) Scheme relating to forest carbon sequestration was launched in 2009, which converts greening, thinning, and sustainable forest management efforts into credits. Project categories and details are as follows:

(i) Forest management projects

a. Projects designed to promote thinning

The goal is to securely achieve sequestration levels (3.8%) for the first commitment period of the Kyoto Protocol; aimed to specifically promote thinning

b. Projects designed to promote sustainable forest management

Aimed to secure long-term carbon sequestration levels through continuous forest management

(ii) Greening projects

Targeted towards sequestration levels for forests planted in areas falling outside the scope of forest planning zones set out in the Forest Act of April 1, 2008, which are eligible for integration into the planning zone prescribed in the Act.

Currently, Kochi is engaged in forest management projects designed to promote thinning which target prefecture-owned forest areas as part of a specialized effort to promote thinning.

Credit issuance （As of October 2015）

Offset credit issuance		22,562t－CO2
	(From emissions reduction)	20,257t－CO2
	(From forest carbon sequestration)	2,305t－CO2 (Buffer*3 68t-CO2)
Total carbon offsets		9,003t－CO2

－Glossary－

*3 Buffer

Amount equivalent to 3% of credit issued is secured as supplementing credit for "buffer management account" of the J-VER Scheme Secretariat to compensate losses associated with natural disturbance, unavoidable conversion of land use, etc.

This buffer rate, however, may be changed in response to situations of natural disturbance, conversion of land use, etc.

3 Sales of carbon offset credits

Issued credit has been utilized for carbon offsetting※2 initiatives through corporate activities, commodities, events, etc.

In 2004, offsets were applied to emissions from events such as the Casio World Open (golf tournament) as well as from public works. There have been 228 cases (of which 10 have been delegated) of offset credit sales so far.

Contract with the Casio World Open organizer

Carbon offset credit sales from 2014 onwards

（As of October 2015）

Credit purchased	Contract concluded	Offset activity
1	2014.4	Carbon offset publication
9	2014.4	Offsetting public works
6	2014.4	Offsetting public works
2(注 1)	2014.5	Offsetting events
1(注 1)	2014.5	Carbon offset pin badge
39(注 2)	2014.5	Carbon offset postcards
5	2014.5	Offsetting public works
5	2014.5	Offsetting public works
5	2014.5	Offsetting public works
3	2014.5	Offsetting public works
6	2014.5	Offsetting public works
4	2014.5	Offsetting public works
5	2014.5	Offsetting public works
5	2014.5	Offsetting public works
3	2014.5	Offsetting public works
1	2014.6	Carbon offset publication
23	2014.6	Offsetting public works
5(*1)	2014.6	Carbon offset forest machinery
34	2014.6	Offsetting public works
8	2014.6	Offsetting public works
4	2014.6	Offsetting print toners
4	2014.7	Carbon offset homemade lunches
10	2014.7	Offsetting public works
1(*1)	2014.8	Offsetting the summer cooling festival
3	2014.8	Offsetting the disaster prevention exhibition
3	2014.9	Offsetting partial replacement works on air conditioners
3(*1)	2014.9	Offsetting partial replacement works on air conditioners
1	2014.9	Carbon offset publication

6	2014.9	Offsetting public works
5	2014.9	Offsetting public works
16	2014.9	Offsetting public works
1(*1)	2014.10	Offsetting tours
6	2014.10	Offsetting public works
14	2014.10	Offsetting public works
9	2014.10	Offsetting public works
6	2014.10	Offsetting public works
7	2014.10	Offsetting public works
6	2014.10	Offsetting public works
20	2014.11	Offsetting shuttle service to event galleries
8	2014.11	Offsetting emissions in corporate office
6	2014.11	Offsetting public works
5	2014.11	Offsetting public works
26	2014.12	Offsetting public works
2(*1)	2014.12	Carbon offset forest machinery
8	2014.12	Offsetting public works
4	2014.12	Offsetting public works
3	2014.12	Offsetting public works
1(*1)	2015.2	Carbon offset commodities
13	2015.2	Carbon offset publication
1(*1)	2015.2	Carbon offset pin badge
25	2015.3	Offsetting of public works
13(*1)	2015.3	Offsetting emissions from election campaigns
20	2015.3	Offsetting emissions from transportation
20	2015.3	Offsetting public works
18	2015.3	Offsetting public works
4	2015.3	Carbon offset homemade lunches
6	2015.3	Offsetting public works
5	2015.4	Offsetting public works
4	2015.4	Offsetting public works
7	2015.4	Offsetting public works
3(*1)	2015.4	Offsetting events
10	2015.5	Offsetting community cycling
4	2015.5	Offsetting print toners
5	2015.6	Offsetting public works
7	2015.6	Offsetting public works
5	2015.6	Offsetting public works
37(*1)	2015.6	Offsetting public works
3	2015.6	Offsetting public works
6	2015.6	Offsetting public works
3	2015.6	Offsetting public works
30(*2)	2015.7	Offsetting emissions from activity projects
14	2015.7	Offsetting public works
15	2015.7	Offsetting public works
1(*1)	2015.7	Offsetting emissions from research activities
3	2015.7	Offsetting the disaster prevention exhibition
1(*1)	2015.7	Offsetting the summer cooling festival
7	2015.9	Offsetting public works
1(*1)	2015.9	Offsetting tours
11	2015.9	Offsetting public works

(*1) Forest carbon sequestration credits

(*2) Sales through delegation

4 Prospect and potential

Currently, Kochi and other prefectures are seeing emissions trading and Carbon Offset initiatives take off as part of wider measures addressing global warming. By utilizing abundant forest resources available throughout the prefecture, Kochi will continue to engage in various projects including those designed to reduce emission with wood pellet boilers or those executed through forest management. This will contribute to the vitalization of economic activities in the hilly and mountain areas as well as building awareness among individuals on global warming measures.

5 J-VER Scheme in Kochi prefecture

The Kochi J-VER Scheme received national accreditation in February 2010 as a scheme set out in accordance with the J-VER Scheme by the Ministry of Environment. It shares the same qualities as the J-VER Scheme, and not only does it allow the process of requesting / registering projects to be completed within the prefecture but also contributes to easing the burden on businesses by not charging administrative fees for project requests and credit issuance. Credits issued through the Kochi J-VER Scheme are recorded in the same register as that of the Ministry of the Environment's J-VER, and can be used as credits of equal quality.

It should be noted that the Kochi J-VER Scheme expired at the end of March 2013. Currently, there are ongoing efforts through the newly established Kochi J-Credit Scheme as a regional version set out in accordance with the new national J-Credit Scheme.

Kochi continuously aspires to facilitate the quantification of forest carbon sequestration as a way of creating new value for forest resources and foster further credit issuance, in so doing contribute to creating jobs and vitalizing the forestry industry by supporting forest maintenance.

Registered projects under the Kochi J-Credit Scheme (As of October 2015)

No. of cases	Project name	Project duration	Area covered (ha)	Estimated sequestration at registration (tons CO2)	Credit certification date	Credit certified (tons CO2)
1	Forest thinning promotion project in Ryoma, Tsuno town, Kochi	2010.5.11 ～2018.5.10	32.43	432	2011.2.4	28
					2012.3.15	192
					2013.10.18	273
2	Forest thinning promotion project in Shimanto Kuroshio, Nakatosa town, Kochi	2007.4.1 ～2015.3.31	142.24	3,006	2011.2.4	879
					2013.10.18	2,299
3	Forest thinning promotion project in Yutorisuto forest, Otoyo town, Kochi	2007.4.1 ～2015.3.31	22.08	808	2011.5.30	545
4	Forest thinning promotion project in Kumonoue, Yusuhara town, Kochi	2007.11.1 ～2015.10.31	154.55	2,845	2011.5.30	273
5	GHG sequestration project in artificial forests by Kochi forest maintenance authority ～Forest planning with fresh breeze from trees～	2008.4.1 ～2016.3.31	24.68	835	2011.3.28	531
6	CO2 forest sequestration project in Goiga forest, Aki city, Kochi	2010.10.1 ～2018.9.30	67.25	818	2012.3.15	401
					2013.3.25	468
7	Forest thinning promotion project "forests with glorious morning sunshine" in Tosa town, Kochi	2007.4.1 ～2015.3.31	14.24	296	2013.1.25	193
8	Shimanto town forest association GHG sequestration forest thinning promotion project ～vibrant mountains, rivers, ocean, nature and people～	2009.4.1 ～2017.3.31	100.03	1,446	2013.1.25	1,225
9	Ino town GHG sequestration forest thinning promotion project ～ protecting the fresh streams of Niyodo rive rthrough forest maintenance～	2011.4.1 ～2019.3.31	21.64	213	2013.5.31	236
10	CO2 sequestration project in Kochi city Yosakoi forest, Kochi	2009.4.1 ～2017.3.31	37.60	952	2012.3.15	715
					2013.3.25	341
11	GHG sequestration and forest thinning promotion project in Mihara village, Kochi	2009.4.1 ～2017.3.31	35.99	586	2013.5.31	607
12	Forest thinning promotion project for city-owned forests by Shimanto city office, Kochi	2014.4.1 ～2021.3.31	95.90	2,987	-	-
		Total	748.63	15,224		9,206

6 Eliminating double-counting of GHG emissions reduction and sequestration values

(1) Eliminating double-counting of GHG emissions reduction and sequestration levels by multiple certifying bodies

As greenhouse gas levels measured for emissions reduction and sequestration are not physically visible, there should be due consideration as to avoid double accreditation from other schemes such as issuance of CO2 sequestration certificates by local public bodies when certifying and issuing credits for greenhouse gas emissions reduction and sequestration under the project.

Under the Offset Credit (J-VER) Scheme, in case there is confirmed double-counting by other certifying bodies, either the GHG emissions reduction volume or sequestration levels will be nullified. If this proves difficult, the credit equivalent to the reduction/sequestration levels concerned will be compensated for.

(2) Eliminating double-counting of emissions publicized voluntarily in social/environmental reports

Kochi prefecture, through its website and White Paper on the environment, clearly sets out the Offset Credit (J-Ver) Scheme as well as offset credits issued and carbon trading/offset levels achieved through the project, thereby eliminating double-counting.

Promoting utilization of wood-based biomass in Kochi

(Wood Utilization Promotion Division)

○ Current status and challenges

Effective use of wood-based biomass not only contributes to reducing CO2 emissions through its carbon neutralizing property and to the rejuvenation of forest / timber industries, but is also expected to foster positive ripple effects to regional economies by preventing outflow of energy spending on fossil fuels sourced from other prefectures and nations and instead gearing towards a system for circulating energy and funds within the region.

For this purpose, Kochi has put "expansion of wood-based biomass use" as one of the pillars for its industry development strategy (forestry sector) in the "second-stage Kochi industry rejuvenation project" (developed March 2013), and is working on measures for vitalizing regional industries. As a quantitative goal, Kochi is aiming to boost levels of wood-based biomass use from 227,000 tons at project development up to 530,000 tons by 2021.

With the introduction of wood-based biomass boilers in the prefecture mainly for greenhouse horticulture, we estimate an annual reduction in heavy oil by approximately 5,000 kiloliters, equivalent to 13,600 tons worth of CO2 emissions reduction, which would account for emissions from around 2,600 households.

In addition to efforts towards utilizing energy generated from wood-based biomass boilers, two wood-based biomass power generation facilities in the prefecture have begun operation in 2015 that takes advantage of the Feed-in Tariff scheme, further accelerating use of renewable energy involving wood-based resources.

Meanwhile, for utilization of wood-based biomass energy, it is essential to secure stable supply of wood-based fuel by ensuring procurement of raw wood. In order to thoroughly respond to increasing demand, Kochi is putting in great efforts to build a framework for ensuring stable supply of raw wood in cooperation with forest-related stakeholders in the prefecture.

○Implementation of measures

(Implemented measures)

In FY2014, there were continuous efforts to support the introduction of wood-based biomass boilers for greenhouse horticulture and hot springs.

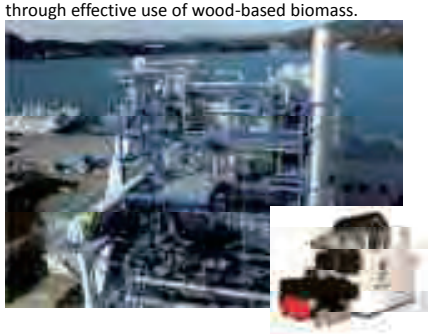
We also encouraged businesses to install wood-based biomass power generation facilities in line with the Feed-in Tariff Scheme.

- Supported introduction of 46 wood pellet boilers
- Supported installation of wood-based biomass power generation facilities in two locations

(On-going measures)

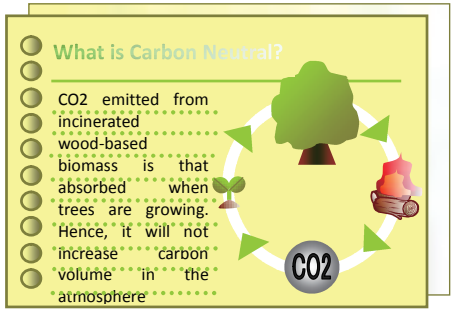
In FY2014, Kochi provided ongoing backing for the introduction of wood-based biomass facilities, also offering operational guidance support to sufficiently comply with national certification guidelines.

The situation concerning the application of wood-based biomass is drastically changing with the additional aspect of power generation to its conventional use in architecture / paper manufacturing and use of generated heat. Measures to fully utilize forest resources including unused wood would be essential in facilitating forest maintenance and vitalizing mountain village areas in the prefecture. Kochi will continue to set eyes on this trend and actively engage in efforts on regionally sourced and regionally consumed energy through effective use of wood-based biomass.



Wood pellet boiler (Shimoominagawa, Okawa village)

Wood-based biomass power generation facility (Niida, Kochi city)



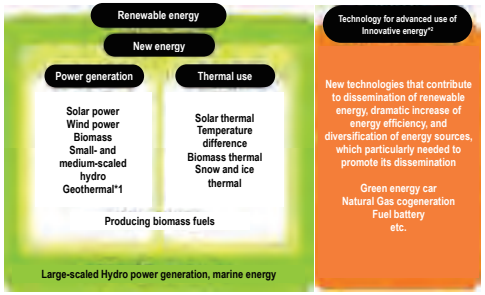
Promoting introduction of new energy
(New Energy Promotion Division)

○Overview

There is increased attention towards renewable energy sources such as solar photovoltaic and wind energy from the perspective of global warming measures and energy security.

Renewable energy is such that lessens the burden on the environment and can be repeatedly generated from the natural environment.

Among which, new energy means sources that are technologically available for practical use but still lacks maturity in terms of economics for wider application.



*1 Small- and medium-scaled hydro power generation should be less than 1,000kW, geothermal power generation should be those with binary system.
*2 Those not recognized as new energy but needed for being disseminated.

○Implementation of measures

1 Developing the vision for new energy

To facilitate the introduction of new energy involving regional resources such as sunlight, wind energy and forests in the prefecture, local municipalities and related bodies, a “regional vision for new energy" was developed to address regional characteristics and potentials for each area.

Currently, in addition to the prefecture, 17 municipalities and 2 wider regions have developed their own regional vision for new energy.

On a prefectural level, the “Vision for new energy in Kochi” was set out in March 2011, detailing measures towards the introduction of new energy in the aim of fully utilizing abundant new energy resources and contributing to combating global warming, as well as supporting industry revitalization and enhanced quality of life for Kochi residents. (To be revised in March 2016)

[Development of the vision on new energy]

Prefecture / municipalities	Title	Period of formulation	Remarks
Kochi Pref.	Shikoku Region Energy Vision [priority theme] “Shikoku 4 prefectures Common Vision for Promotion of Wind Power Generation”	Feb. 2005	
	Tosa Bay Regional Energy Vision [priority theme] “Utilization and survey of offshore wind energy”	Feb. 2005	Prefectural Institute of Fishery
	Kochi Prefecture New Energy Vision	Mar. 2011 (revised in Mar. 2013) To be revised in Mar. 2016	Mar. 1997 Formulation of Kochi Prefecture Regional New Energy Vision

Prefecture / municipalities	Title	Period of formulation	Remarks
Kochi city	Kochi City New Energy Vision	Mar. 2013	
Muroto City	Muroto City Regional New Energy Vision	Feb. 2006	
Aki City	Aki City Regional New Energy Vision	Feb. 2003	
	Aki City Regional New Energy Vision [priority theme] “Study on concrete forest biomass utilization”	Feb. 2006	
Tosa City	Tosa City Regional New Energy Vision	Mar. 1998	
Susaki City	Susaki City Regional New Energy Vision	Feb. 2006	
Shimanto City	Nishi-Tosa Village Regional New Energy Vision	Mar. 2002	
	Nishi-Tosa Village Regional New Energy Vision [priority theme] “Possibility of cascaded use of biomass”	Feb. 2004	
Konan City	Konan Kami Regional New Energy Vision	Feb. 2008	
	Konan Kami Regional New Energy Vision [priority theme] “Regional revitalization and realization of low-carbon society by utilization of used forest biomass”	Feb. 2009	
Kami City	Kahoku Town Regional New Energy Vision	Mar. 2001	
	FY2007 Konan Kami Regional New Energy Vision	Feb. 2008	
	FY2008 Konan Kami Regional New Energy Vision (priority theme) “Regional revitalization and realization of low-carbon society by utilization of used forest biomass”	Feb. 2009	
Toyo Town	Toyo Town Regional New Energy Vision	Feb. 2003	
	Toyo Town Regional New Energy Vision [priority theme] “Feasibility survey of bio-diesel fuel project”	Feb. 2004	
Tano Town	Tano Town Regional New Energy Vision	Feb. 2005	
Yasuda Town	Yasuda Town Regional New Energy Vision	Feb. 2004	
Ino Town	Ino Town Regional New Energy Vision	Feb. 2006	
Naka-Tosa Town	Naka-Tosa Town Regional New Energy Vision	Feb. 2004	
Sakawa Town	Sakawa Town Regional New Energy Vision	Feb. 2007	
Yusuhara Town	Yusuhara Town Regional New Energy Vision	Mar. 2009	
	Yusuhara Town Regional New Energy Vision [priority theme] [Survey for eboshiyama wind power generation project”	Feb. 2007	
Shimanto Town	Taisho Town Regional New Energy Vision	Mar. 1998	Former Taisho Town
Otsuki Towen	Otsuki Town Regional New Energy Vision	Feb. 2003	
14 municipalities in Western Kochi *1	Western Kochi Prefecture Regional New Energy Vision	Feb. 2004	
5 towns and villages in Ryohoku region *2	Kochi Prefecture Ryohoku Regional New Energy Vision	Jun. 2004	

*1: Former Nakamura city, Sukumo city, Tosa-shimizu city, former Kubokawa town, Yusuhara town, former Onomi village, former Higashi-tsuno village, former Saga town, former Taisho town, former Okata town, Otsuki town, Former Towa village, former Nishi-Tosa village, Mihara village
*2: Motoyama town, Otoyo town, Tosa town, Okawa village, former Hongawa village

2 Introduction of new energy

For new energy sources including wind power, solar thermal energy and wood-based biomass, various measures have been set out on a national level to support application.

In Kochi, the introduction of new energy is being facilitated such as through utilizing the national subsidy scheme for facilities and equipment so as to contribute to the global environment as well as to boost popularity and build awareness.

◆Abundant forest resources

84% of forests rate the highest in Japan!!

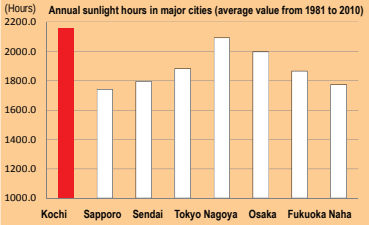
Table: Forest rate by prefecture (top-5 prefectures) As of Mar. 31, 2012

Prefecture	Forests rate (%)	Forest area (ha)	Land area (ha)
Kochi	84%	596,783	710,516
Gifu	81%	861,636	1,062,117
Nagano	79%	1,069,673	1,356,223
Shimane	78%	525,589	670,796
Yamanashi	78%	347,689	446,537
Nationwide	67%	25,081,390	37,291,870

Source: Website of Forestry Agency
http://www.rinya.maff.go.jp/j/keikaku/genkyou/index2.html

◆ Long sunlight hours

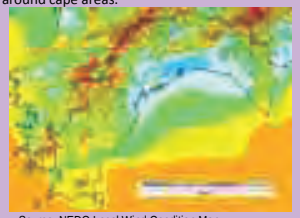
2,373 hours in 2013 are the highest level in Japan!!
(Observed at Kochi Meteorological Observatory)



Source: Website of Japan Meteorological Agency
http://www.jma.go.jp/jma/menu/report.html

◆Good wind conditions

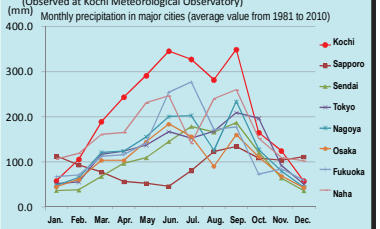
Relatively good conditions in mountainous regions and around cape areas.



Source: NEDO Local Wind Condition Map
http://app8.infoc.nedo.go.jp/nedo/

◆Plentiful precipitation

2,327 mm of annual precipitation in 2013 is the highest level in Japan!!
(Observed at Kochi Meteorological Observatory)



Source: Website of Japan Meteorological Agency
http://www.jma.go.jp/jma/menu/report.html

◆ Introduction status in the prefecture

[Wind power generation facility]

Municipality	Plant	Implementing body	Output
Kanan city	Noichi wind power plant	Kochi prefecture	250kW× 1 unit
Kami city	Hokigamine wind power plant	Kochi prefecture	750kW× 2 units
Otoyo town	Otoyo wind power plant	Kochi prefecture	600kW× 2 units
Tsuno town	Hayama wind power plant	Hayama Wind Power Plant Co., Ltd.	1,000kW× 20 units
Yusuhara town	Yusuhara wind power plant	Yusuhara town	600kW× 2 units
Otsuki town	Otsuki wind farm	Otsuki Wind Power Co., Ltd.	1,000kW× 12 units

[Solar PV power generation facility]
(Accounting for all certified equipment between July 2012and April 2015)

Certified equipment	No. of cases	Introduced capacity
Below 10kW	6,037	29,237kW
10kW and above	5,496	676,666kW
Of which mega solar (1,000kW and above)	108	455,221kW

[Small hydro power plants (below 1,000kW)]

Municipality	Name	Implementing body	Output
Muroto city	Kiragawa power plant	Shikoku Electric Power Co., Inc.	256kW
Aki city	Namuragawa power plant	Shikoku Electric Power Co., Inc.	420kW
Shimanto town	Matsubakawa power plant	Shikoku Electric Power Co., Inc.	320kW
Shimanto town	Tsuga power plant Unit no.3	Shikoku Electric Power Co., Inc.	550kW
Kami city	Shinkai power plant Unit no.2	Shikoku Electric Power Co., Inc.	800kW
Yusuhara town	Yusuhara small hydro power plant	Yusuhara town	53kW
Okawa village	Shirataki power plant	Okawa village home village authority	60kW
Okawa village	Ohira power plant	Sumitomo Kyodo Electric Power Co., Ltd.	150kW

[Biomass power generation facility]

Municipality	Name	Implementing body	Output
Kochi city	Kochi waste disposal plant	Kochi city	9,000kW
Kochi city	Tosa power plant	eREX New Energy Co., Ltd.	29,500kW
Kochi city	Tosa power plant	Tosa Green Power Co., Ltd.	5,650kW
Sukumo city	Sukumo biomass power plant	Green Energy Laboratory Co., Ltd.	5,800kW
Susaki city	Kochi plant daiichi power plant	Sumitomo Osaka Cement Co., Ltd.	133,000kW
Aki city	Wider Aki melting center power plant	Wider Aki municipality area office association	1,700kW
Shimanto city	Hata clean center	West Kochi environmental facility association	1,800kW

Kochi Green New Deal Fund (funding project for promoting introduction of renewable energy)

(New Energy Promotion Division)

○Overview

In 2013, Kochi established the "Kochi Green New Deal Fund" which was funded by the national subsidy for projects dealing with CO2 emissions reduction. Utilizing the fund, Kochi will encourage introduction of power generation facilities using renewable energy in regional disaster prevention centers and evacuation sites, fostering the "development of a low-carbon, disaster-resistant community."

[Fund total] 1.8 billion JPY

[Project implementation] FY2013～2015

○Subsidy for projects promoting introduction of renewable energy etc.

Subsidizes costs for introducing power generation equipment etc. using renewable energy in disaster prevention centers, evacuation sites and others.

■Subsidy coverage ratio

Municipalities, some administrative associations: 10/10, 2/3 for some

Private businesses: within 1/3

■Examples of equipment eligible for the project

(1) Equipment for renewable energy

(i) Solar photovoltaic, (ii) wind power, (iii) small hydropower, (iv) earth thermal energy, (v) energy from waste and geothermal energy, (vi) biomass and (vii) others (including solar thermal energy / snow and ice thermal energy)

(2) Associated with renewable energy

(i) Storage cells

(ii) Streetlamps / road lamps (applicable only to LED streetlamps incorporating renewable energy or storage cells, and long-life streetlamps such as those using LED lighting with light-control features)

(iii) In-door ceiling lighting (applicable only for replacing mercury lighting, which requires high voltage to turn on, to long-life lighting such as LED lamps)

(iv) High efficiency lighting/air conditioning (applicable only for installing renewable energy systems etc. at facilities to efficiently utilize generated energy)

(v) Others (fuel cells etc.)

Solar photovoltaic systems and fuel cells need to be installed at the same time in order to securely provide electricity during nighttime when energy is not generated.

Installment of fuel cells alone at facilities already equipped with renewable energy power generation systems would also be eligible.

■Eligible facilities

Regional disaster prevention centers as well as facilities necessary to sustain city functions essential for the lives of regional residents

<Example of eligible facilities>

Municipal offices	Fire departments / HQ
Police HQ / stations	Health clinics
Water / wastewater facilities	Waste disposal facilities
Community center	Gymnasiums
Welfare facilities	Schools
Parks	Public transport facilities
Lodging facilities (*)	Convenience stores (*)
Welfare evacuation sites (*)	

(*)Limited to sites with potential use for evacuation sites in emergency situations such as disasters

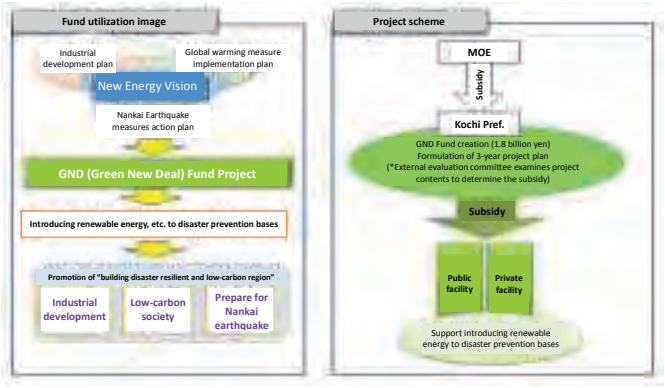
■Projects to be implemented

External appraisal committee will be held in FY2013 regarding selection of eligible facilities, for which introduction is slated to be carried out by FY2015.

<Breakdown of the number of eligible facilities and operators>

Prefecture *	Municipality etc.	Private	Total
13	64	1	78

*Development of prefectural facilities will be funded as contract costs for works etc., not through subsidies



Kochi-style in-community benefit sharing renewable energy project

(New Energy Promotion Division)

○Current status and challenges

Through the Vision for New Energy in Kochi (set out in March 2011), the prefecture is working to facilitate the introduction of renewable energy. Kochi also seeks to utilize renewable energy resource abundantly available in the prefecture for planning industry revitalization, in the aim of reviving the industry and rejuvenating the community.

Against such backdrop, the "Act on Special Measures Concerning Procurement of Electricity from Renewable Energy Sources by Electricity Utilities" was enforced in July 2012, instituting the Feed-in Tariff Scheme wherein power utilities purchase generated electricity at a fixed price over a fixed period of time.

In order to take full advantage of the momentum arising from the Feed-in Tariff Scheme, Kochi is working on the "Kochi-style in-community benefit sharing renewable energy project" in which the prefecture, local municipalities and corporations in the prefecture jointly set up a power generation company and circulate profits back into the community as much as possible.

○Expected benefits

This prefecture-driven initiative would encourage interested municipalities and private-sector firms in the prefecture to enter into the power generation market, by complementing the lack of business know-how and lowering barriers for funding.

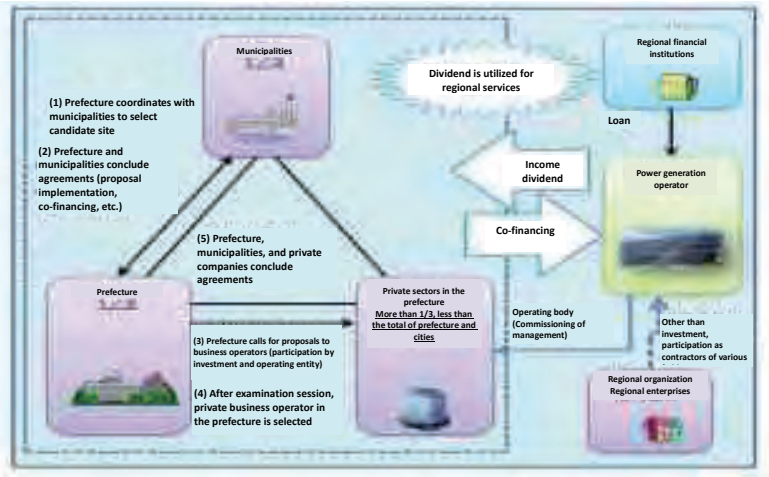
Active participation in the power generation market would allow local municipalities to capture returns generated from the business, which can be used for rolling out new public services. Private-sector firms in the prefecture would also benefit from increased opportunities for receiving contracts to provide works or maintenance and management as well as potential expertise to be gained.

○Implementation of measures

Utilizing this business scheme, solar photovoltaic power generation projects with total capacity of approximately 10MW are being rolled out at 7 locations in 6 municipalities.

	Output capacity	Estimated power generation	Start of operation
Age city	Approx. 4.5MW	Approx. 5.4mil kWh (Equivalent to app. 1500 households)	2014.11.21
Tosa town	Approx. 1.2MW	Approx. 1.28mil kWh (Equivalent to app. 350 households)	2015.4.1
Sagawa town	Approx. 1.3MW	Approx. 1.42mil kWh (Equivalent to app. 400 households)	2014.10.17
Kuroshio town	Approx. 0.5MW	Approx. 0.67mil kWh (Equivalent to app. 180 households)	2014.10.20
Hidaka village	Approx. 1.4MW	Approx. 1.47mil kWh (Equivalent to app. 410 households)	2015.1.19
Tosashimizu city	Approx. 1.2MW *total output for 2projects	Approx. 1.25mil kWh (Equivalent to app. 350 households)	2015.4.7 2015.5.25

Profits from power generation will be redistributed to regional efforts such as vitalization of the economy and energy-related measures.



Solar PV power generation project
(Park Wastewater Division / Noichi zoo park)

○ Overview

In 1995, a solar photovoltaic system was installed at the parking lot of Noichi Animal Park with the aim of raising environmental awareness among Kochi residents, and this showcased the practicality of solar photovoltaic power generation to the wider public. Performance in 2014 is shown as below.

There will be ongoing power generation projects and awareness-building activities.

1 Power generation project

Electricity generated by solar photovoltaic power makes up for around 5 to 6% of total energy consumption in the park.

Achieved in FY2014: approximately 78,000 KWH

2 Awareness-building activities

The park has set up a power generation display panel for visitors, showing the live status of electricity being generated, so as to increase interest in environmental issues.

A guided session explaining the overview of the project is available for groups upon advance request.

Solar PV system (Noichi animal park)

Wind power generation
(Public Enterprise Bureau, Electricity and Water Works Division)

○ Overview

Wind power generates energy through turning wind turbines. Since the system uses naturally occurring wind to generate electricity, it is a clean, environmentally friendly method that does not emit carbon dioxide. Construction of wind power plants is underway throughout the nation.

According to a research by New Energy and Industrial Technology Development Organization (NEDO), total installed capacity nationwide as of March 2014 was 2.71 million kW with 1,934 turbines. In Kochi prefecture, installed capacity at wind power plants as of March 2015 was 36,150kW with 39 turbines (6 wind farms), and the prefecture is likely to see a substantial increase in installation given the kickoff of the Feed-in Tariff Scheme for renewable energy in July 2012. Meanwhile, wind power plants need to meet various regulatory requirements such as obtaining development permits and meeting structural standards for earthquake-resistance before they can be constructed.

Furthermore, as turbines are often placed on mountains with sufficient wind conditions, they are prone to natural disasters such as being hit by a lightening which could inevitably force turbines to cease operation for a certain amount of time to perform repairs. Public institutions and other bodies are taking on research to prevent/mitigate such damage.

While wind energy has its challenges, it is an area that needs to be actively explored since it is considered one of the clean energies that can contribute to combating global warming.

Hokigamine wind power plant (Tosayamada town, Kami city)

Hybrid power generation
(Public Enterprise Bureau, Electricity and Water Works Division)

○ Overview

Power generation systems combining different sources such as solar photovoltaic energy, wind power and hydropower are called hybrid power generation. The most common is a small-scale hybrid system incorporating solar cells and wind turbines, which works to supply electricity by mutually complementing their power generation features.

In 2004, the Public Enterprise Bureau installed a “wind-solar PV hybrid streetlamp/street clock” at its control center (Kamobe, Kochi city) with the main objective of increasing penetration of and building awareness towards power systems using natural energy.

The streetlamp, mounted by a wind turbine and solar cell panels, provides lighting using electricity generated by wind power and solar photovoltaic energy, and will serve as emergency lighting in case of power outage caused by disasters such as earthquakes.

Recently, corporations in the prefecture have developed streetlamps with a similar concept designed to offer backup in case of disasters, which are certified by the prefecture as disaster-prevention related products.

Park & Ride (P&R) project
(Transportation Policy Division)

○ Overview

In the Kochi city area, the national government, prefecture and city as well as private companies and transportation operators are working together on the P&R project.

The project provides parking space in suburban areas and encourages people to get off their vehicles at the car park and take trams or busses to their final destination.

This is expected to shrink the inflow of cars into central areas of Kochi city, thereby easing congestion, fostering efficient use of energy through utilizing public transportation, and offering positive environmental impact such as reduced levels of exhaust fumes and noise.

※Conditions apply for using the park-and-ride scheme, such as purchasing a commuter pass for trams or busses

○ Implementation of measures

(Implemented measures)

In 2014, Kochi publicized the P&R project through its website in the aim of promoting use of public transportation.

The status of P&R usage as of August 1, 2015 is as follows.

[Tram usage]

	Available parking	Parking space occupied	Monthly commuter pass prices into Kochi city center
Prefectural Museum Doori	193 cars	193 cars	7,150JPY
Tokiden Transportation Sanbashi tram garage	31 cars	27 cars	7,150JPY
Tosaden Transportation Gomenmachi station	86 cars	78 cars	16,940JPY
Tosaden Transportation Ino tram park	15 cars	10 cars	16,940JPY

[Bus usage]

	Available parking	Parking space occupied	Monthly commuter pass prices into Kochi city center
Tokiden Transportation Ikku branch	20 cars	20 cars	9,740JPY
Family Mart Kochi Yokohama store	5 cars	4 cars	11,420JPY
Family Mart Harigi store	5 cars	0 cars	16,130JPY

*At Ikku branch, parking is available for express coach users

P&R at Museum Doori

Measures regarding fluorocarbons
(Environmental Measures Division)

○Overview

In the aim of ensuring the collection and disposal of substances such as fluorocarbons that destroy the ozone layer, the "Law on ensuring implementation of recovery and destruction of fluorocarbons in specified products (Law concerning the recovery and destruction of fluorocarbons)" was enacted and issued in June 2001.

However, given the changing environment surrounding fluorocarbons, such as stagnating recovery rate of refrigerating agents and serious leakage of such agents in using cooling devices, a new approach was deemed necessary.

In order to comprehensively address the overall life cycle of fluorocarbons from manufacturing to destruction/regeneration, beyond the scope of fluorocarbon recovery and destruction in the past, a revised legislation on recovery and destruction of fluorocarbons was enacted on April 1, 2014 entitled "Law on streamlined use and appropriate management of fluorocarbons (Law concerning fluorocarbons emissions control)."

This requires managers (users) in charge of commercial refrigeration and air conditioning equipment to comply with "criteria for users" which sets out obligations regarding the installation, use and disposal of such equipment.

Users will also be required to be aware of the fluorocarbon leakage status, and in cases where a leakage in the amount of 1,000 tons CO2 or above occurs under the users' watch within the fiscal year, they will be obligated to report calculated leakage for each corporation to the Minister overseeing the business by the end of July in the following fiscal year.

Furthermore, in addition to the preexisting registration requirement for fluorocarbon recovery operators, the new legislation obliges fluorocarbon charge operators to be registered as well.

Given the fact that fluorocarbons contribute to global warming, it is essential to properly grasp the amount of fluorocarbons being recovered and charged, and as such Kochi will make efforts to gain accurate information on such by raising awareness towards process management schemes among registered fluorocarbon charge and recovery operators.

Registered operators based on the Law concerning the recovery and destruction of fluorocarbons

(As of March 31, 2015)

Category of registered operators	Registered operators
Class-1 fluorocarbon recovery operator*	227

*April 1, 2015 onwards, Class-1 fluorocarbon charge and recovery operators based on the Law concerning fluorocarbons emissions control

○ Criteria for users

■ Proper placement of installed equipment

(1) Do not place oscillatory sources near equipment
(2) Ensure availability of work space around the equipment to perform inspection / maintenance
(3) Clean equipment areas

■ Equipment inspection

Basic inspection	
Performed on	All commercial refrigeration and air conditioning equipment
Frequency	Once every 3 months
Method	Visual inspection
Look for	・Unusual noise ・External damage, corrosion, rusting, oil bleeds ・Frosting of heat exchangers
Performed by	Not specified (no qualification necessary)

Regular inspection	
Performed on	Commercial refrigeration and air conditioning equipment for which rated output for compressor motors exceeds a certain capacity
Frequency	Once a year, or at least once every 3 years (depending on product category or rated output)
Method	Visual inspection by specialized operators
Inspection details	System leakage inspection, specialized refrigerant leakage inspection using direct and indirect leak detection methods
Performed by	Inspectors with sufficient knowledge on methods for charging fluorocarbons (qualification needed)

■ Dealing with leakage of fluorocarbons

(1) Specify/inspect/repair leakage areas
(2) Prohibit additional charging of fluorocarbons until repair is performed

■ Record/keep maintenance and inspection logs

(1) Record and keep logs for equipment inspection/repairs and charge/recovery of refrigerants
(2) Disclose relevant records as requested by maintenance operators for equipment maintenance

Efforts to maintain and recover seagrass beds / intertidal flats / coral reefs
(Fisheries Promotion Division)

○Current situation and challenges

Seagrass beds*, intertidal flats and coral reefs are fishing grounds for reef resources such as abalones and clams, and also serve as nurturing grounds for various fish and shellfish. Furthermore, they offer public benefits providing water purifying functions and relaxing space for residents.

In recent years, however, coastal regions in Kochi have been affected by the loss of seagrass beds caused by a phenomenon known as "sea desertification" as well as the decline in clam resources due to functional decline in intertidal flats, raising concerns for the fishing industry. The maintenance/recovery of seagrass beds, intertidal flats and coral reefs is a pressing matter to be addressed.

○ Implementation of measures

(Implemented measures)

While various factors including changes in the marine environment can be accounted for the loss of seagrass beds, surveys/research by national, prefectural and university institutions have found that overgrazing of seagrass by sea urchins and fish that feed on algae is one of the major causes.

Prefectural efforts in combating sea desertification have shown that removing sea urchins from seagrass beds to prevent overgrazing is effective in areas where seagrass still exists.

Based on findings from tests/research implemented in the prefecture up to 2007 combined with their verification results, Kochi developed the "Guideline for addressing sea desertification in Kochi" to be used as reference for fishing businesses and regional residents to take on measures against sea desertification.

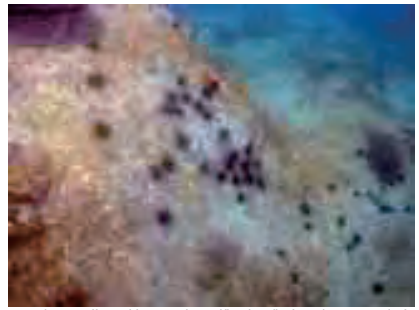
In 2009, as part of a national project, Kochi started to back efforts to preserve seagrass beds/intertidal flats etc. undertaken by a group comprised of fishers and regional residents through a national project.

Similarly, since 2013, Kochi has utilized the national project (project for enhanced performance of multifaceted roles by fisheries) to support activities by groups engaging in the maintenance/recovery of functions in seagrass beds and intertidal flats. Furthermore, Kochi conducted ad-hoc and post-hoc surveys in marine areas undergoing conservation measures so as to better grasp the benefits of such measures and effectively facilitate further implementation, and found exuberant algae growth and inhabitance of fisheries-relevant species such as Japanese spiny lobster.

In the aim of improving functions in intertidal flat areas and recovering clam resources, large-scale seabed cultivation as well as surveys on clam resources and research on species that heavily prey on clams took place in the Tennozu area. In the research, an actual stingray was caught which confirmed its feeding on clams.

(Measures to be implemented)

There will be ongoing support for the implementation of ad-hoc and post-hoc surveys in marine areas carrying out conservation measures on seagrass beds/intertidal flats/coral reefs. In addition, Kochi will conduct research on clam resources and species that heavily prey on them, at the same time rolling out large-scale "cover nets" which have been proven to significantly increase the survival rate of clams.

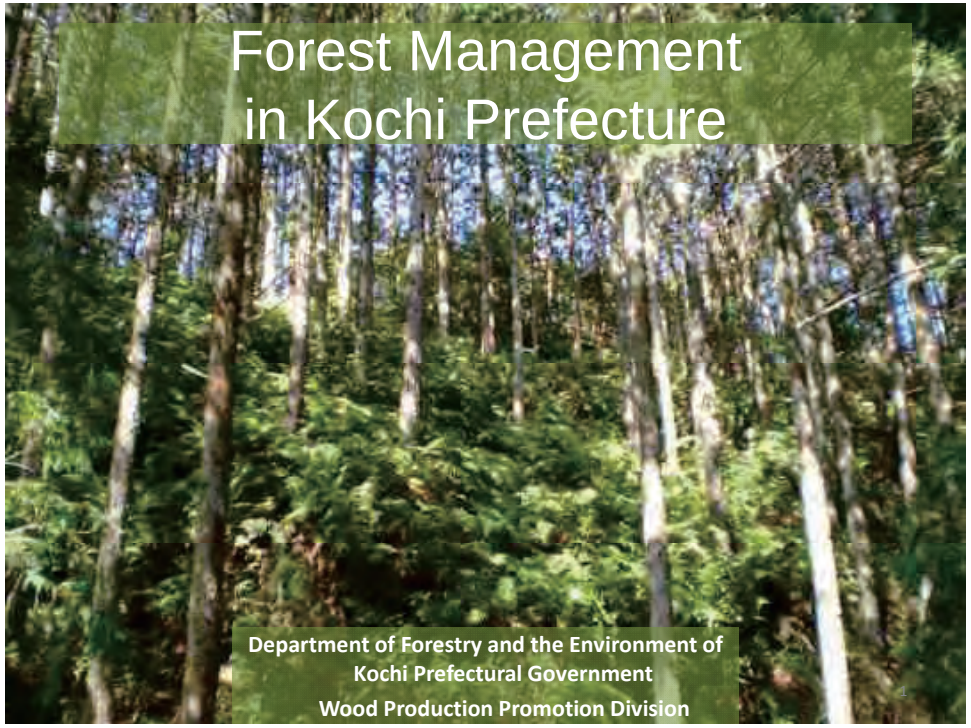


Surveyed area affected by sea desertification (before the removal of sea urchins)
(Ikenoura area, Susaki city in 2010)

Surveyed area where seagrass beds have formed (after the removal of sea urchins)
(Ikenoura area, Susaki city in 2013)

Testing installation of cover nets
(Tennozu, Uranouchi bay in 2014)

―Glossary―
* Seagrass bed
Seagrass bed is where seaweeds grow in luxuriance.



Forest Management in Kochi Prefecture

Department of Forestry and the Environment of Kochi Prefectural Government

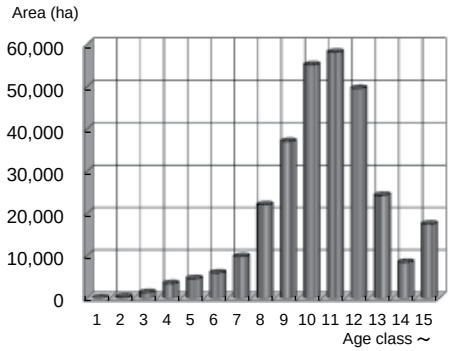
Wood Production Promotion Division

Forest Resources in Kochi Prefecture

◆ Current condition of forest resources (FY2014)

Classification	Total	Private and communal forests			National forests		
		Total	Artificial forest	Natural forest, etc.	Total	Artificial forest	Natural forest, etc.
Area (ha)	595,601	469,426	297,998	171,428	126,174	90,723	35,451
	100%	79%	(63)	(37)	21%	(72)	(28)
Growing stock ($1,000 m^3$)	185,574	158,146	136,767	21,379	27,427	22,861	4,566
	100%	85%	(86)	(14)	15%	(83)	(17)

◆Age class distribution of private artificial forests (FY2014)



The forest/forestry sector can contribute to fighting against global warming through such measures as planting of new trees, sustainable forest management, and reduction of deforestation.

Kochi prefecture is the most forest-rich prefecture in Japan as 84% of the prefecture's area is covered with forests.
Utilizing the most of this characteristic, the prefectural government is making advanced use of forest resources and promoting adequate forest maintenance in order to ensure exercise of multiple functions of forests such as global warming prevention and water resources conservation.

* Sources
Private and communal forests: Forestry Promotion Division of Kochi Prefecture
National forests: Shikoku Forest Management Bureau

Issues surrounding Forestry in Kochi

Lumber price drop

・Large price increase can not be expected for lumber as an internationally-traded product.

Many small-scale and dispersed forests

・Difficult to carry out efficient operation
・Difficult to carry out planned and stable management

No advancement of adequate forest management (such as thinning)

Decrease in and aging of labor force

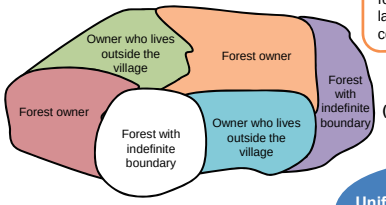
Forestry workers

Promotion of Conversion of Small-scale Forests into Large-scale Plots ("Forest Factory")

Efforts are in progress to convert small-scale and distributed forests into large-scale plots, and certify them as "forest factories" to realize planned, efficient forest operation and management.
At the same time, the work system is being improved to carry out the current work at low costs to meet the challenges of lumber price drop and forestry labor shortage and carry out adequate maintenance of forests.

Promotion of effective, integrated operation

Group of small-scale forest owners



<What is integration?>
To maintain small-scale forests collectively as a large block with the consent from all owners

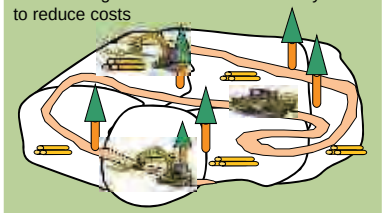
Integration (forest cooperative, etc.)

Unification of measures for integrated operation

Five-year plan approved by the prefectural government
⇒
Implementation of various assistance measures

"Forest Factory" for integrated operation

Constructing efficient roads and work systems to reduce costs



<Forestry business entity>
Stable management and employment

<Forest owners>
Healthy forest Lumber revenue

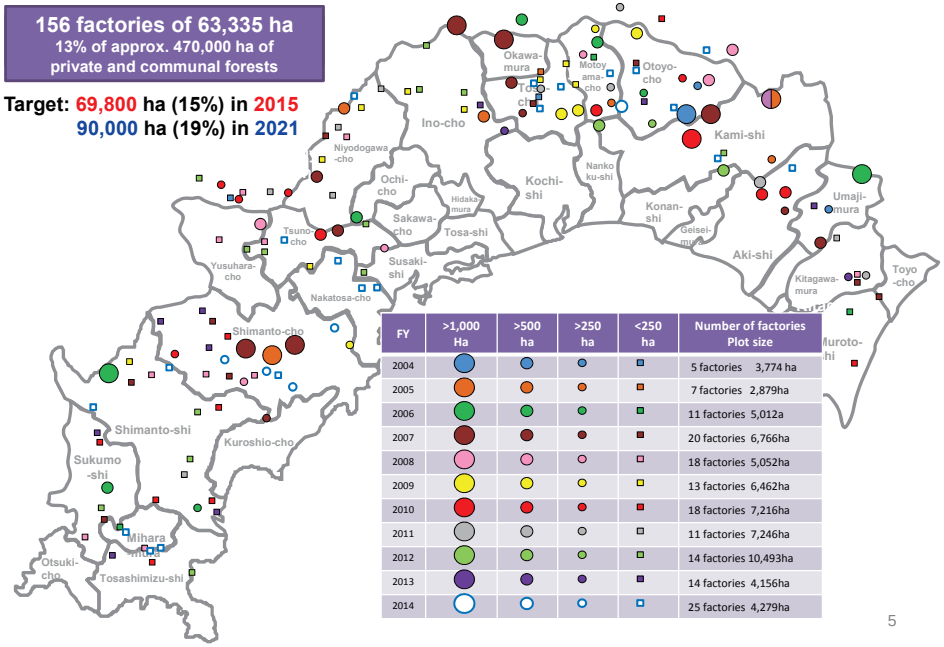
Effect on the community

Stable supply of lumber
Improvement of public welfare functions of forests

Map of “Forest Factories” (as of the end of March 2015)

156 factories of 63,335 ha
13% of approx. 470,000 ha of private and communal forests

Target: 69,800 ha (15%) in 2015
90,000 ha (19%) in 2021



FY	>1,000 Ha	>500 ha	>250 ha	<250 ha	Number of factories Plot size
2004					5 factories 3,774 ha
2005					7 factories 2,879ha
2006					11 factories 5,012a
2007					20 factories 6,766ha
2008					18 factories 5,052ha
2009					13 factories 6,462ha
2010					18 factories 7,216ha
2011					11 factories 7,246ha
2012					14 factories 10,493ha
2013					14 factories 4,156ha
2014					25 factories 4,279ha

Enactment of Urgent Thinning Promotion Ordinance and Implementation of Thinning

The citizens of the Kochi prefecture are receiving great benefits from forests, which have multiple functions such as producing lumber, preventing global warming, maintaining the natural environment, preserving the prefectural land, and conserving water resources. As a result of the Kochi prefectural government’s positive efforts for afforestation of Japanese cedar and cypress, many artificial forests have been built, making it one of the forest-rich prefectures in Japan.

Many of the forests in the prefecture are becoming more mature as resources. However, in the middle of extremely difficult challenges faced by forests and forestry, such as decrease of forestry workers due to depopulation and aging of mountain villages and prolonged lumber price drop, adequate maintenance such as thinning is not adequately performed on an increasingly larger number of artificial forests, causing concerns about the deterioration of multiple functions of forests and occurrence of disasters.

In view of these circumstances, the Kochi prefectural government recognizes it to be an important task for the citizens of the Kochi prefecture to ensure sustainable exertion of multiple functions of forests including prevention of global warming and therefore enacted the Urgent Thinning Promotion Ordinance to promote adequate thinning urgently.

Phase 1 (FY2003 to FY2007)

Classification	2003	2004	2005	2006	2007	Total
Planned (ha)	15,000	15,000	15,000	15,000	15,000	75,000
Actual (ha)	16,583	17,178	15,589	12,537	10,850	72,737

Phase 2 (FY2008 to FY2012)

Classification		2008	2009	2010	2011	2012	Total
Planned (ha)		14,000	14,500	15,000	15,500	16,000	75,000
Actual (ha)		8,799	10,717	10,193	11,541	6,419	47,669
	Tending thinning	6,989	8,702	7,972	9,416	3,858	36,937
	Commercial thinning	1,810	2,015	2,221	2,125	2,561	10,732

Phase 3 (FY2013 to FY2017)

Classification		2013	2014	2015	2016	2017	Total
Planned (ha)		7,300	7,700	8,000	8,000	8,000	39,000
Actual (ha)		6,028	5,259				
	Tending thinning	3,701	2,990				
	Commercial thinning	2,327	2,269				

Support for Forestry Workers

Employees

◇ Provision of forestry engineer training courses
- Portable forestry machine training, vehicle-type construction machine driving skill training, slinging skill training, etc.

◇ Improvement and reinforcement of prefectural forestry schools
- Improvement of facilities (school building, etc.)
- Capacity building through basic courses (improve personnel skills to immediately ready for work) and short-term courses (training for various forestry workers)

◇ Improvement of work environment
- Assistance for purchasing of protection gear for safety, protection against bee stings, and training for safe work skills

Small-scale foresters

◇ Promotion of small-scale forestry
- Partial support to cities to cover the costs required for practical skill training and integrated operation
- Dispatching of field advisors and assistance to safety inspection patrol, etc.

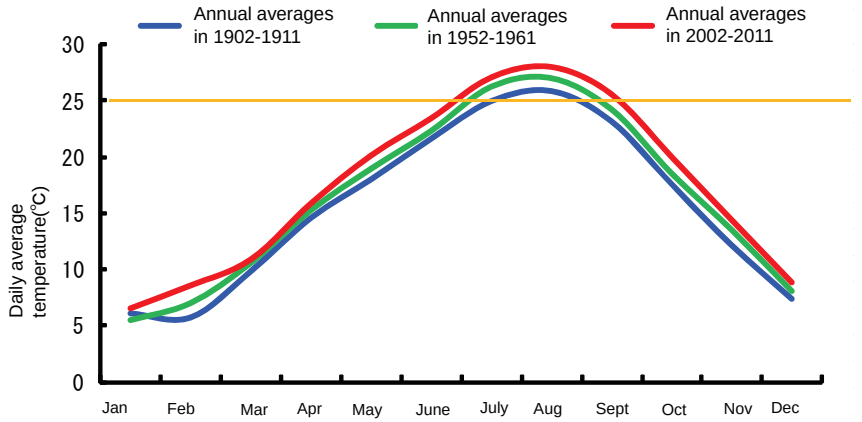
Special-use forest products industry workers

◇ Capacity building and secureing of workers for special-use forest products industry (such as Tosa Binchotan charcoal, etc.)
- Partial support to cities that provide assistance to applicants to this industry

Adaptation Measures against Global Warming

Environmental Agriculture Promotion Division,
Department of Agricultural Development,
Kochi Prefecture

Temperature Changes in Kochi Prefecture



* The annual average temperature is higher than that of 100 years ago by 1.9℃ and that of 50 years ago by 1.0℃ (higher than the nationwide average).
* The temperature has risen significantly in February (+2.9℃), September and October (+2.5℃).

Fruit Trees: impacts from global warming

● Global warming causes high temperatures and dry weather in summer, and insufficient dormancy in winter

Watercore disorder

Watercore disorder lowers fruit quality and <u>increases abnormal flower opening and germination</u>

Abnormal flower opening and germination

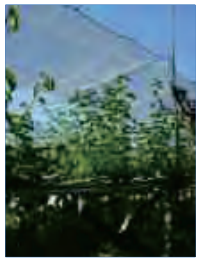
If such damages can be reduced;
・Shipping volume will increase by 10 to 30%
・Economic effect of 150 to 500 million yen

Fruit Trees: countermeasures against impacts

● Global warming-induced high temperatures and dry weather in summer, and insufficient dormancy in winter

・Reduction of temperature rise in summer and securing of a low-temperature period in winter by shading

Development of a vertical stretching method for shading materials



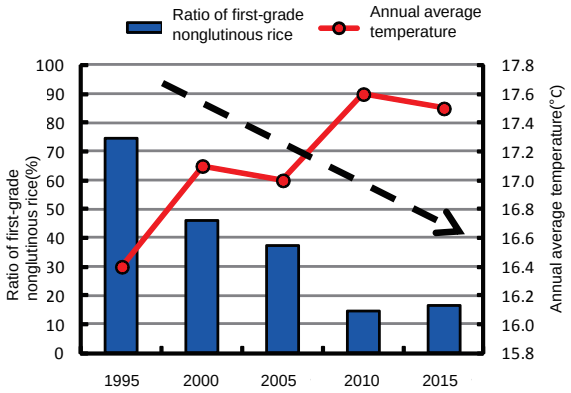
Shading of pears on trellises

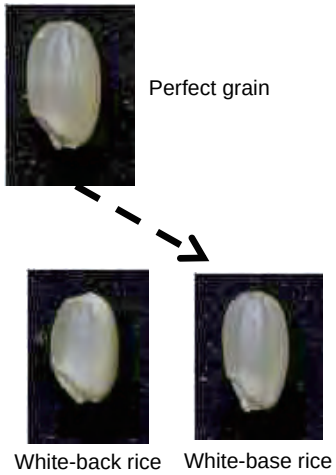
Development of temperature rise prevention technologies!

Paddy rice: impacts from global warming

- Global warming decreases production of first-grade rice

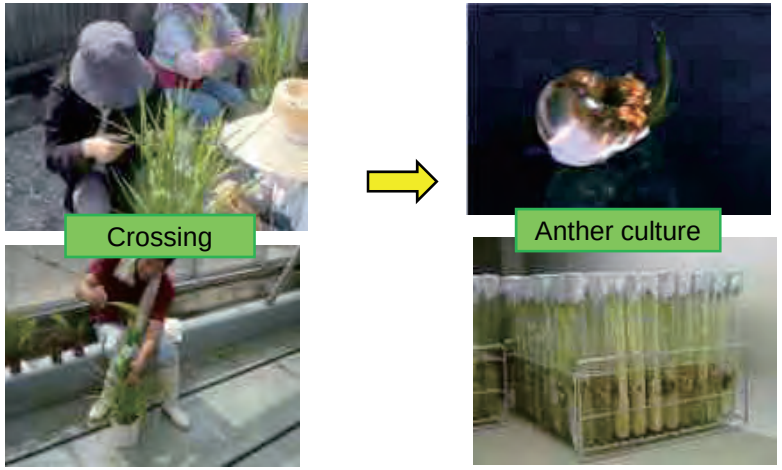
Daily average temperature higher than 27 or 28°C during 20 days after sprouting increases the risk of producing white-back and white-base grains.





Paddy rice: countermeasures against impacts

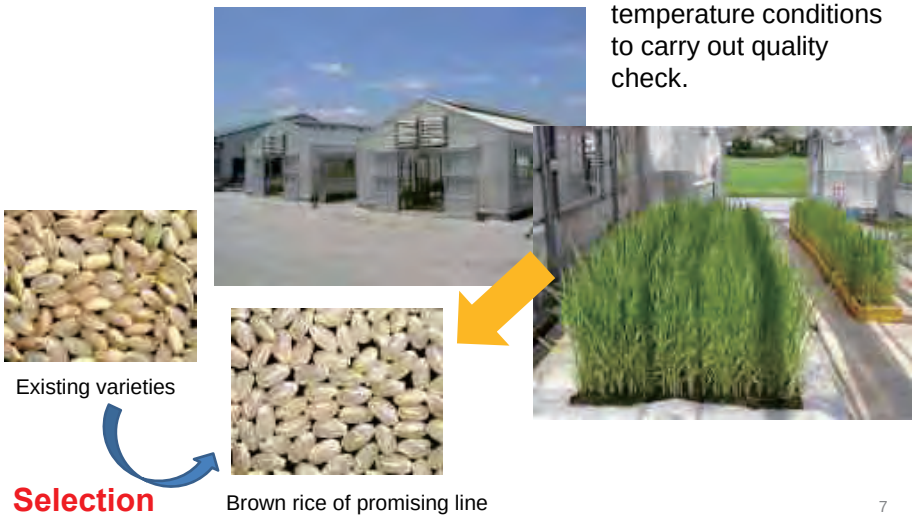
- Selection of heat-resistant varieties
  - Breeding using DNA markers
  - Crossing and anther culture
  - Adaptability test of strains



Paddy rice: countermeasures against impacts

- Selection of heat-resistant varieties
  - Simple and efficient quality check-

Artificially create high temperature conditions to carry out quality check.



Overview of coastal protection facility development project for directly-controlled area in Kochi Coast

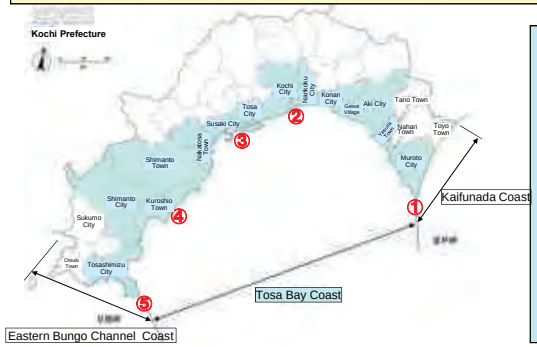
27 April, 2016

Kochi Office of River and National Highway
Shikoku Regional Development Bureau
Ministry of Land, Infrastructure, Transport and Tourism,

View of Nagahama Section – Tobara Section

Coasts in Kochi Prefecture

Overview of coasts in Kochi Prefecture
The coastline in Kochi Prefecture stretches a distance of approximately 713km from the east to the west, and is divided by Cape Muroto and Cape Ashizuri sticking out to the south into three sections: Kaifunada Coast; Tosa Bay Coast; and Eastern Bungo Channel Coast. Most of the eastern area of the Niyodo River, which runs through the center of the prefecture, is elevated coasts while the plains around Urado Bay is an exception. In the western area of the River, there are many bays and coves, e.g. Uranouchi Bay and Susaki Bay as well as deeply indented coastlines formed by settling with mountains and steep cliffs.



Overview of Tosa Bay Coast
- Tosa Bay Coast extends from Cape Muroto to Cape Ashizuri in Kochi Prefecture in the southern part of Shikoku, and faces the Pacific Ocean. In the east and west of the Niyodo River, a class A river in the prefectural center, coastal features vary: In the east, there are many rock reefs around Cape Muroto, and pebble beaches from the Cape to the center area of the coast, with large open sandy beaches.
- Kochi Port as an important port, forms the center of regional development, and is a distribution hub for production and consumption activities in economic zone in this area. In addition, the region boasts abundant tourism resources that utilize local coastal resources, e.g. Katsurahama Beach and the Yokonami Peninsula.
- The coastline between Niyodo River and Cape Ashizuri is deeply indented, featuring breathtaking natural scenery where the mountains look out over the Pacific Ocean. In addition, there are a number of sandy beaches, e.g. Irino Beach and Oki Beach for leisure and various recreational activities.


⑤ Cape Ashizuri (Tosashimizu City)


④ Shirahama Beach (Kuroshio Town)

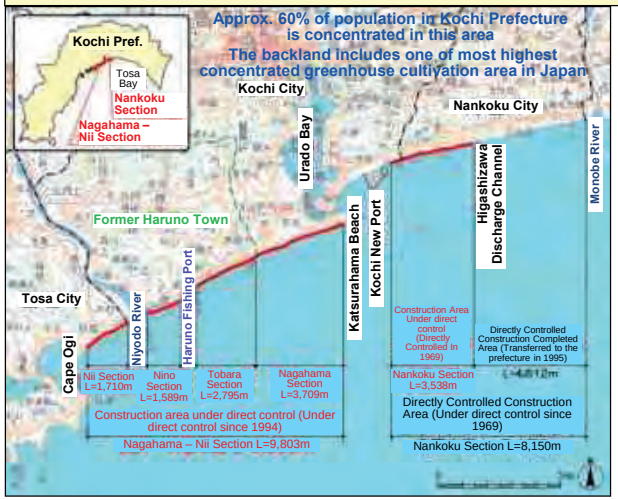

③ Yokonami Peninsula (Susaki City)


② Katsurahama Beach (Kochi City)

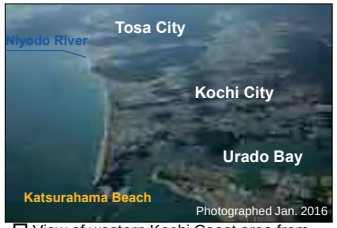

① Cape Muroto (Muroto City)

Overview of Kochi Coast

■ The Kochi Coast is a sandy coast in length of approximately 30 km, in the center of Kochi Prefecture and the inner part of the Tosa Bay. The Niyodo River and Monobe River flow into the bay in the west and east, respectively, and Urado Bay and Kochi New Port are located in the center of the Coast.
■ Shore erosion is currently in progress in the Coast, due to the reduced amount in sand supply and blocked coastal drift sands and other reasons. In addition, The Coast has seen several damages due to high waves and high tides due to frequent typhoon damages in this region.
■ It is predicted that there is a 70% probability of an earthquake centered in the Nankai Touch in the next 30 years. There are concerns that this will result in ground subsidence over a wide area and extensive damage due to a tsunami after the earthquake.



☐ View of eastern Kochi Coast area from direction of Katsurahama Beach



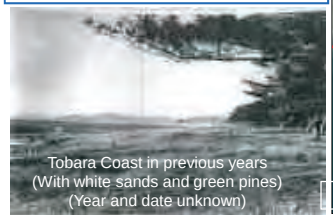
☐ View of western Kochi Coast area from direction of Katsurahama Beach

Coastal erosion in Kochi Coast: current situation

The most likely factors of coastal erosion in Kochi Coast include reduction in the amount of sand supply from nearby rivers, reduction in the volume of sand supply to the coastal area as result of sand collection in river mouth areas, and blockage of sand drift as a result of port facilities construction. In recent years, the amount of sand supply to the coastal area has been in increase as result of reduced river sands collection and implementation of backfilling of sand collection holes in river mouth areas. Furthermore, coastal protection facilities in the Coast area has contributed to mitigation of coastal erosion over the past few years.

Main factors of coastal erosion
(1) Reduced sand supply due to river sand collection.
(2) Reduced sand supply to overall coast area due to sand collection in the river mouth of Niyodo River.
(3) Blockage of sand drift as a result of breakwater construction for Haruno Fishing Port

Status of coastal erosion in recent years
(1) Sand flow in stabilization as result of reduction in river sand collection
(2) Increased trend of sand supply to coastal area along with implementation of backfilling of excavated holes
(3) Beach nourishment efforts since 2009 contributes to increased sand amount in coastal area

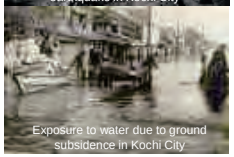

Tobara Coast in previous years (With white sands and green pines) (Year and date unknown)

Contribution of coastal protection facilities in Nino Section, Kochi Coast

Damage to Kochi Coast: current situation

Coastal area of Tosa Bay in which Kochi Coast is located has suffered from extensive damage for a number of times in previous years since the area is frequently hit by typhoons. The Nankai Great Earthquake in 1946 caused damage from tsunami and ground subsidence. Afterwards, there has been a number of impacts including i) significant costal erosion as result of reduced sand supply volume, ii) increased run-up height of waves due to recession of shorelines, and Iii) collapse of sea banks due to wave overtopping and erosion of their foreshore.

Damage from earthquake and tsunami



Damage by high tides and erosions

Wave overtopping due to high waves

Project overview

■ In accordance with the "Tosa Bay Coastal Protection Master Plan (Kochi Prefecture)", the "Coastal Protection Facility Development Plan for directly-controlled area in Kochi Coast" has been in progress with the objective of prevention of damage due to high tides, wave overtopping, erosion and earthquakes/tsunami.
● To prevent wave overtopping to avoid extensive damage from wave immersion through "provision of high breakwater" and "formation of sandy beach".
● Coastal erosion countermeasures: To prevent shoreline recession to avoid extensive erosion through countermeasures of "headland", "detached breakwaters", "artificial reefs" and "beach nourishment". Furthermore, protect habitats of seaside plants, sea turtles and other species.
● Anti-Seismic and liquefaction measures: To prevent extensive damage due to earthquake/tsunami originating in Nankai Trough by advance prevention of subsidence of sea wall by means of earthquake/liquefaction measures e.g. anti-seismic measures for sea walls.

Plan specifications

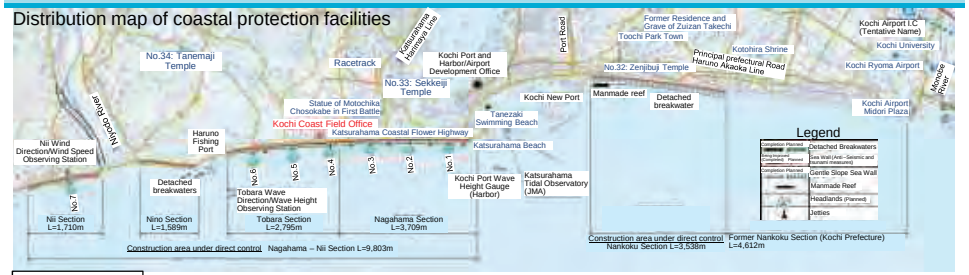
Coastal protection facility development project for directly controlled area in Kochi Coast	High tide erosion countermeasures	Tide level	Syzygy mean high tide	T.P.+0.74m	(Old elevation)
			Planned deviation	1.46m	Deviation calculated for Typhoon on Sept. 7, 1902
			Planned high tide	T.P.+2.20m	(Old elevation) Syzygy mean high tide + planned deviation
		Ocean wave (Offing wave/ significant pulse)	Planned wave height	13.0m	30 year probability wave Height and period calculated with ocean wave estimation Data and observation data
			Planned cycle	15.5sec	
			Predominant wave direction	SSW-SE (Nankoku) SSW-ESE (Nagahama – Nii)	Past record wave direction
	Anti-seismic/ liquefaction measures	Subject earthquake		Central Disaster Prevention Council (2003) Tonankai/Nankai Linked Earthquake	
		Designed tsunami water Level		Nankoku Konan Region Coast T.P.+8.0m (New elevation)	
				Kochi Central Region Coast T.P.+8.0m (New elevation)	

Plan overview

Section	Type	Unit	Quantity
Nankoku Section	Gentle slope sea wall	m	3,538
	Beach building work	$1,000m^3$	173
	Detached breakwaters	No.	21
	Artificial reef	m	310
	Anti-seismic / liquefaction measures.	m	3,538
Nagahama – Nii Section	Headland	m	1,900
	Gentle slope sea wall	m	9,803
	Beach building work	$1,000m^3$	2,100
	Detached breakwaters	No.	4
	Optical fiber	m	10,900
	Anti-seismic / Liquefaction measures	m	9,803

High-tide erosion countermeasures

Distribution map of coastal protection facilities

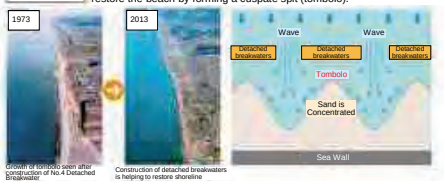


History of Project

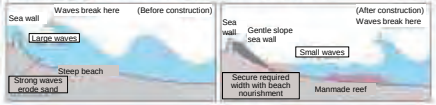
- In 1969, construction works were started in Nankoku and Former Nankoku Sections in range of approx. 8.15km (from the mouth of the Monobe River to the boundary of Kochi Port) after the Sections were designated as a directly-controlled coastal project site. In 1995, the completed detached breakwaters were transferred to Kochi Prefecture. The offshore facilities in the Nankoku Section were completed in 2004.
- In 1994, construction works were started in Nagahama, Tobara, Nino and Nii Sections in range of approx. 9.80km (from Katsurahama Beach to Cape Ogi) after the Sections were designated as a directly-controlled coastal project site. Currently, high-tide erosion countermeasures with headlands, detached breakwaters and beach nourishment are in progress.

Major coastal protection facilities

Detached breakwaters Structures made from blocks and other materials are being built away from the coastline in order to reduce the size of the waves reaching the shore and restore the beach by forming a cuspate spit (tombolo).



Artificial reefs A structure that has the wave absorbing functions of a coral reef is being artificially built, and is superior from both the perspectives of coastal environment conservation and coastal usage promotion since it is under the water.



Headlands

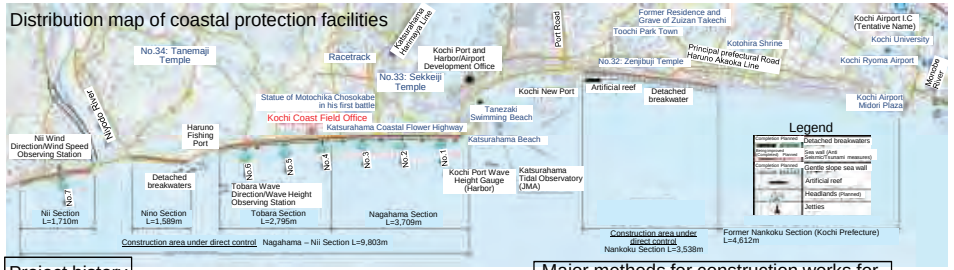
Headlands are effective in stabilizing the flow of the reduced volume of sand supply to a wide area, and has the following features.

- Stabilize the seashore by dividing the long coastline into a number of pocket beaches.
- The shielding effect of the top of the headland enables a quiet region to be formed behind it.

Beach nourishment works Stabilization and utilization of the beach are promoted by maintaining and restoring the seashore by means of artificially supplying sand.

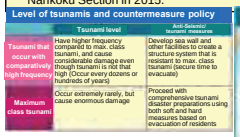
Anti-seismic/ Liquefaction Measures

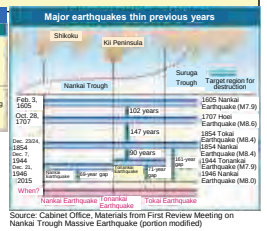
Distribution map of coastal protection facilities



Project history

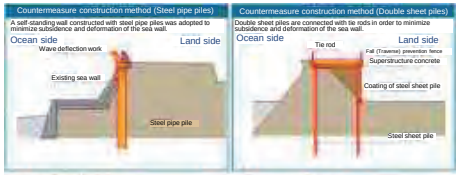
- The national, prefectural and municipal governments are in collaboration for comprehensive countermeasures in Kochi Prefecture to prepare for an earthquake and tsunami with center in the Nankai Touch with probability of approximately 70% in the next 30 years.
- Implementation of anti-seismic/liquefaction measures against earthquakes and tsunamis for sea walls in Kochi Coast area was commenced in JFY2011 to minimize subsidence and deformation of the sea walls due to liquefaction, and prevent flooding by tsunamis Construction Work has been completed in the Nino Section and Nii Section, with work started in the Nagahama/ Tobara Section in 2014 and in the Nankoku Section in 2015.





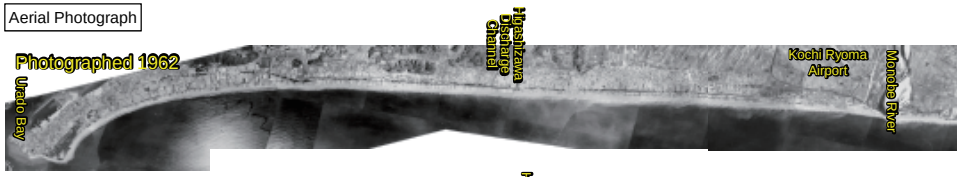
Source: Cabinet Office, Materials from First Review Meeting on Nankai Trough Massive Earthquake (portion modified)

Major methods for construction works for anti-seismic/liquefaction measures

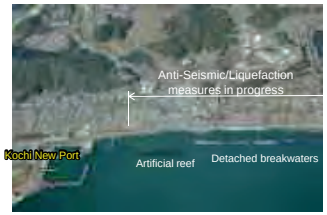


Current status of Kochi Coast (Nankoku Section)

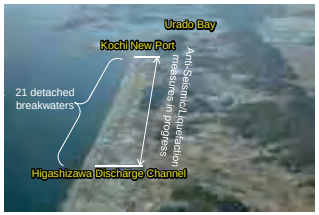
Aerial Photograph



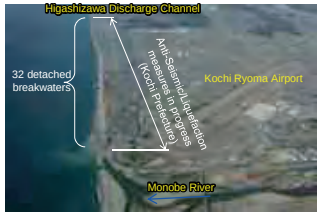
Current status of major coastal protection facilities



Nankoku Section



Nankoku Section



Former Nankoku Section

Current status of Kochi Coast (Nagahama – Nii Section)

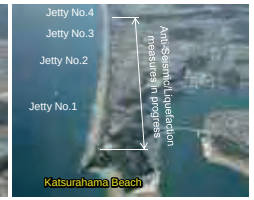
Aerial Photograph

Current status of major coastal protection facilities

Nii Section

Nino Section

Tobara Section



Nagahama Section

Alignment with related projects and regional cooperation scheme

■ Regional cooperation scheme: Requests for project completion at early stage are received from Kochi Prefecture, Nankoku City, Kochi City, Tosa City and "Alliance for promotion of development of Kochi Coast area in direct control" and other organizations. Projects for further collaboration with local stakeholders will be promoted.
■ Use of coast area: Kochi Coast is expected available for marine recreation, local events and tourism, and efforts to facilitate coastal area use in an optimum manner will be promoted.
■ Coastal environment: It is observed that sea turtles are coming ashore every year to lay their eggs. Protection activities targeted for sea turtles are popular, and local elementary schools and organizations with permission from the Governor of Kochi Prefecture in accordance with the Kochi Prefecture Sea Turtle Conservation Ordinance conduct such sea turtles protection activities.

Situation of the region: Partnership for coastal cleaning

Sightseeing in surrounding area of coasts: Katsurahama Beach

Release of baby sea turtles

Use of coasts: People enjoys fishing

Local event: Kochi Ryoma Marathon

Situation of sea turtles (They come ashore to lay eggs.)

Outline

1. Introduction to CITC
2. Achievements & Progress
3. Upcoming Activities

1. Introduction to CITC

Introduction to CITC

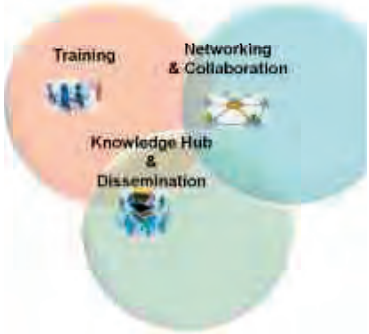
- **Climate Change International Technical and Training Center (CITC) is :**
  - Established by **Thailand Greenhouse Gas Management Organization (TGO)**
  - A flagship project by the **Ministry of Natural Resources and Environment, Thailand**
  - Officially launched on **May 8, 2014**
  - Supported by **Japan International Cooperation Agency (JICA)**

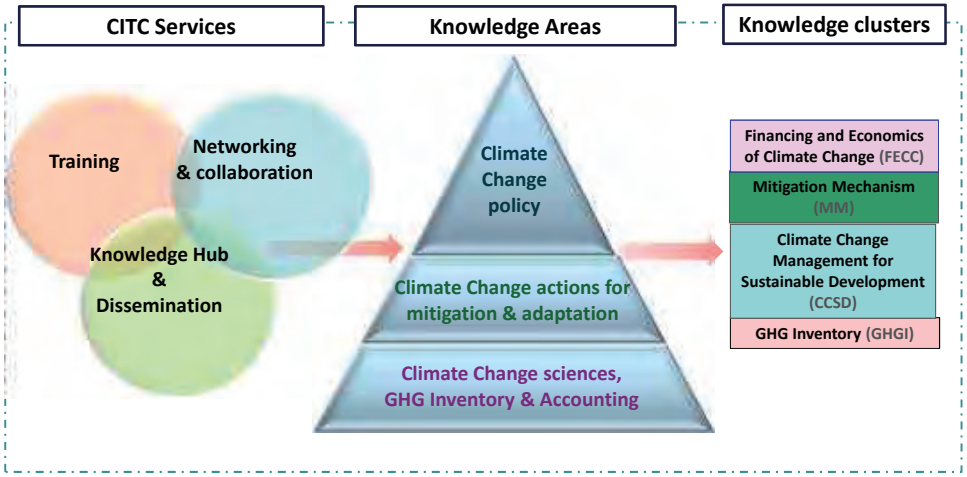
Vision

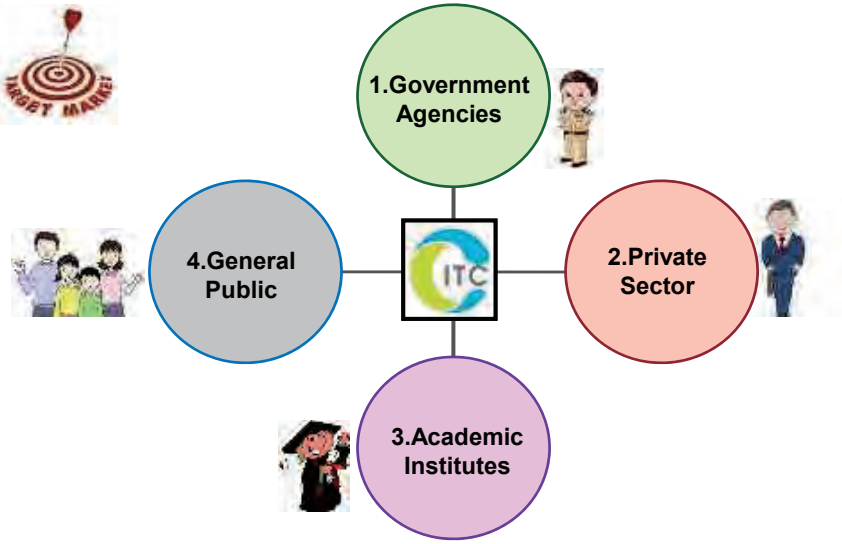
- Become a leading climate change training center in ASEAN

Mission

1. Provide capacity development on climate change mitigation and adaptation
2. Promote climate change networking platform
3. Promote knowledge dissemination on climate change mitigation and adaptation







2. Achievements & Progress

Achievements & Progress – Training Program (Domestic)

Curriculums	Targets	Date	No. of Participants	
			Trainees	TTT
1. Greenhouse Gas Inventory (GHGI)	Central governments practitioners	Aug, Sep 2014/ May, July 2015	143	19
2. Low Carbon and Resilient Society Development (LCRS)	Local governments practitioners	Dec 2014	38	33
3. Low Carbon and Resilient Society Development (LCRS)	Local governments executives	Mar 2015	59	-
4. Low Carbon and Resilient Society Development (LCRS)	Central governments Executive and practitioners	Sep 2015	37	-
5. Climate Change Management for Sustainable Development (CCSD)	Local governments, Central governments, Academic Institutions and Private agencies	Jan 2016	56	-
6. Climate Change Economics (CCE)	Central governments	Mar, May /June 2015	61	13
7. Mitigation Mechanism (MM)	Central governments practitioners, Academic Institutions and Private agencies	Sep 2015	88	42
Total			**482**	**107**

Achievements & Progress – Training Program (International)

Curriculums	Targets	Date	No. of Participants
			Trainees
1. Climate Change Management for Sustainable Development (CCSD)	Central governments, Academic Institutions	February - March 2016	39
2. Mitigation Mechanism (MM)	Central governments, Academic Institutions and Private agencies	February - March 2016	40
3. Climate Finance (CF)	Central governments, Academic Institutions and Private agencies	March 2016	58
Total			**137**

Achievements & Progress – Curriculum development & Training

Regional Training For ASEAN On "Climate Change Management for Sustainable Development" And "Mitigation Mechanism"

Training: Climate Change Management for Sustainable Development" And "Mitigation Mechanism
Target Groups: central, private sector and academia in Thailand and in ASEAN countries
Date: 29 February – 4 March 2016, Bangkok
Participants: 40 persons



Achievements & Progress – Curriculum development & Training

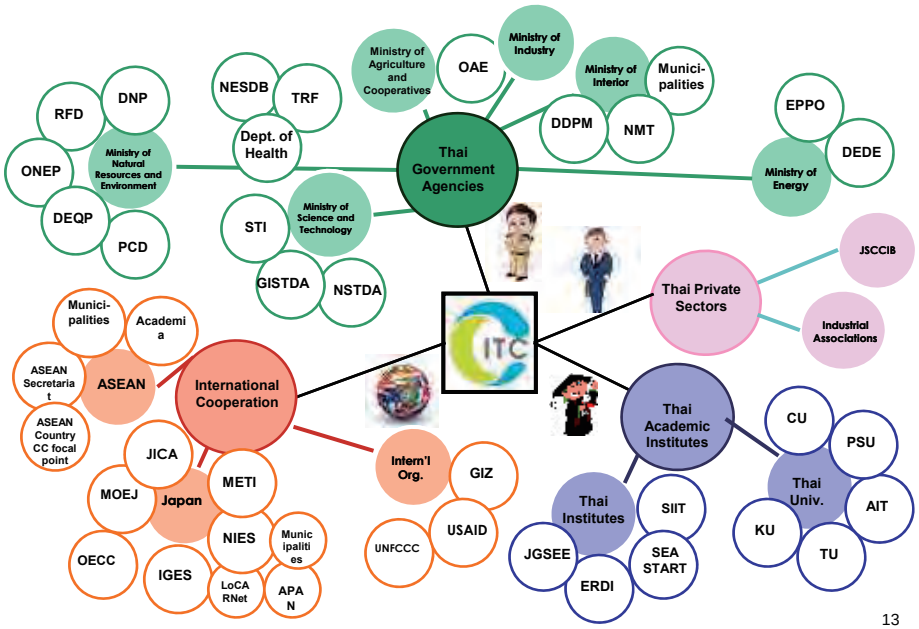
Climate Finance (CF)

Training: Climate Finance
Target Groups: national government officers who engage in mitigation/adaptation related activities, finance planning, and infrastructure development/investment as well as financial and investment related agencies
Date: 28-29 March 2016 , Bangkok, Thailand
Participants: 58 persons





Achievements & Progress – Networking



Achievements & Progress – Networking

Workshop: 3rd CITC Regional Conference On Climate Change And Sustainable Development: "How To Accelerate Climate Actions In Asia Through Capacity Building And Climate Finance"

Target Groups: Government agencies, private sector, and academic institutes

Date: March 30 – April 1, 2016 Pullman Kingpower Hotel, Bangkok Thailand

Participants: 201 persons from ASEAN Secretariat, focal points, cities and academia from ASEAN member countries

Achievements & Progress – Networking

The UNFCCC COP21 Side Event

"Sustainable Development And Climate Change :Toward Enhancing The Role Of Capacity Development For Implementation Of INDCs In The ASEAN Countries "

(co-organized with JICA) Paris, France

(more than 70 participants)

Achievements & Progress – Networking

Seminar: The 4th Green Economy Green Growth in "Capacity Building for Climate Change Related Financial Mechanisms" Session

Date: Feb 4th, 2015 at Nay Pyi Taw, Myanmar

Objective: To present the objective of CITC to become a one stop technical and training center on mitigation and adaptation in Southeast Asia region, the curriculum development and training activities

Achievements & Progress – Networking

Meeting: ASEAN Working Group on Climate Change (AWGCC) for introducing the establishment of CITC and CITC activities from 2012-2015
Participants: Focal point officials from 10 ASEAN member states
Date: May 12th, 2015 at Vientiane, Lao PDR

Achievements & Progress – Networking

Meeting: Collaboration with National University of Laos
Date: May 12th, 2015 at Vientiane, Lao PDR
Objective: To represent CITC's previous works and exchanging knowledge about current situation and the demand on Climate Change Knowledge of Lao population

Achievements & Progress – Networking

Seminar: "Low Carbon Asia Research Network (LoCARNet) 4th Annual Meeting, International Conference of Low Carbon Asia Positive Action from Asia – Towards COP21 and Beyond"
Date: October 11th – 13th, 2015 at Jahor Bahru, Malaysia
Objective: To present on the activities of CITC on the curriculum development and trainings on GHG inventory, low carbon and resilient society, mitigation mechanism and sustainable GHG management for Thai and ASEAN countries

Achievements & Progress – Networking

Workshop: The 13th Workshop on GHG Inventories in Asia (WGIA13)
Date: August 4th – 7th, 2015 at Bali, Indonesia
Objective: To discuss and exchange views on National Communications and Biennial Update Reports of each country in Asia; collecting and analyzing essential information for GHG inventory curriculum development under CITC

Achievements & Progress - Knowledge Hub & Dissemination

Exhibitions

- Workshop: Low Carbon and Resilient Society (Adaptation) for Director of Provincial Administration Organization on March 5th-6th, 2015 at Centara Hotel, Had Yai, Song Khla, Thailand
- Workshop: Climate Change Economics on March 9th-11th, 2015 and March 16th-17th, 2015 at 5th Floor meeting room of Faculty of Economics, Thammasat University, Bangkok, Thailand
- Workshop: Enhancing action in BKK to reduce energy waste on July 28th, 2015 at Department of Public Work, BMA City Hall 2

Achievements & Progress - Knowledge Hub & Dissemination

Exhibitions

- Roadshow: RENEWABLE ENERGY WORLD on September 3rd-5th, 2015 at Impact Arena Mueng Thong Thani, Nonthaburi, Thailand
- Visiting and handing over the LCRS plan, launching by TGO, by General Surasak Karnjanarat, the Minister of MONRE Thailand on September 10th, 2015 at TGO
- Annual Seminar Year 2015, The Twelfth National Economic and Social Development Plan (2017-2021), on September 11th, 2015 at Grand Diamond Ballroom, Impact Arena Mueng Thong Thani, Nonthaburi, Thailand

Achievements & Progress - Knowledge Hub & Dissemination

- Developing mass media channel for promoting Climate Change Channel on YouTube. 3 Documentary VDOs had been launched;

1. Low Carbon Society (LCS) The Series EP.1 “Mr. Somchai Jariyacharoen”
2. Low Carbon Society (LCS) The Series EP.2 “KYOTO Low Carbon”
3. Low Carbon Society (LCS) The Series EP.3 “Khun Wandee Kooncharayakong - Solar farm)

CITC website (www.citc.in.th)

3. Upcoming Activities

Upcoming Activities

Apr-Jun 2016	Jul-Sep 2016	Oct-Dec 2016
Trainings / Workshops		
Workshop on Mitigation Mechanism	Training on Climate Change Management for Sustainable Development for central government	CITC Capacity Building Activities for Lao PDR
Training on Climate Change Economics	Training on Greenhouse Gas Inventory for central government	
	TTT Course	
	Training on Climate Change Economics (E-Learning)	
Knowledge Hub & Dissemination		
Publications through media to all targets		
PR and Networking activities (road shows, participation of domestic & international events)		
CITC website		

Upcoming Activities

1. Curriculum development and Training

Curriculums	Targets	Date	No. of Participants
1. GHG Inventory (GHGI)	Central government -practitioners	July 2016	50
	Government agencies -practitioners (ASEAN)	Under development	-
3. Mitigation Mechanism (MM)	Local government, Central government, Academic Institutions and Private agencies	June 2016	50
4. Climate Change Economics (CCE)	Local government, Central government, Academic Institutions and Private agencies	May 2016 June 2016	80
6. Train The Trainers (TTT)		July 2016	30
Total			210

Fight against Climate Change…TOGETHER !!!

Thailand Greenhouse Gas Management Organization (Public Organization) (TGO)
www.tgo.or.th

Climate Change International Technical and Training Center (CITC)
www.citc.in.th

JICA Training in Japan for the Kingdom of Thailand

Measures Against Global Warming by Niigata City

Tomedoki
(Niigata City global warming prevention character)

19th April 2016

Niigata City Environmental Section

Profile of Niigata City

Niigata City

[Population]
Japan: about 127 million
Niigata Prefecture: about 2.37 million
Niigata City: about 800,000

[Area]
Japan: 377,900 km^2
Niigata Prefecture: 12,580 km^2
Niigata City: 730 km^2

[Location]
Longitude: 139.04 degrees east
Latitude: 37.92 degrees north

Features of Niigata City

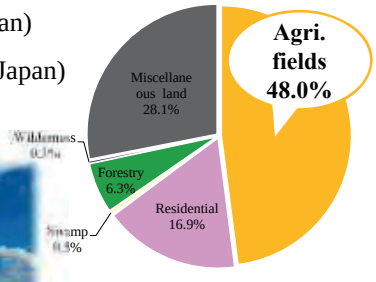
[Main Industries]
Service industries, retail, manufacturing (food production such as rice snacks and fish cake, chemicals, pulp and paper, etc.)

[Land use] Agriculture 48% (28,500 ha)

[Food self-sufficiency rate] 63% (highest among government ordinance cities)

[Yield of paddy-field rice] 145,200 t (largest in Japan)

[Number of authorized farmers] 3,122 (largest in Japan)



■ Land use in Niigata City (2010)

Niigata's City Planning Vision

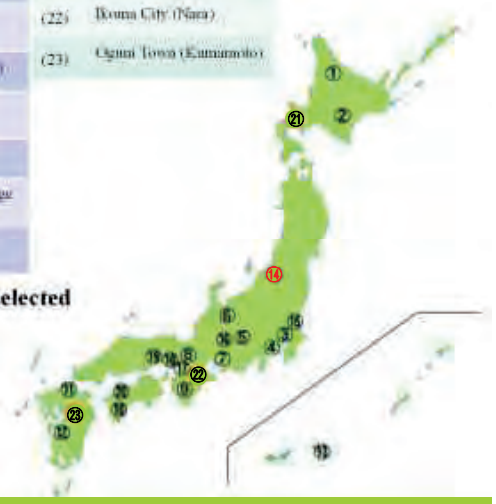
"To be an environmentally healthy city in which the rural and the urban are interwoven"

Aiming to be a rural environmental city, utilizing Niigata's characteristic as Japan's No. 1 rural city, in which people and values such as food, culture, energy, etc., are circulated between the urban and rural areas, for the benefit of all

Selected as "Environmental Model City"

Primary Selected Cities		Secondary Selected Cities		Tertiary Selected Cities	
(1)	Shimokawa Town (Hokkaido)	(14)	Niigata City (Niigata)	(21)	Niseko Town (Hokkaido)
(2)	Obihiro City (Hokkaido)	(15)	Tsukuba City (Ibaraki)	(22)	Kouna City (Nara)
(3)	Chiyoda Ward (Tokyo)	(16)	Mitake Town (Gifu)	(23)	Oguni Town (Kumamoto)
(4)	Yokohama City (Kanagawa)	(17)	Amagasaki City (Hyogo)		
(5)	Iida City (Nagano)	(18)	Kobe City (Hyogo)		
(6)	Toyama City (Toyama)	(19)	Nishiawakura Village (Okayama)		
(7)	Toyota City Aichi)	(20)	Matsuyama City (Ehime)		
(8)	Kyoto City (Kyoto)				
(9)	Sakai City (Osaka)				
(10)	Yusuhara Town (Kochi)				
(11)	Kitakyushu City (Fukuoka)				
(12)	Minamata City (Kumamoto)				
(13)	Miyakojima City (Okinawa)				

Niigata City was selected in March 2013



Niigata City Global Warming Countermeasures Action Plan (Environmental Model City Action Plan)

History of Adoption of the Plan

2009 **Adoption of "Niigata City Global Warming Countermeasures Action Plan"**
Action plan in accordance with the Act on Promotion of Global Warming Countermeasures (Article 20-3)

2009 Establishment of Niigata City Global Warming Countermeasures Local Promotion Committee

Members: Citizens' groups, private sector, climate action promotion officers, administration (Secretariat: Niigata City)
Objective: To achieve targets of the Action Plan
Activities: Provide education to citizens and private companies regarding promotion of global warming prevention activities

2013 Niigata City was selected as Environmental Model City

2014 Adoption of Niigata City Global Warming Countermeasures Action Plan as **"Environmental Model City Action Plan"**

Steps to Adoption of the Plan

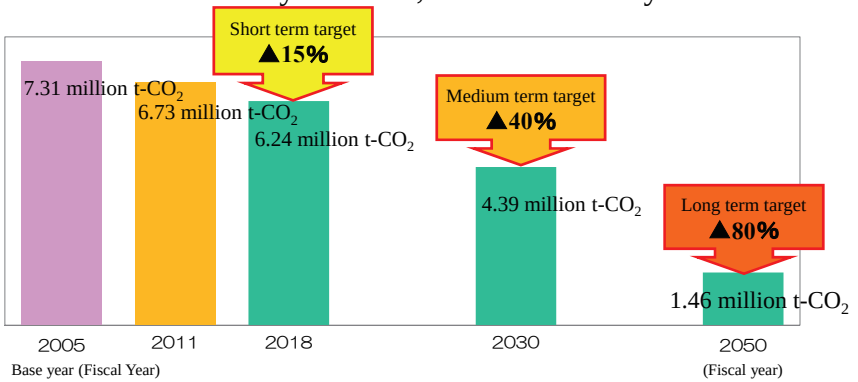
Date	Details
April *2013-*	Survey and analysis of status of global warming within the city
July	Survey and analysis of policies and measures within the City Office
Sept	Organization of Adoption Committee Committee members: Academics, representatives of the energy industry, representatives of the transport industry, residents' organizations, residents
Nov – Feb *2014*	Adoption Committee Meetings (4 times)
Feb	Presentation of draft plan to Niigata City Council Meeting
March	Opinions sought from members of Niigata City Environmental Deliberation Council and Niigata City Global Warming Countermeasures Local Promotion Committee
March – April	Invitation of public comment
April	Report to Niigata City Global Warming Countermeasures Headquarters
April	Adoption and publication of Plan

Overview of the Action Plan

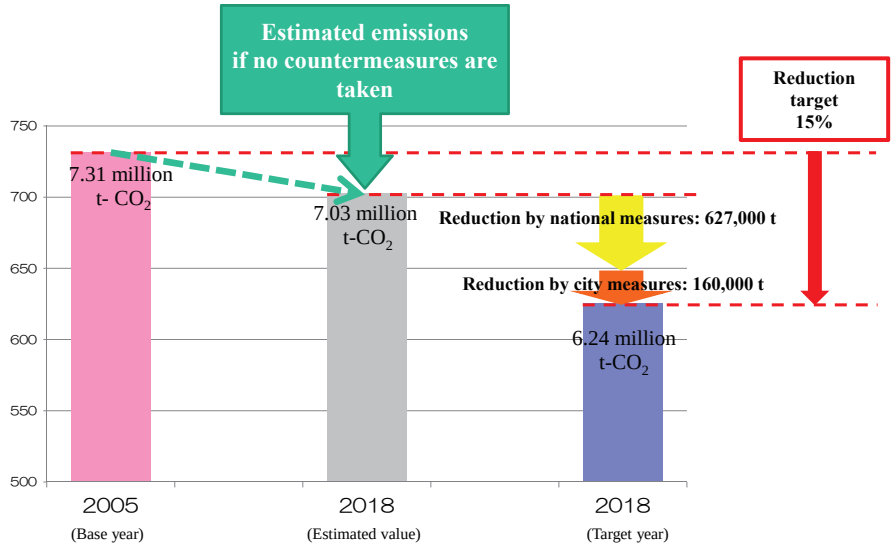
(1) Target period: Fiscal year 2014 to 2018

(2) Scope: CO_2 emissions from Niigata City area

(3) Target values: From FY 2005 level, 15% reduction by FY 2018, 40% reduction by FY 2030, 80% reduction by FY 2050



Short Term Target Setting



Basic Principles for Implementation of the Plan

1 Conservation and sustainable use of rural environment

2 Establishment of smart energy city

3 Shift to low carbon transport

4 Shift to low carbon lifestyle

Summary of Main Countermeasures

1 Conservation and sustainable use of the rural environment

● **Effective utilization of rural resources**
<Focus Measure>
Formation of 'Niigata New Food Valley'

● **Promotion of interaction between urban and rural**
<Focus Measure>
Promotion of Niigata Educational Farm

Agricultural activity center

Agri-park
Experience of agriculture by all elementary school children within the city

Ikutopia Shoku Hana
PR and dissemination base of food and flower brands

Creation of new value in agriculture

Summary of Main Countermeasures

2 Establishment of Smart Energy City

● **Promotion of the use of unused energy**
<Focus Measure>
Utilization of sewage heat and promotion of co-digestion of sewage sludge

Use of sewage heat
Sidewalk snow melting and air conditioning system

Chubu wastewater treatment plant
Power generation using digestion gas (560 kW)

● **Promotion of use of biomass**
<Focus Measure> Promotion of use of plant biomass

Use of plant waste as energy
Pellets, firewood

Pellet boiler
Use of rural resources (biomass) for energy

Summary of Main Countermeasures

3 Shift to low carbon transport

● <Focus Measure> Restructuring the Public Transport Network

Ensuring day-to-day transport within the area
Enhancement of local and residential buses

Smooth movement within the city center
Introduction of BRT (next generation bus system)

● **Shift to Low Carbon Mobility**

Promotion of the spread of EV chargers
Introduction to public facilities

Development of bicycle paths

Promotion of eco-driving

Summary of Main Countermeasures

4 Shift to low carbon lifestyle

● <Focus Measure> Introduction of low carbon lifestyle

Enhance understanding of energy efficiency at home
Training courses to promote energy efficiency

Promotion of 3R, reduction of waste
Development of collection system, thorough waste separation

Incentive for environmental activities
Point award system

● **PR and outreach activities**

Holding events
Niigata City Environmental Fair

Publicity through homepage, etc.
Establish environmental website, use of SB

Promotion System of the Plan

Joint Promotion by Citizens, Companies, and Administration

- Niigata City Global Warming Countermeasures Local Promotion Committee
- Niigata City Biomass Utilization Promotion Council
- Niigata City Smart Energy Promotion Association
- Niigata City Mobility Management Promotion Council

Promotion by Cooperation among Relevant Administrative Organizations and other groups

- National government
- Niigata Prefecture
- Niigata Prefecture Global Warming Prevention Activities Promotion Center

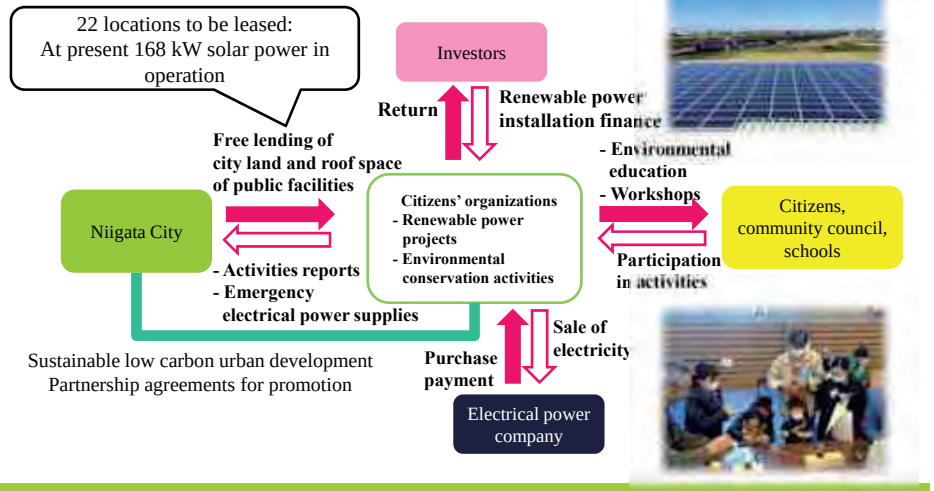
Promotion by Cooperation within the City Government

Global Warming Countermeasures Headquarters (Head: Mayor)

Cooperation with citizens

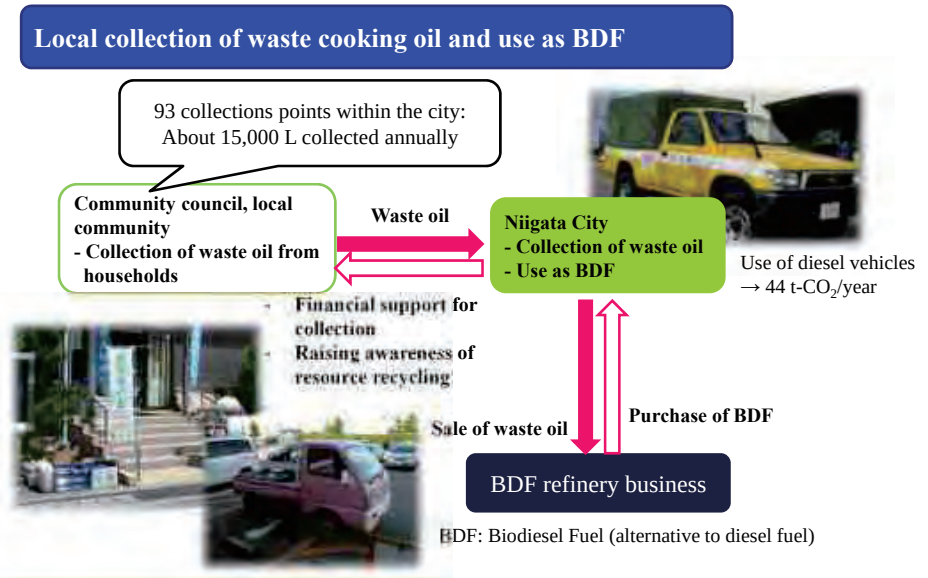
Example of Initiatives in Cooperation with Citizens (1)

Promotion of renewable energy in cooperation with citizens' organizations



Example of Initiatives in Cooperation with Citizens (2)

Local collection of waste cooking oil and use as BDF



環境モデル都市

ありがとうございました。

Thank you very much.

Carbon Offsetting Efforts of Niigata Prefecture

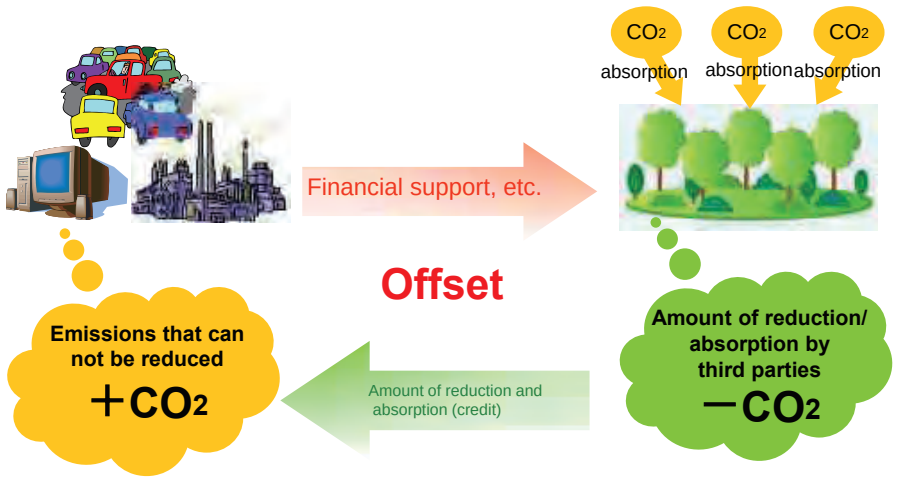
April 19, 2016

JICA Training in Japan

"Project for Capacity Development on Climate Change Mitigation/ Adaptation in the Southeast Asia Region"

Global Environment Office, Environmental Planning Division,
Department of Environmental and Civic Affairs,
Niigata Prefectural Government

What is Carbon Offsetting? (1)



•A carbon offset is a reduction in the carbon dioxide that is emitted by individuals or through business activities in order to compensate (offset), in whole or in part, for the carbon dioxide emissions that cannot be reduced in our daily lives, and are generated by the purchase of reduction and absorption efforts (carbon credit) by other parties.

What is Carbon Offsetting? (2)

Carbon offsetting is:

- ○ Voluntary efforts by companies and individuals
  ※ Different from emissions trading
- ○ Purposes vary such as to differentiate their own products or to contribute to global warming countermeasures

⇩

Voluntary GHG emissions reduction efforts

National government is operating "J-Credit Scheme" in Japan

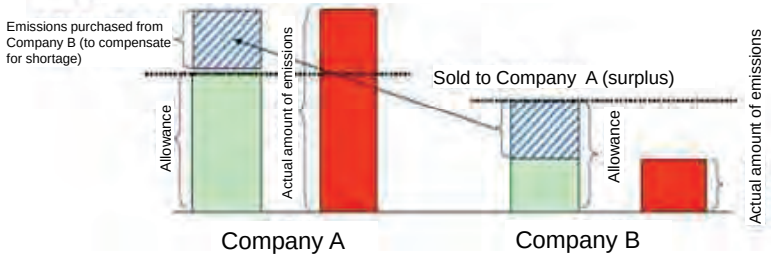
Niigata Prefectural Government operates "Niigata J-Credit Scheme," which is approved by the national government.

※ Niigata Prefecture is working on the promotion of carbon offsetting as a scheme that provides opportunities to take actions against global warming.

Emissions Trading Scheme in Japan

○ GHG emissions caps (maximum allowed amount) are set for companies
○ Companies can trade their caps in addition to making their own reduction efforts.

● Image of Emissions CAP-and-Trade scheme



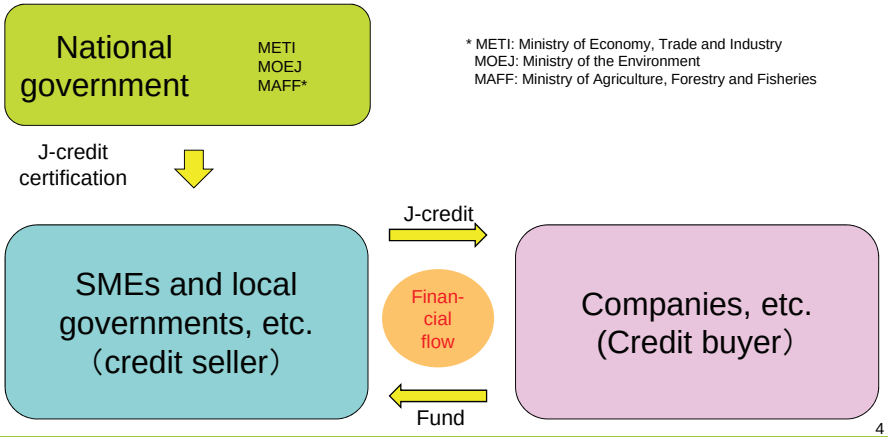
Source: Ministry of the Environment

⇒ Still under consideration by national government

Overview of Niigata J-Credit Scheme (1)

○ A scheme of certifying the amount of GHG emissions reduction as a “credit” through such measures as introduction of energy-efficient facilities and forest management by SMEs, etc.,

○ The scheme aims to promote investment in energy saving and low-carbon investments to SMEs and local governments. It also and the promotion of fund flow in Japan, and it is expected to achieve a good balance between the environment and the economy.



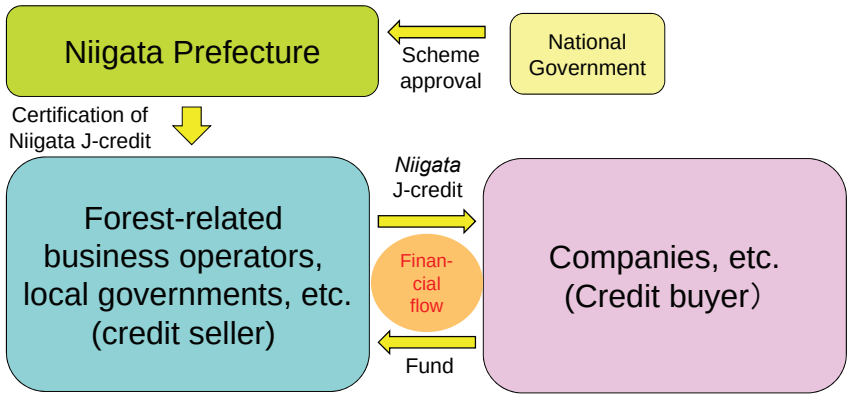
* METI: Ministry of Economy, Trade and Industry
MOEJ: Ministry of the Environment
MAFF: Ministry of Agriculture, Forestry and Fisheries

Overview of Niigata J-Credit Scheme (2)

○ Niigata Prefectural Government certifies and issues credit for the amount of CO_2 reduction and absorption through forest management projects inside the prefecture.

⇒ ***The Niigata J-Credit Scheme focuses on forest management activities***

○ Credit certification and issuance system of Niigata Prefecture has been approved by the national government. The Niigata J-Credit Scheme is ensured for the same credibility as the national J-Credit Scheme.



Certification and Approval of Provincial Schemes by National Government

Certification of provincial J-VER programs and approval of local J-credit schemes

● National government (program administrator) certifies and approves provincial credit-certification and issuance.

In accordance with the national program (2013), these provincial schemes are approved as “provincial J-VER Programs” (from 2009) or as “local J-credit schemes.”

● Credits issued by provincial governments through the above process are registered in the same category as credits issued by the national government.

Jan. 2010: Niigata Offset Credit Scheme was certified by the national government (first case in Japan)
Oct. 2013: Approved as local J-credit scheme (transferred to the new national scheme)

- The entire process from project application to Niigata credit issuance is completed in the prefecture.
  → Promote participation from forest management operators in Niigata
- Register Niigata credit certified by the prefectural government in the national registry
  → Credit can be used by companies across the country

Benefits of Carbon Offset Efforts

Benefits in corporate activities

● Promote global warming prevention measures
  •Reduction of GHG emissions by companies
● Differentiation of products and services
  •Add values of environmental consideration and forest conservation to products and services

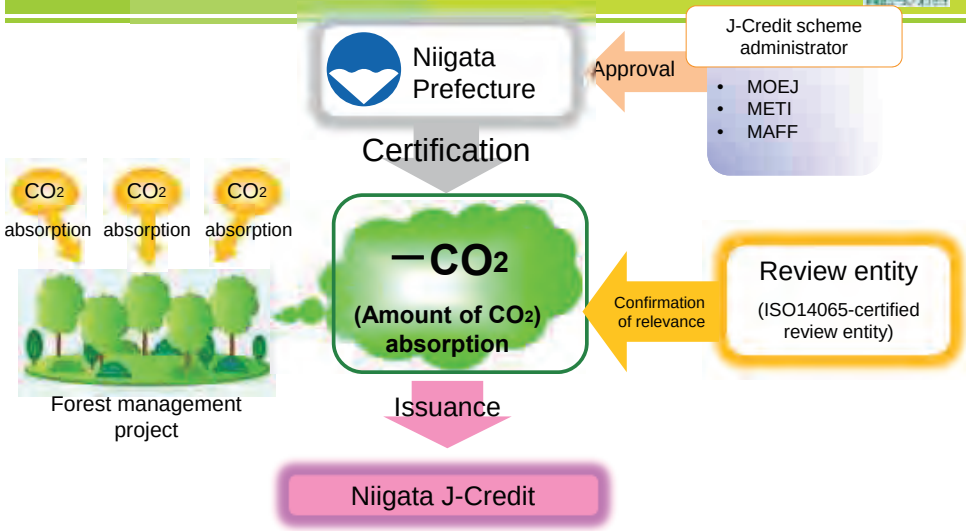
Contribution to local environmental conservation

● Global warming prevention
  •Raise residents’ awareness of global warming prevention through offset products
● Promotion of forest management
  •Promote sound forest management through credit sales revenue

Contribution to local promotion

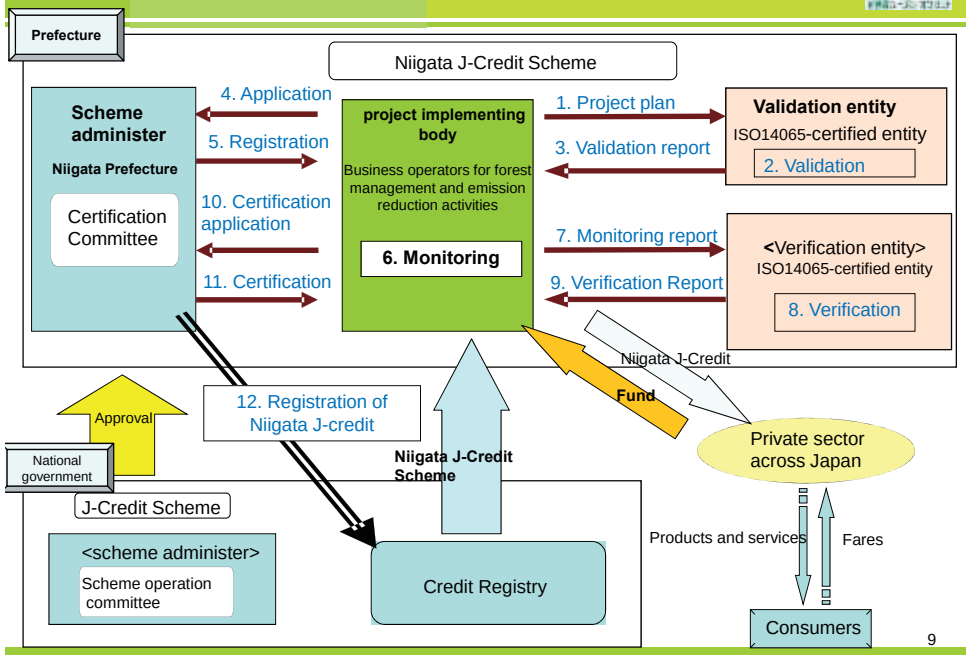
● Expansion of market for local products
  •Add value to local products to establish new markets and outlets.
● PR of local attractiveness
  •Local PR using offsets

Niigata J-Credit Scheme



Niigata J-credits are highly credible and are certified and issued under the Niigata J-Credit scheme, which was approved as a regional scheme under the national J-Credit scheme. As these credits derive from the absorption amount generated through forest management in Niigata, the funds to purchase the credits are restored to the forest management activities in the prefecture.

Mechanism of Niigata J-Credit Scheme



History of Niigata Carbon Offset Scheme

Niigata Carbon Offset Scheme	(Reference) National Scheme
June 2008 A carbon offset model project implemented in Sado City	Oct. National credit scheme (certification of emissions reduction) launched by METI, etc. Nov. Offset credit (J-VER) scheme launched by the Ministry of the Environment
May 2009 Niigata carbon offset scheme launched Aug. Niigata Prefecture Norin Kosha registered Sado ibis forest development project as forest absorption program, the first of its kind in Japan.	
Jan. 2010 Nation's first prefectural J-VER program certified by the national government	
Aug. 2013 Application for approval of regional J-credit scheme filed with the national government Oct. 2013 Nation's first regional J-credit scheme approved by the national government	April J-credit scheme was launched as an integrated version of national credit scheme and offset credit (J-VER) scheme
April 2016 6 projects have been registered in the prefecture. Volume of credit issuance: approx.13,000 tons	As of today, approved provincial J-credit schemes are Niigata and Kochi only.

Features of Niigata Carbon Offset Scheme

Issuance of highly credible credits

○ Obtained "provincial J-VER program certification" and "local J-credit scheme approval" from the national government

→ Credits will be recorded in the registry in the same line as credits issued by the national government.

○Reviewed by local experts and officials who understand the actual local condition

→ Ensure proper forest management and assure its sustainability.

Creation of projects that highlight co-benefits of rich forests

○Focus on " the story" of forest management

・Restoration of local habitat for ibis

・Forest management to protect snow and water which produce special products in the region

Generation of credits that companies across Japan want to use

Methodology of Niigata J-Credit Scheme

Methodology FO-001 Forest Management Activities

[Absorption principle]	Forest management activities are conducted in the forest based on the forest management plan, and the amount of absorption increases with biomass, both above and beneath the ground.
[Applicability conditions]	(1) Activities are conducted in forests stipulated in Articles 5 and 7.2 of the Forest Act. (2) Activities are conducted in line with the principles of the forest management plan by unit. (3) When the stand subject to logging is included in the project site, the total absorption amount during the certification period is below zero. (4) Thinning is planned during the certification period of the forest management plan. (5) Land conversion is not planned in the forest management plan.
[Baseline absorption]	• The absorption amount when proper forest management is not continued.
[Main monitoring items]	• Area where forest management (planting, nursing and feeding damage) is conducted by tree species and age (nursing: weeding, thinning, feeding damage prevention measures) • Location where forest management is conducted (identified by measurement of tree height, etc., indicator of forest productivity) • Status of forest management or protection (including patrol)

Scope of CO_2 absorption

Scope of absorption

- The area of artificial forests where it can be proved that forest management activity (i.e. planting, nursing, weeding, thinning, and insect damage prevention measures) was conducted after April 2013,

  and,

- The area where proper management and protection of forest has been conducted during the certification period after April 2013, based on the forest operation and management plan.

Proof of Management Status

- Proper forest management
  ⇒Confirmed by the forestry registry
- Proper forest protection (including forest patrol)
  ⇒Verified using records such as the work record, with which the target stand, period, method, implementing body and contents of implementation can be checked

Costs and Support for Project Application/ Implementation

Costs for project application and implementation

1. Screening cost (relevance confirmation and validation)
2. Monitoring cost (field survey)

   Expenses for measuring area size of project site, tree height in the plot and diameter of breast
3. Administrative costs

   Administrative work for applications and credit management (sales, cancellation, etc.)

Support system

1. Screening cost

   Full amount of initial cost supported by national and prefectural governments
   (support of verification cost once every two years)
2. Monitoring cost

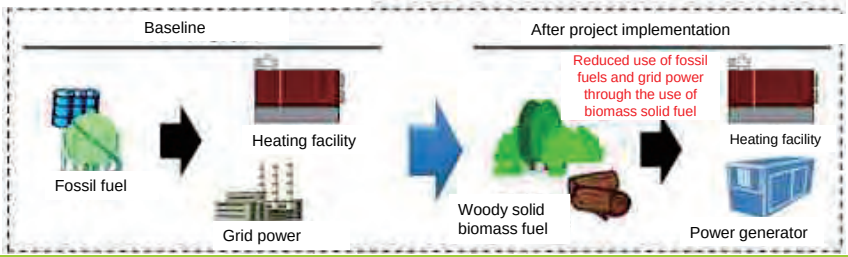
   Handling of measurement figures during forest management
3. Promotion of regional carbon offset

   Prefecture assists the use of carbon offset logo and provides opportunities to sell products

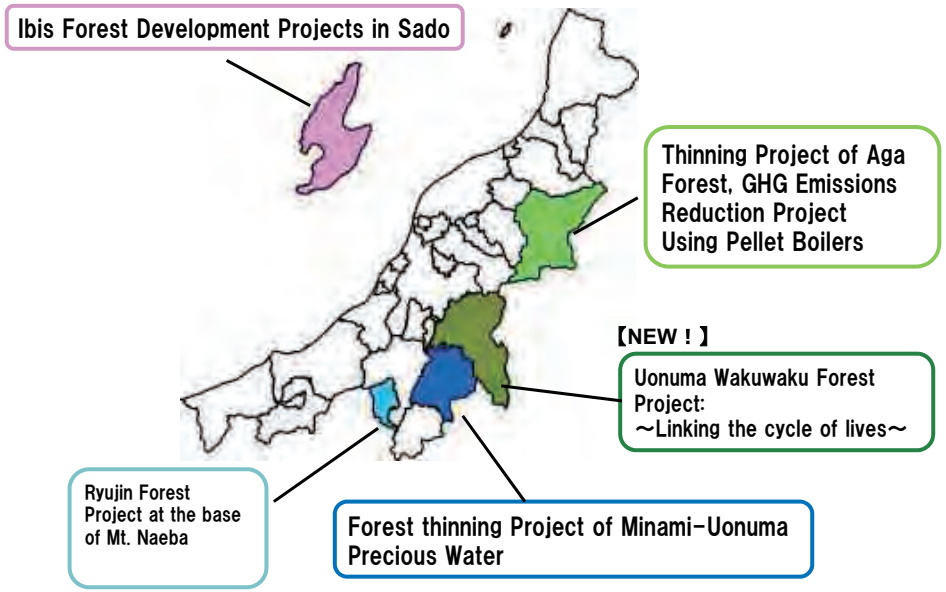
Methodology of Niigata J-Credit Scheme

Methodology EN-R-001: Switch of fossil fuel/ electricity with biomass solid fuel (woody biomass)

[Reduction principle]	Use of biomass solid fuel that is produced from woody biomass in a boiler, power generation unit or cogeneration unit, will displace the use of fossil fuel or grid electricity
[Applicability conditions]	(1) Biomass solid fuel or generated power replaces the use of fossil fuel or grid power (2) Heat or electricity generated at the target facility, which uses biomass solid fuel, is self-consumed in whole or in part as a principle. (3) Biomass solid fuel is made from unused woody biomass. (4) Woody biomass used for home heating devices is not building waste. (5) In case the project involves installation of a facility, it has to meet the applicability conditions specified in the methodology of the facility.
[Baseline emissions]	Amount of CO_2 emissions generated from fossil fuel combustion that would generate equivalent amount of heat value from the target biomass facility in the project case
[Main monitoring items]	• Amount of used biomass solid fuel after project implementation • Amount of heat generated by biomass solid fuel after project implementation • Amount of fuel and electricity consumption used for biomass transportation and producing biomass fuel after project implementation • Energy efficiency of baseline and project facilities when the project involves installation of a facility



Project Sites in Niigata Prefecture



Project in Niigata Prefecture (1) Sado Ibis Forest Development

～Creation of Sago forest as habitat of ibis birds～

Methodology No. R001: Increase in CO_2 absorption amount through forest management (forest thinning promotion)

Project Site	Sado, Niigata Prefecture
Project Target Area	154 ha
Amount of Credit Issued	4,965 t-CO_2

～Features～

- **Achieve CO_2 absorption to promote global warming prevention.**
- **Contribute to an improved living environment for released ibis and conservation of abundant forest ecosystem.**
- **Promote forest thinning and other forest management, and vitalize forestry with the income of carbon offsetting activity.**

Forest management in Sado city is important to make a forest and habitat for returning the ibis to the wild.

～Development of community where people and ibis live in harmony～

【Photo credit: Ministry of the Environment】

■Contact
Yoshio Watanabe, Niigataken Norin Kosha
TEL:025-285-7711 E-MAIL:rinsei@niigata-inet.or.jp
URL:http://www.tokinomori.jp/

Project in Niigata Prefecture (2) Eternal Aga Forest Project

～Creation of forest that can be sustained for 1,000 years～

Methodology FO-001: Forest management activities
EN-R-001: Switch of fossil fuel or grid power with biomass solid fuel (woody biomass)

Project Site	Agamachi, Higashikanbara-gun, Niigata Prefecture
Project Target Area	74.03 ha
Amount of Credit Issued	2,361 t-CO_2

～Features～

- **Create a forest that will be sustained for 1,000 years.**
- **Increase the use of forests for CO_2 absorption and watershed protection, and offer clean air and water to the lower reaches of the Agano River.**
- **Effectively utilize thinned trees from forest development as wood biomass to promote the Agamachi biomass town concept, based on the energy cycle system.**

Creation of eternal forest that offers clean air and water!

"Eternal forest" that nurtures Agano River 【Photo credit: Agamachi Municipal Government】

Agamachi biomass town concept

■Contact:
Masahiko Saito, Agriculture, Forestry and Commerce Section, Agamachi municipal Government TEL:0254-92-5764 E-mail:saito_msh1417@town.aga.niigata.jp

Project in Niigata Prefecture (3) Ryujin Forest Project at Mt. Naeba

～Efforts to keep a snow country for 100 years～

Methodology No.R001: Increase in CO_2 absorption amount through forest management (forest thinning promotion)

Project Site	Tsunanmachi, Nakauonuma-gun, Niigata Prefecture
Project Target Area	165.29ha
Amount of Credit Issued	4,478 t-CO_2

～Features～

- **Contribute to water and soil conservation of mountains and forests in Tsunan town, one of the most snowy areas in the world, and one of 100 Exquisite and Well-Conserved water places.**
- **Increase CO_2 absorption amount to tackle global warming, sustaining the snowy region even 100 years from now, as it is for the next generations.**
- **Work on prevalence of carbon offset in collaboration with local NPOs, etc.**

Leave the snow and water nurtured by the forest for the next generations in Ryujin forest!

Snow-covered Mount Naeba

Ryugakubo water, one of 100 Exquisite and Well-Conserved Waters

【Photo credit: Paradox】

■Contact: Toshiro Hayakawa, Tsunanmachi Forest Cooperative
TEL:025-765-2510 E-MALL:shinrin155@tsunan-fa.or.jp

Project in Niigata Prefecture (4) Forest Thinning Minami-Uonuma's Precious Water

~To protect water nurtured by snow and forest~

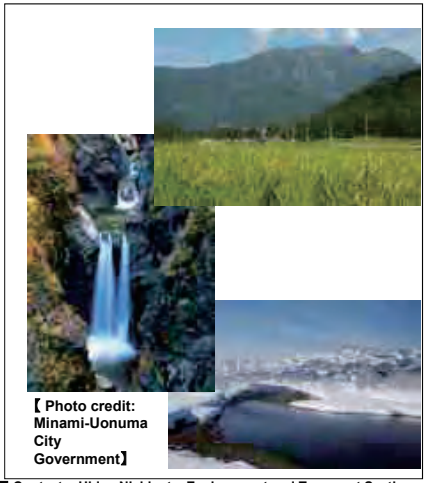
Methodology No. R001: Increase in CO_2 absorption amount through forest management (forest thinning promotion)

Project Site	Minami-Uonuma, Niigata Prefecture
Project Target Area	82.27 ha
Amount of Credit Issued	1,482 t-CO_2

~ Features ~

- Increase CO_2 absorption by proper thinning to avoid the impacts of global warming on local industries.
- Increase the forest function of watershed protection and protect water, on which Koshihikari brand rice from Minami-Uonuma is grown and Japanese Sake is made.
- Promote use of wood pellet and effectively use forest thinning's that cannot be used as timber.

Forest management nurtures local water that is used to grow Minami-Uonuma brand rice and make Japanese sake!



【Photo credit: Minami-Uonuma City Government】

■ Contact: Hideo Nishigata, Environment and Transport Section, Civil Life Department, Minami-Uonuma Citt Government
TEL:025-773-6666 E-MALL:h-nishikata@city.minamiuonuma.lg.jp

Project in Niigata Prefecture (5) Uonuma Wakuwaku Forest Project

~To develop an exciting and thrilled forest that has many potentials~

Methodology No. R001: Increase in CO_2 absorption amount through forest management (forest thinning promotion)

Project Site	Uonuma, Niigata Prefecture
Project Target Area	93.30 ha
Amount of Credit Issued	N/A ※ to be issued from FY2016

~ Features ~

- Promote development of exciting and thrilled forest so that its original functions as a forest are fulfilled 100 years later, where cycle of various lives is nurtured, and where people interact with nature.
- Promote use of thinned woods and create the system of timber use for local vitalization.
- Accelerate local vitalization through enhanced interaction and collaboration between urban and rural areas, by enhancing environmental education and nature experience programs.

Develop a forest that thrills people, that provides a place for interaction between nature and people!

Cedar forest in Uonuma

Nature experience and education

【Photo credit: Uonuma City Government】

■ Contact: Miki Konno, Environmental Planning Group, Environmental Measure Office, Environment Section, Uonuma City Government TEL:025-792-9766 E-MALL:konno-miki@city.uonuma.niigata.jp

Example of Carbon Offsetting under Niigata scheme

JA* Uonumaminami

http://www.ja-uonuma.or.jp/ *Japan Agricultural Cooperatives

【Donation-type offset】

Every 1 yen from the sales of 1 pack of mushroom is used to purchase "Ibis Forest Credit" (which was generated from "Sado Ibis Forest Development").
The mushroom, 'Uonuma Yairo Shiitake Kazoku shiitake mushrooms,' is shipped mainly to the Kanto and Chubu regions in Japan. The activity helps forests to be restored as the natural habitat of ibis birds, which are the symbol of the environmental conservation of Niigata Prefecture.

(We are supporting forest development for ibis.)

Thank you for your attention.

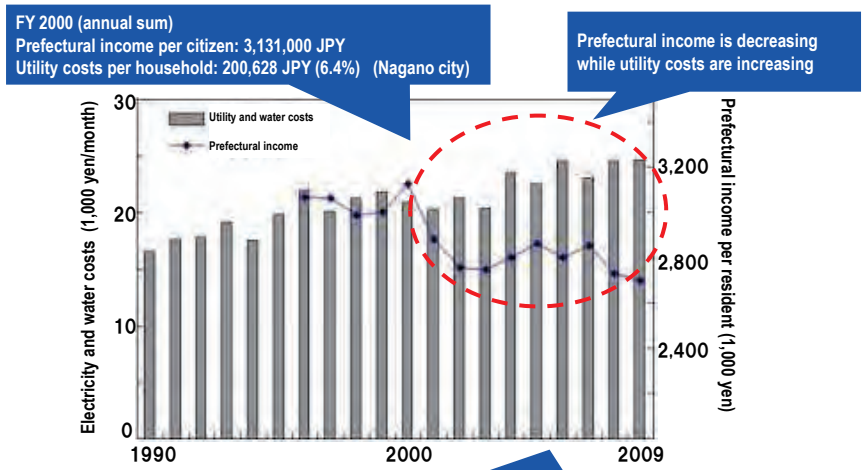
Nagano Prefecture's Sustainable Energy Strategy

Sustainable Energy Division, Environment Department
Nagano Prefecture

http://www.pref.nagano.lg.jp/ontai/kensei/soshiki/soshiki/kencho/kankyoene/index.html

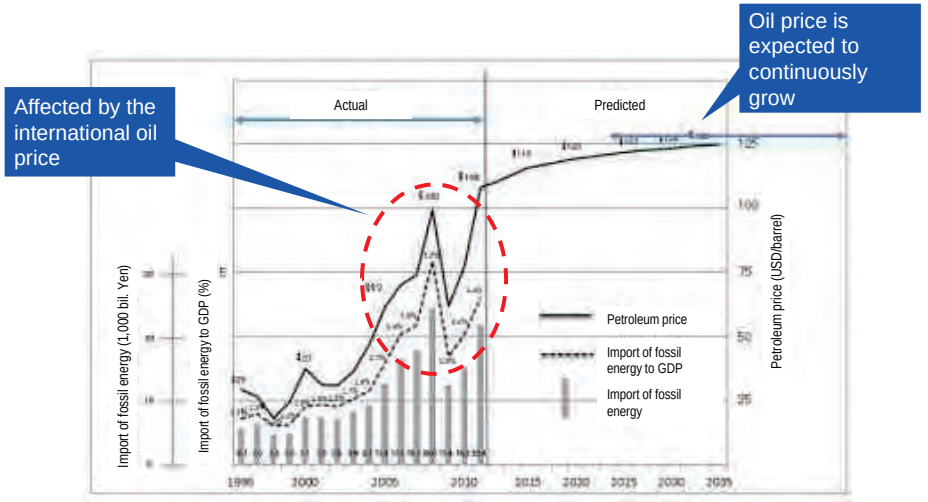
Why Nagano Prefecture promotes natural energy and energy saving?

Cost of utilities is suppressing citizen's life



*Source: Proposal of strategic working group for Nagano Prefecture Climate Change Policy

Impact from international oil



*Source: "Nagano Prefecture Environment and Energy Strategy"

Economic conditions of Nagano Prefecture

- Total Gross Prefectural Product (FY2008) 505,016 billion yen
- Gross Prefectural Product in Nagano (FY2008) 8,035 billion yen
  (1.59% of Japan's GDP)
- Total import of fossil fuels (FY2008) 25,983 billion yen
- Import expense of Nagano Pref.(FY2008) 415.7 billion yen (GDP proportion)
  (5.14% of Prefectural GDP)

Financial outflow to overseas from Nagano Pref.

- Gross product of wholesale and retail in Nagano Pref. (FY2008) 540.7 billion yen
- Gross product of construction in Nagano Pref. (FY2008) 370.9 billion yen
- Gross product of agriculture, forestry and fisheries in Nagano Pref. FY(2008) 157.3 billion yen

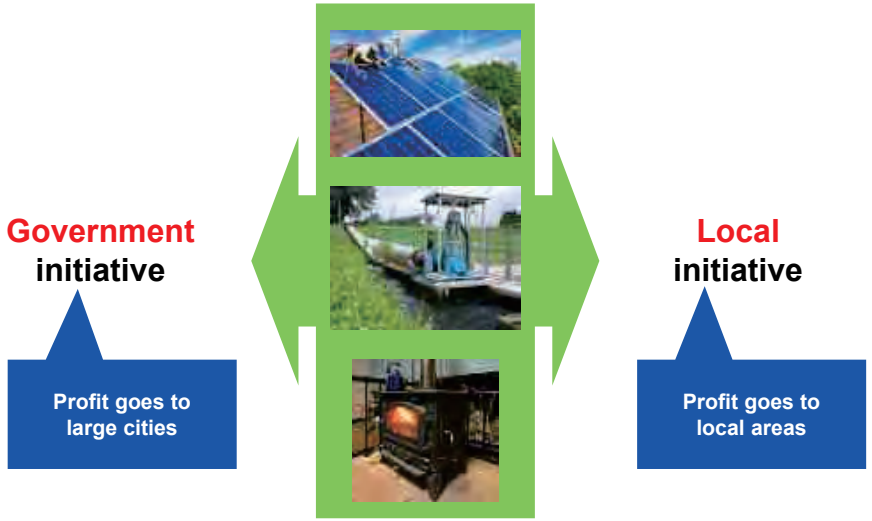
Equivalent to production amount of major industries in Nagano Pref.

Why Nagano Prefecture promotes natural energy and energy saving?

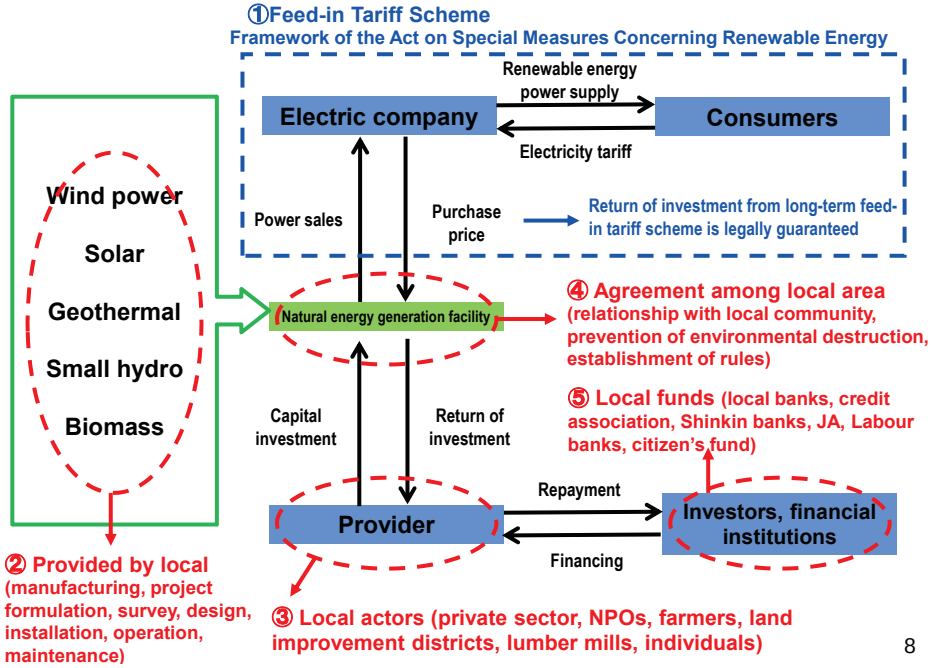
1. **Environment**
   (Greenhouse gas emission reduction)
2. **Economy**
   (Shift from financial outflow to local investment)
3. **Local contribution**
   (Source of vitality and creation)

How to link natural energy With local revitalization?

2 types of natural energy



5 keys to local initiative



How to link natural energy With local revitalization?

Renewable Energy Act (Feed-in-Tariff) is a necessary condition

It is important to maintain sufficient conditions at a local level

Natural Energy Promotion Measures as a Package

Use of fixed-price purchase scheme to promote natural energy led by local governments

1. Establish a base to promote natural energy use led by local governments.

Promote information sharing and knowledge dissemination on natural energy in wider area in collaboration with Shinshu Natural Energy Network. Also promote activities of local council.

Promote experiences of local natural energy projects through '1-village 1-natural-energy' project and work on risk reduction efforts that include information provision and dispatch of experts.

Use prefectural facilities and unused land to promote creation of highly public business models led by local governments. Also promote human resources development involved in natural energy projects which include development of local environmental energy office and finance schemes and accumulation of related know-how to create and improve knowledge on such projects.

1st roof lease of prefectural facility

Toyoda final wastewater treatment center

2. Take promotion measures by natural energy type.

〈Solar power generation〉
- Program to study natural energy installation
- Development of roof lease model
- Project formulation support

〈Small hydro power generation〉
- Small hydroelectric generation caravan
- Water right consultation
- Support for project development

〈Biomass〉
- Shinshu F-POWER project
- Support for project development
- Promotion of advanced forestry

〈Green heat〉
(solar heat, geothermal, hot-spring heat, etc.)
- Scheme to study natural energy installation
- Support for survey and facility costs

Support measure 1 Natural energy power generation led by local project entities

(Project to promote local natural energy power generation)

1) Non-construction project (basic plan, detailed design, planning, implementation design, etc.)

Target: City governments, NPOs, SMEs and citizens' groups (legal entities)
Subsidy amount: Up to 50%/ 5 million yen
Profit payment: Payment from the following year with income from power sales (10 years)
* payment by water flow survey of small hydroelectric project is exempted

2) Construction project (construction cost, etc., for facility introduction)

Target : NPOs, SMEs and citizens' groups (legal entities)
Subsidy amount (PV installation): up to 25%/ 15 million yen
(other than PV) : up to 30%/ 90 million yen
Profit payment: payment from three years after start generating income by power sales (total 13 years)

※Budget (FY2016): 358.81 million yen

Support measure 2 Natural energy heat use led by local project entities

(Support project for natural energy creation led by local government)

Target is a local heat supply and projects that involve use of solar heat, hot-spring heat, geothermal, snow and ice heat, wood biomass, etc., implemented by city governments and private entities.
(power generation projects and demonstrative projects are not covered.)

1) Planning (planning, feasibility study, design, etc.)

Subsidy rate: Up to 50%
Maximum amount: 5 million yen

2) Facility project (equipment introduction, etc.)

Subsidy rate: Up to 50% (municipal government), up to 1/3 (private company)
Maximum amount: 5 million yen

※ Budget (FY2016): 24.75 million yen

Support measure 3 Use of natural-energy-based disaster prevention by city governments and private sector (Nagano-ken Green "New Deal" Fund Program)

1) For city governments

Support for a project that involves installation of natural energy at disaster prevention facilities, etc.
(projects include local disaster reduction functions such as securing winter heating and telecommunications, and use of various local energy)

Subsidy rate: up to 100%

2) For private sector

Support for a project that introduces natural energy to private facilities that can serve as local disaster management center at the time of such disaster
(projects that are more likely to serve as model projects will be selected through public application)

Subsidy rate: up to 1/3 (up to 50% for projects in Sakaemachi-town and Nozawaonsen-mura village)

Maximum amount: 5 million yen (up to 75 million yen for projects in Sakaemachi and Nozawaonsen-mura)

※ FY2016 budget: 315.67 million yen

Support measure 4 Natural energy HR bank and information database

1) Human resource database related to natural energy projects

Provision of information on person who have technical and management knowledge and skills related to project planning, implementation and maintenance
(* Consultation fee may be incurred. Need to coordinate with them individually.)

2) Information database on natural-energy-related schemes, etc.

Provision of information on laws and regulations, and support programs related to natural energy project from planning, implementation and maintenance.

http://www.database.shin-ene.net

Support measure 5 Small hydroelectric generation support-group, water right consultation and guidance

1) Small hydroelectric generation support-group ('caravan')

Support group consists of officers of Nagano prefecture's relevant departments and concerned organizations who provide consultation, seminars and onsite advices.

- Environment department (overall coordination)
- Agriculture department (agricultural water)
- Construction department (landslide dam)
- Corporate bureau (power generation technology)
- Nagano association of land improvement project organizations) (agricultural water)

Consultation

Seminar for selecting proper site

2) Consultation on small hydroelectric generation and water right

The environment and construction departments serve as contact points for consultation of water right of small hydroelectric generation in collaboration with small hydroelectric generation caravan.

3)Guidance on introduction of small hydroelectric generation
(including financial performance calculation template)

http://www.pref.nagano.lg.jp/ontai/kurashi/ondanka/shizen/susumekata.html

Support measure 6 1-village 1-natural energy project

Solar power 【Ainori-kun】 Ueda

Small hydroelectric power 【Maguse river power plant】 Kujimadaira

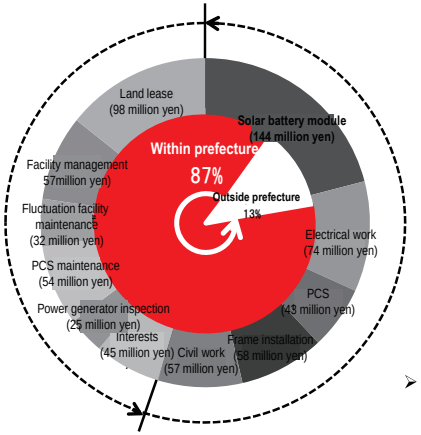
Wood stove 【Kokuho Asama hospital】 Saku

http://www.pref.nagano.lg.jp/ontai/kurashi/ondanka/shizen/jire.html

103 projects are registered.

Case 1: Ohisama BUN/SUN mega-solar project (Suwa city) ☆

An action to disseminate know-hows acquired in renting roof of prefecture's public facilities



Direct economic effect value 597 million yen + Spinoff effects 352 million yen

= Economic impact (for 20 years) 949 million yen

Toyota final treatment facility with solar panels lined on the roof

- **Mega solar of roof rental of prefecture's public facilities (1MW)+ roof rental of local facilities (city hall) (6kW)**
- **Joint project of prefecture, Okayasanso Co., Ltd. and Shizen Energy Shinshu Net**
- **Aims to make gained know-hows open to the public to diffuse them in the prefecture.**

Case 2: Citizens' joint solar power plant (iida city)

Citizen-funded joint power plant funded by Ohisama Shinpo Energy Co., Ltd.

Kanae Mitsuba nursery

House with 0-yen system

1. Citizens' joint solar power generation (from 2004)

➢Funded by citizens
➢Rent roof of Iida city and other public facilities and private entities (for 20 years)
➢162kW in total
➢Generated power is purchased by various facilities at the similar price as that of power company.

2. Ohisama 0-yen system (for private residence) (from 2009)

- Funded by citizens
- Surplus power purchase scheme
- No initial cost borne by house owner
- Owner pays fixed power rate for 9 years to business operator and transfers the panel from it to the owner in the 10th year.

3. Mega sanpo project (for large facilities)(from 2012)

- Funded by citizens and loan from financial institutions
- Fixed-price purchase scheme
- Rent roof of public facilities and private entities mainly in southern Shinshu area and install solar panels of 15 to 50kW to be a total of approx.1MW.

Case 3: Joint use of megawatt solar (Saku city)

Japan's first local new energy LLP established by 14 companies, 1 university and chamber of commerce of Saku

Limited liability partnership (LLP)
Saku Himawari

Cowbell engineering Co., Ltd.
100kW

Nagano Yoshida Industry Corp.
100kW

Kashiyama Kanagata Industry Corp.
80kW

Soshin Electric Co., Ltd.
140kW

Nakagawa Denki Seisakujo Co., Ltd.
50kW

Yoshida Inudstry Co., Ltd.
100kW

Sasaki Kougyu Co., Ltd.
30kW

Panels installed on the roof of LLP office building

Marushin
50kW

Tadekita Metal Co., Ltd.
50kW

Pascal Corp.
30kW

Asama Piston Co., Ltd.
70kW

AOB Keioh Group Corp.
100kW

Sawai
40kW

Saku University
30kW

Saku Chamber of Commerce and Industry
30kW

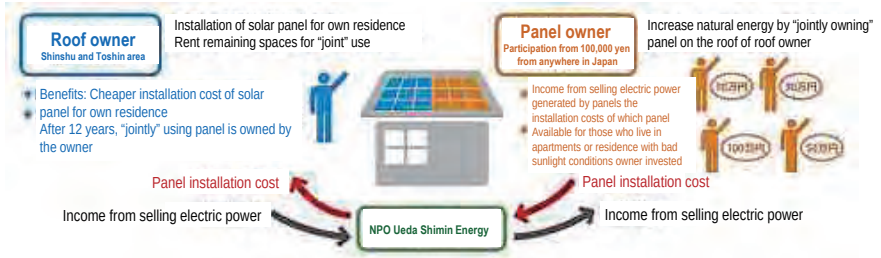
- 1MW in total
- Ministry of the Environment project
- used for local environment education

Case 4: Solar panel Ainorikun (Ueda city)

An action funded by roof owners and panel owners aiming to promote solar panels

Roof owners and panel owners

- Project of NPO (Ueda Citizens' Energy)
- Panel owners pay panel installation cost and receive income from power sales for the first 10 years.
- For the next 2 years, Ueda Citizens' Energy receives the income as operation cost.
- Roof owners receive the income from the 13th year.
- A panel owner with a minimum payment of 100,000 yen can participate.



*Reproduced from the website of NPO Ueda Shimin Energy

Case 5: Solar power generation using leased roof of private companies (Azumino city)

Roof lease project among private companies mainly conducted by cooperative of SMEs

〈lease acceptance〉
Cooperative Chuo-Keiyukai

協同組合 中央経友会

Cooperative with more than 2,000 SME members
(head office: Azumino in Nagano Prefecture)

Lease of power generation facility ↓ ↑ Pay lease

〈power generation and selling company〉
Clean Energy Shinshu

クリーンエネジー信州

Fully funded by Chuo Keiyukai
(head office: Chuo Keiyukai)

FIT-based power selling ↓ ↑ Income from power sales

〈power company〉
Chubu Electric

Pay installation fee →
← Delivery of facility

〈partner installation company〉
Registered entity (member company)

Pay rent →
← Roof lease

〈roof lessor〉
Cooperative member company

Installed at 8 locations in the prefecture (390kW in total) as of April 2015

Case 6: Magase River Hydropower Plant (Kijima-daira village)

Supply electricity to Magase hot spring and sell surplus electricity.

Agricultural water taken

Water sent ↓

Dust removal using electricity by small hydroelectric power generation

Water sent →

Surplus power sold →

Power transmission ↓

Magase River Hydropower Plant
- 95kW/ effective drop 65m
- 1jet turgo impulse waterwheel
- 3-phase synchronized Francis power generator
- Use of agricultural water

- Kijimadaira-villaage's public project
- Managed by Kijimadaira Kanko Co., Ltd. (semi-public sector) as part of its business
- Surplus power sold to Chubu Electric based on RPS law

Used for pumps, boiler room, administration building and external light of Magase hot spring

※ Photos of Magase hot spring from its website

Case 7: Komagane natural-energy-based small hydroelectric power plant No. 1 (Komagane city) ☆

Secure profitability by selling all power generated at the micro hydroelectric power plant

Conduit in the center, power generator at center bottom, and power conditioner in the building on the right

Komagane natural-energy-based small hydroelectric power plant No. 1

- 5.5kW / effective drop15m
- Crossflow waterwheel
- 3-phase permanent-magnet power generator
- Use of agricultural water
- Project of Komagane Shizen Energy Hatsuden Co., Ltd. established by local companies and residents
- First small hydroelectric power generation plant in fixed-price purchase scheme in the prefecture

Komagane natural-energy-based small hydroelectric power plant No. 2 (planned)

- No. 2 plant is under plan
- Will construct by Godo Kaisha Shimodaira Zenigamedo Small Hydro power plant
- Planned site on right-side photo (Zenigamedo River)

Case 8: Shinshu F-POWER Project (Shiojiri city) ☆

Power generation using biomass resources

Thinnings, etc.

Rendering

Locally produced timber

Floor wood, construction material, etc.

Listings

Selling power

Heat supply

Development of a system for sustainable use of forest resources

Remaining forest resources not used for construction

Intensive timber processing facility (lumber mill, completed in April 2015) and wood biomass power generation plant (co-generation) development (in Shiojiri)

Heat use

- Main business operator: Soyano Kenzai Co., Ltd.
- Power generation 10MW
- Use of timber for power generation: 180,000m^3 (listings75,000m^3+unused timber 105,000m^3)

Case 9: Binary power generation with hot-spring heat (Takayama village) ☆

First binary power generation in the prefecture using hot-spring heat

※Above photo from Shichimi onsen website

Shichimi-onsen hotel Keizantei, Shinshu Takayama ho-spring resort

- Known for cloudy sulfurous hot water from the sources
- Binary power generation with 9 spring sources of its own
- It also has introduced hot-spring heating system

Binary power generation facility at Shichimi onsen hotel

Binary power generation facility

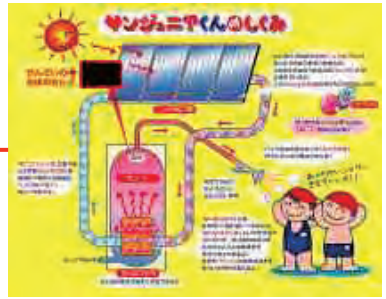
20kW small domestically produced binary power generation unit (manufactured by IHI)

※Above phot from IHI website

Case 10: use of solar power for showers of school swimming pools (Suzaka city)

Supply solar-heated water to showers at school swimming pools

Suzaka Moriue primary school



Explanation about solar power water heating system

Suzaka Nirei primary school

※Photos and figure from Sunjunior website

- Collaboration project of local company, Sun-Junior, and local government
- Hot water (35˚C) supply system for showers/storage of 460 liters of hot water
- Students can warm up their body after being in the swimming pool with solar-power generated hot water shower and learn about solar power system.

Case 11: Wooden chip boiler for onsen facility (Sakae village)

Wood biomass to generate energy locally, and to use during emergency after disasters

Wooden chip boiler

Kitano Tenman hot spring

Public bath

※Above photo from Kitano Tenman hot spring website

Chip pit

- Project of Sakaemura, Sakaemura forestry association and Sakaemura promotion corporation
- Use of Ministry of the Environment (green new deal) GND fund
- Wooden chip boiler (output 200kW) is introduced and it is operated with locally produced chips from curved wood whose use was hard to find
- Emphasis placed on evacuation in winter, based on experience of earthquake disaster on March 12, 2011
- Heavy snow-covered area → with accumulation of 2 to 4 meters

Case 12: Wood stove at hospital daycare center (Saku city)

Secure heating of daycare center by wood stove

Wood fuel supplied by Saku forestry association

Daycare center of Asama General Hospital

Appearance of daycare center of Asama General Hospital

Kosumosu daycare center (hospital daycare center)

Capacity: 40 persons, aged between 56 days and 2 years

※above photo from the hospital website

- As it is a daycare center for hospital employees' children, they can work without worrying even in power outage during disaster occurrences.
- Wood fuel stored in the storage next to the daycare center to cope with power outage for a few days
- The wood stove is locally produced by a local manufacturer.
- Use of Environment Ministry's GND fund

Case 13: Introduction of geo-heat facility to day-care centers (Asahi village)

Day-care center with evacuation system of infants in summer and winter

Appearance of Asahimura integrated cay-care center

- Installed at Asahimura integrated day-care center (serves as local evacuation center in disasters) (capacity: 150 persons)
- Use of locally produced larch tree
- Ministry of the Environment GND fund is used
- Solar panels (20kW) installed on the roof (non GND)

Room with geo-heat air-conditioning system for children aged 1 or younger

Geo-heat sent to air-conditioning facility

Geo-heat pump control panel

Geo-heat pump heat exchanger

Case 14: Development of heating device that uses hot-spring water (Shonosuwa town)

Heating device that uses hot-spring water

Hot-spring heater ORAE-eja

- Developed by Project X-ONE group (local industry-university-government group)
- Heater using hot water heat
- Use of surplus hot spring water supplied to homes (Shimo-suwa town has 2.6 million kl of hot water spring every minute and it is supplied to many households. However, only 800,000kl of it used for bathing.)
- No fuel cost, 540 yen of power consumption per month
- No ventilation required and no CO_2 from combustion
- Can be heated 24 hours a day
- Installation at elderly people's centers and residences started in 2014

Project X-ONE group

Yamaneko Quality & Design co., Ltd.

D・R Pocket Co., Ltd.

Tokyo University of Science, Suwa

Monozukuri Shien Center Shimosuwa

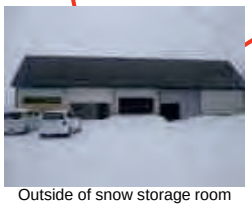
Case 15 Agricultural produce storage using snow and ice heat (Yamanouchi town)

Use of abundant snow to store local agricultural products to reduce environmental load

Agricultural products storage

Send cold wind by fan.

Snow storage
(snow is stored inside a rack)



Outside of snow storage room
(renovated old JA storage house)

In addition to keep freshness, new taste as a result of low-temperature maturation is expected.

How to convert energy/ electricity saving to local benefits?

2 types of energy/ electricity saving

Patient
Blind
Diligent

Depends on motivation and spirit

Benefit
Smart
Mechanism

Established in daily life

What is Benefit

For a company with 100 million yen of annual sales, when annual utility cost is 3% of sales,
100 million x 0.03 = 3 million yen

When reducing 10% of annual utility cost,
3 million yen x 0.1 = 300,000 yen

When operating profit rate is 2%,
Equal effect to attain 15 million yen of sales
(300,000 yen / 2% = 15 million yen)

*Source: "Shittoku BOOK" Kanto Bureau of Economy, Trade and Industry, METI

How to save Smart

How to determine contracted power

(In a case of high-voltage power over 50kW and below 500kW)

By recognizing the max. power demand* over the last 1 year as contracted power, **basic tariff is determined**.
*Maximum power demand: the monthly max. value of average consumption (kW) in 30 min.

The peak in August will be the contracted power for 1 year until the next July at longest if max. power demand in each month does not exceed the peak.

Suppression of peak demand (max. power demand) is a Key!!

If 100kW of the maximum power demand is reduced to 90kW (-10%), the basic tariff is also reduced.

1,638 yen × 10 kW × 12 months = 196,560 yen

(Unit price of basic tariff) (Reduced contracted power) (Reduction of annual basic tariff)

* TEPCO: Unit price of basic power tariff for operation using high-voltage power

***Source: "Shittoku BOOK" Kanto Bureau of Economy, Trade and Industry, METI**

<Mechanism 1> Package of Household Energy Conservation Measures

Increase energy efficiency and save energy at home

[1] Appliance Energy Efficiency Labeling System

Uniform energy efficiency label (for electric toilet seats)

Uniform energy efficiency label (for fluorescent lights)

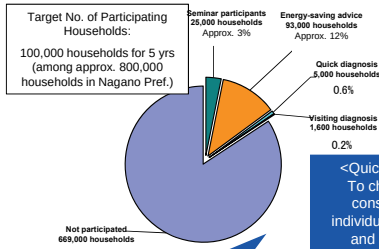
In Nagano, retailers are required to put energy efficiency labels on all appliances.
In addition to air conditioners, televisions, and refrigerators, electric toilet seats and fluorescent lights have become subject to labeling.

[2] Home Energy Saving Support System

<Energy Saving Seminar>
To disseminate knowledge on energy conservation at home

<Energy Saving Advice>
To provide energy conservation information to individual households

Target No. of Participating Households:
100,000 households for 5 yrs (among approx. 800,000 households in Nagano Pref.)



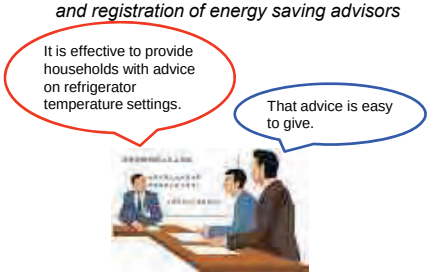
<Quick Diagnosis>
To check energy conservation at individual households and give advice

<Visiting Diagnosis>
To visit individual households to check energy conservation and give advice

Encouraging individuals to shift to more energy-efficient appliances and take energy saving measures at home

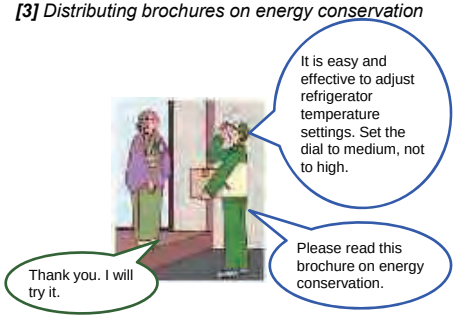
How does the Home Energy Saving Support system work?

[1] Public-private partnership agreements & training and registration of energy saving advisors



[2] Providing energy saving advice when contacting consumers

[3] Distributing brochures on energy conservation



[4] Activity report

Promotion of Energy Saving at Home

The Shinshu Energy Saving Campaign is carried out across Nagano Prefecture in summer and winter by setting numerical targets.

Search for "Cool/Warm Share" spots and events (JP only)

http://www.pref.nagano.lg.jp/ontai/kurashi/ondanka/setsuden/hotshare/index.html

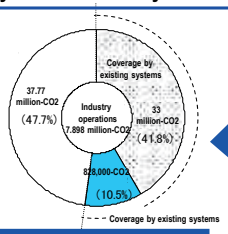
Search for energy saving measures (JP only)

http://www.pref.nagano.lg.jp/ontai/kurashi/ondanka/setsuden/shoene/documents/26katei.pdf

<Mechanism 2> Package of Industrial Energy Conservation Measures

Increase energy efficiency and save energy in industry

[1] Anti-global warming planning and reporting system for industry



Target unit will change from business establishments to business operators, which will increase the number of businesses subject to the system from about 200 to about 300.

The prefectural government gives companies advice and guidance and evaluates and awards them. Cost reduction is used as an incentive to promote their efforts to increase operational efficiency and shift to more energy-efficient equipment.

This system also works as commuter & passenger transport, vehicle use, and logistics planning systems. This system accepts the voluntary submission of plans from small- and medium-size companies.

[2] Public-private partnership agreement system

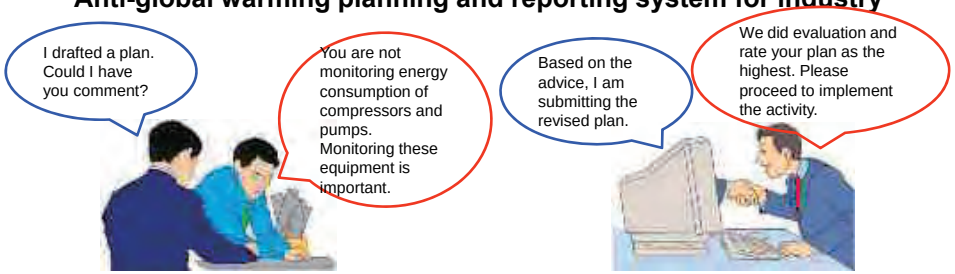
The prefectural government makes partnership agreements with companies which set ambitious targets on energy conservation and GHG emissions reduction and assists them with their efforts to meet the targets.

[3] Promotion of cooperation and collaboration between businesses

The prefectural government support the activities of Shinshu Energy-saving Patrol Team, promote the introduction of the environment management system, and facilitate the organization and activation of business associations.

➡ Providing multifaceted support to companies in their energy management and conservation efforts.

Anti-global warming planning and reporting system for industry



① Advice on developing a draft plan

② Acceptance and evaluation of proposal

③ Confirmation, advice and supervision of activities

④ Evaluation and award for the three-year activity

National government's support on energy-saving for businesses

1) Free energy audit
Dispatch experts and propose improvement measures to small- and mid-size business operators.

2) Subsidy to energy-saving facility
Subsidize part of the costs to introduce and update energy-saving facility in factory and office.

3) Subsidy to energy-saving building
Subsidize part of the costs for introduce equipment and construction materials needed for building with high energy-saving performance.

For more details, please make inquiry to General Energy Public Relation Office in Kanto Bureau of Economy, Trade and Industry.

http://www.kanto.meti.go.jp/seisaku/shiene/index_enekoho.html

Nagano Prefecture's support on energy-saving for businesses

1) Free energy audit by Shinshu energy-saving patrol squad
Voluntary activity by enterprises in prefecture. Application should be made to the secretariat.
The Prefecture support its activity cost.

2) Low-interest loan for energy-saving facility
A low-interest loan for introducing and updating energy-saving facility in factory and office, etc.

For other information, please visit Nagano Prefecture Energy/ Electricity Saving Portal Site.

http://www.pref.nagano.lg.jp/ontai/kurashi/ondanka/setsuden/shoene/index.html

〈Mechanism System to promote sustainable energy performance and natural energy to buildings

① Sustainable energy performance of building

A building owner consider sustainable energy performance (insulation, etc.) before starting building work.

② Introduction of natural energy to buildings

A building owner consider introduction of natural energy facility before starting building work.

Detached house is also included. For a large building (>2,000m³), building plan and result of consideration should be submitted to Prefecture

Sustainable energy evaluation tools and introduction consideration manual are disseminated at seminars. Through Nagano Prefecture Housing Promotion Council, dissemination of energy-saving technology is also disseminated.

	System for consideration of sustainable energy performance of buildings			System for consideration of introducing natural energy to buildings			
	Sustainable energy performance consideration (Building owner)	Sustainable energy performance presentation (Building owner)	Submission of sustainable energy performance (Building owner)	Consideration of possibility of national energy introduction (Building owner)	Natural energy facility information presentation (Building owner)	Submission of result of natural energy introduction (Building owner)	Submission of result of consideration of utilizing unused energy
≥ 10,000m²	○	○ Obligation to make efforts	○	○	○ Obligation to make efforts	○	○
10,000m² ≥ 2,000m²	○	○ Obligation to make efforts	○	○	○ Obligation to make efforts	○	×
2,000m² ≥ 300m²	○	○ Obligation to make efforts	○	○	○ Obligation to make efforts	×	×
300m² ≥ 10m²	○ (Obligation to make efforts during transition period)	×	×	○ (Obligation to make efforts during transition period)	×	×	×
10m² or less Temporary buildings Cultural heritages No need for air conditioning	×	×	×	×	×	×	×
Remarks	• Information is provided upon requested by building owner	• Present at entrance/exit, etc. • Detached house excluded	• Submission to Prefecture • Prefecture can publish and advice	• Information is provided upon requested by building owner	• Present at entrance/exit, etc. • Detached house excluded	• Submission to Prefecture • Prefecture can publish and advice	• Submission to Prefecture • Prefecture can publish and advice

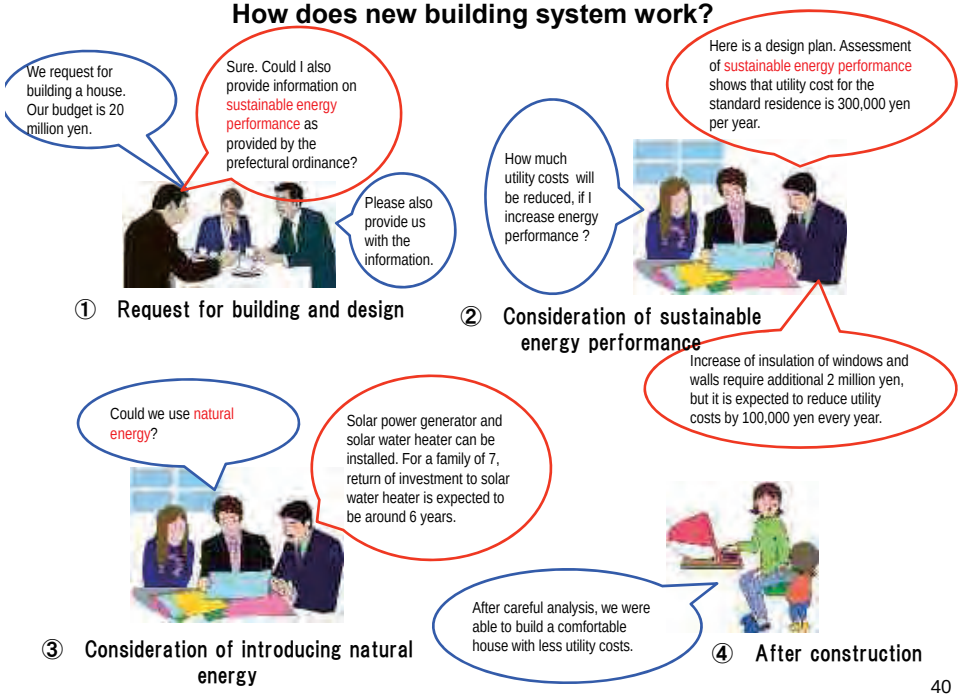
For particularly large building (>10,000m²), utilization of unused energy (exhaust heat, etc.) is also considered.

Approx. 30,000 buildings will be the target in 5 years.

➡ Construction of buildings with high energy efficiency performance and that utilizing natural energy is promoted.

The system covered buildings over 300m² (since April 2014) buildings less than 300m² (from April 2015)

How does new building system work?



How to introduce natural energy to buildings

To make building "more comfortable and economical," prioritize insulation and air sealing of building

Basic concept

Insufficient insulation and air sealing
⇒excessive equipment and costs

Sufficient insulation and airtight
⇒proper equipment and costs

Natural energy introduction manual for buildings

Free download on the website (the whole pages are available)

http://www.pref.nagano.lg.jp/ontai/jourei26/kentiku/manual.html

How to link energy/ electricity saving to local advantage?

Structuralize energy cost saving

to realize robust local economy

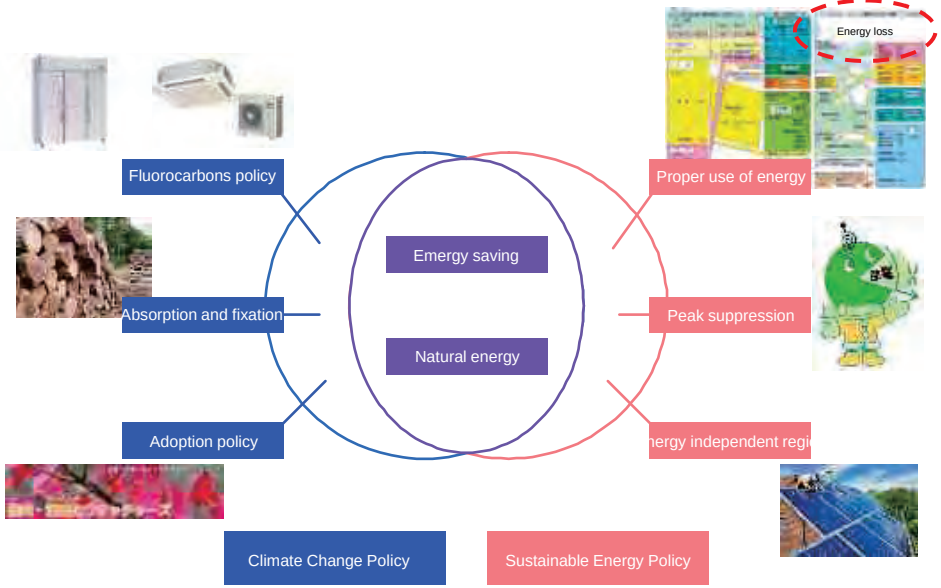
How to strongly initiate natural energy and energy saving?

Nagano Prefecture Environment and Energy Strategy

～ Resident's Plan for the Third Nagano Prefecture Climate Change Policy～

Nagano Prefecture Environment and Energy Strategy

～ Resident's Plan for the Third Nagano Prefecture Climate Change Policy～



➡ New plan integrating Climate Change Policy and Sustainable Energy Policy

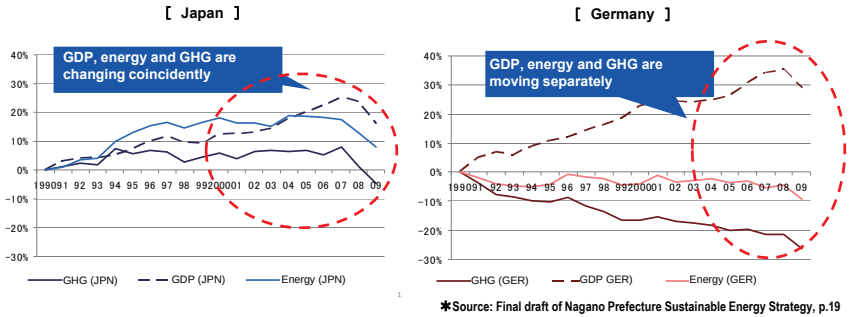
Basic goal of the Strategy

[Basic goal] Building low-carbon local society with sustainable energy

While attaining economic growth,

Reduce energy consumption and GHG emissions

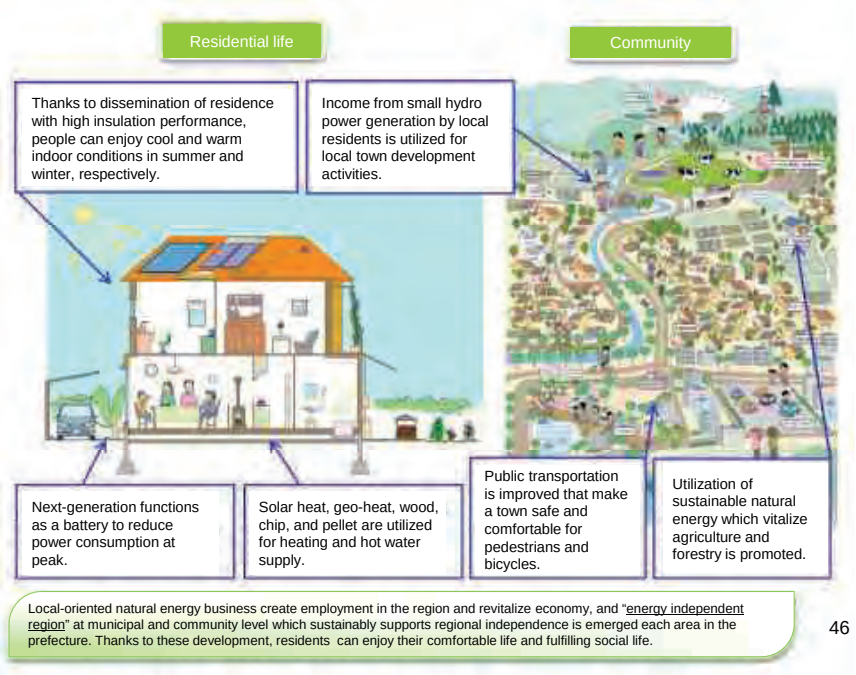
Comparison of GDP, energy consumption, GHG emissions between Japan and Germany (1990-2009)



✱Source: Final draft of Nagano Prefecture Sustainable Energy Strategy, p.19

➡ Decoupling of economic growth and energy consumption is possible.

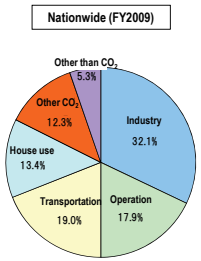
Future vision

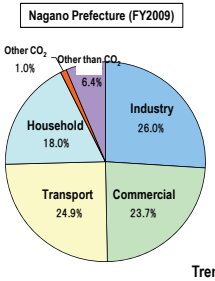


Local-oriented natural energy business create employment in the region and revitalize economy, and "energy independent region" at municipal and community level which sustainably supports regional independence is emerged each area in the prefecture. Thanks to these development, residents can enjoy their comfortable life and fulfilling social life.

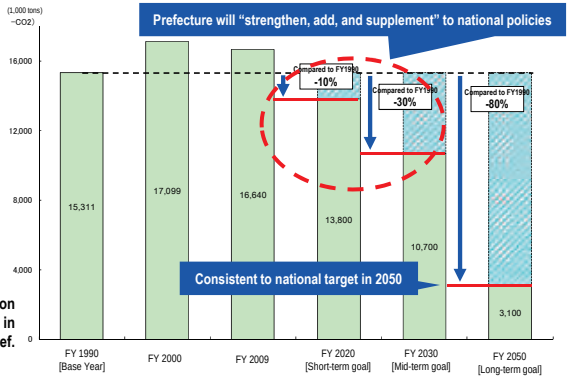
GHG emissions reduction target

Composition of GHG emissions by sector in Nagano Pref. and nationwide (2009)

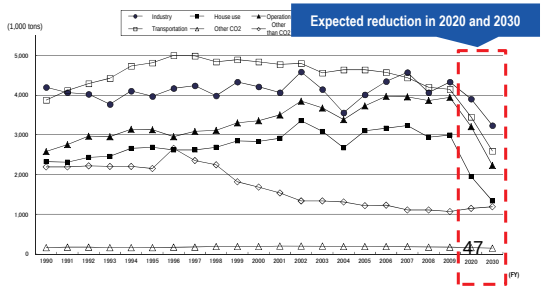




Trends of GHG emissions by sector in Nagano Pref.

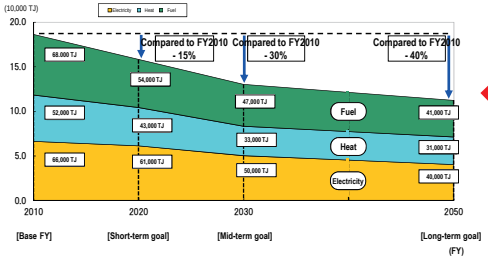


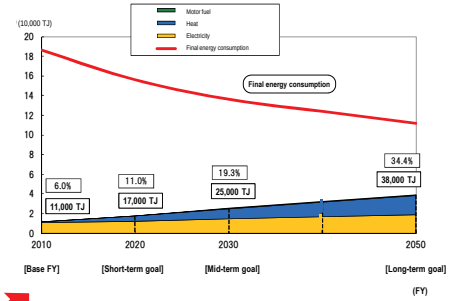
Trends and reduction target of GHG emissions in Nagano Pref.



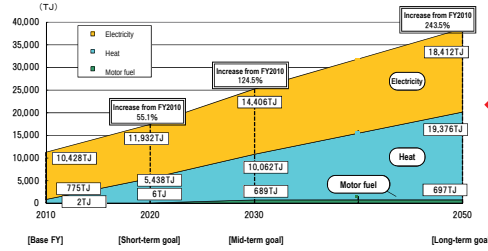
Target of final energy consumption and natural energy introduction

Target of final energy consumption





Target of natural energy introduction



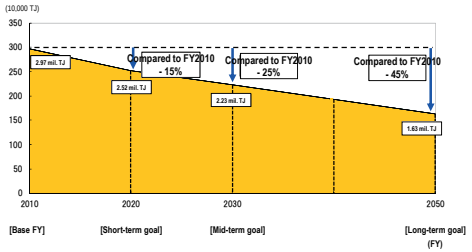
Energy self-sufficiency

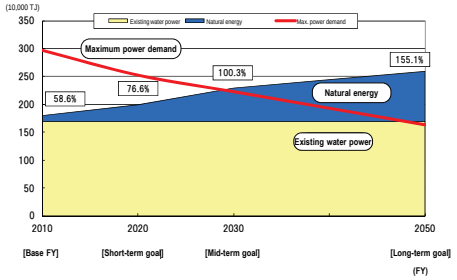
(Case of energy introduction)

Ratio of generating volume of renewable energy in prefecture to annual energy consumption in prefecture

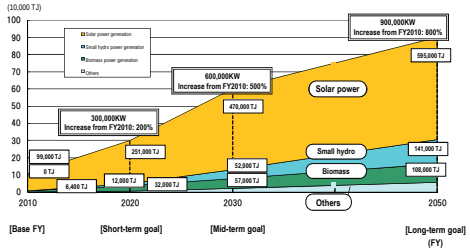
Target of maximum electricity demand and the capacity of natural energy generation facility

Target of the max. power demand





Target of the capacity of natural energy generation facility



Energy self-sufficiency

(Case of capacity of power generation facility)

Ratio of existing generation capacity of renewable energy generation facility in prefecture to the annual maximum power demand (at peak) in prefecture

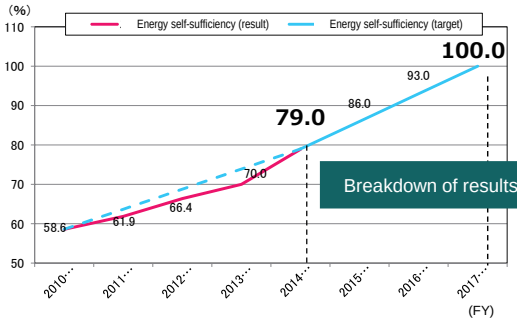
Target of energy self-sufficiency

100% in FY2017

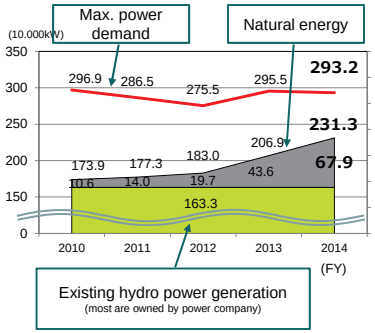
(Self-sufficiency =
existing generation capacity corresponding to power peak in prefecture)

Trends of energy self-sufficiency in Nagano Pref.

(Generation facility capacity)



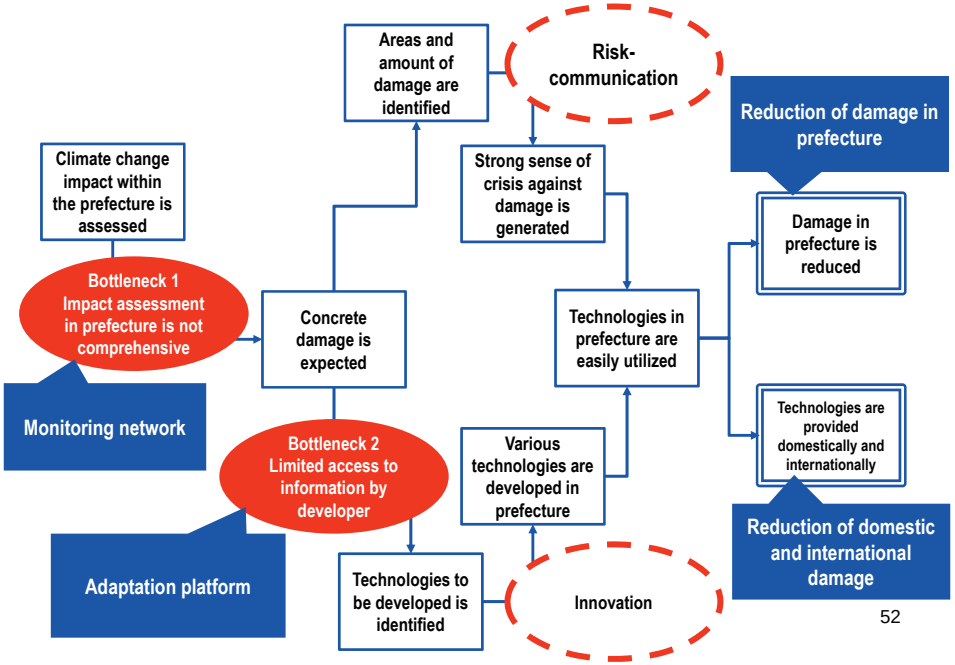
Breakdown of results



Promotion of natural energy and energy saving

How to create adaptation technologies and disseminate in the area?

Bottlenecks of adaptation



"Monitoring" and "Platform"

Climate Change Monitoring Network

Aims to establish a highly-accurate measurement system to predict impacts in wide range of sectors.

- Data required for measuring climate change impact is collected by various organizations, associations and individuals in prefecture for their purposes.
  → Need to use those data for understanding and predicting climate change impacts.

- Research on prediction of climate change impact is conducted by various organizations, associations and individuals in prefecture for their purposes.

→ Need to develop those researches in terms of understanding and predicting climate change impacts

Measurement and research system that enables to share and adopt measured data and research outcomes constantly among related organizations and researchers, etc.

Shinshu Climate Change Adoption Platform

Aims to share impact prediction with developers to revitalize development of technology, production and service for adoption

- Research and development likely to link to adaptation of climate change are conducted by various organizations, associations and individuals in prefecture for their purposes.

→ Need to develop those researches in terms of climate change adaptation policy

- Seeds likely to link to climate change adaptation policy are researched and developed by various organizations, associations and individuals in prefecture for their purposes.
  → Need to utilize those seeds as climate change adoption policy.

Platform that enables to promote information sharing and research and development concerning climate change impact among related organizations and researchers, etc.

Expected technology, products and service

System and device that predict and monitor new diseases and pests

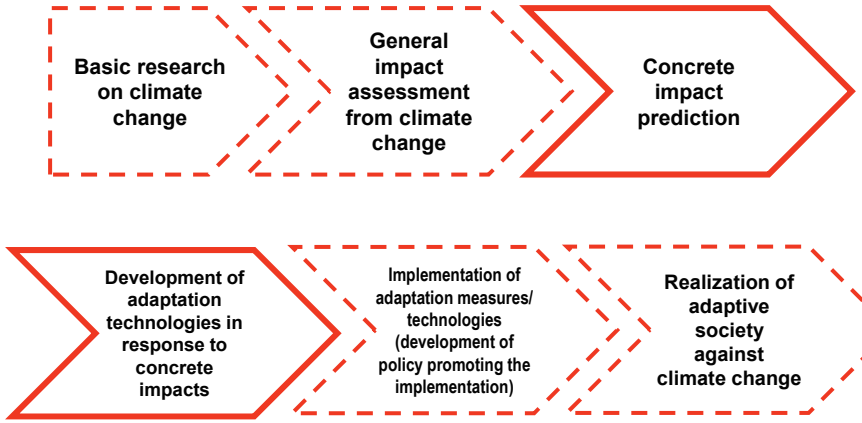
Medicines and medical equipment that prevent and cure infectious disease unseen in Japan

Construction materials, building technology and building reform technology resilient to strong wind and typhoons

Service that forecast and notify real-time meteorological information at each village

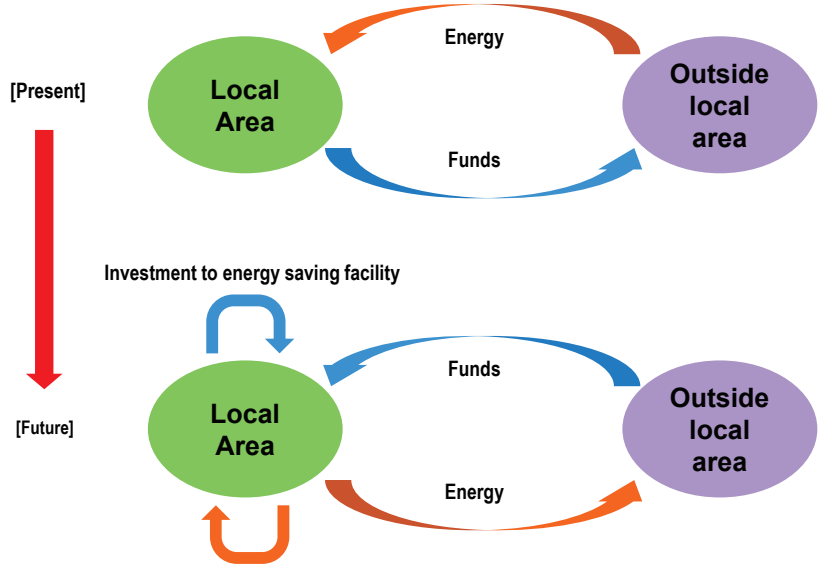
These technologies, products and services (technical and policy seeds) are needed for planned and effective adaptation policy at a local level

Overall adaptation policy

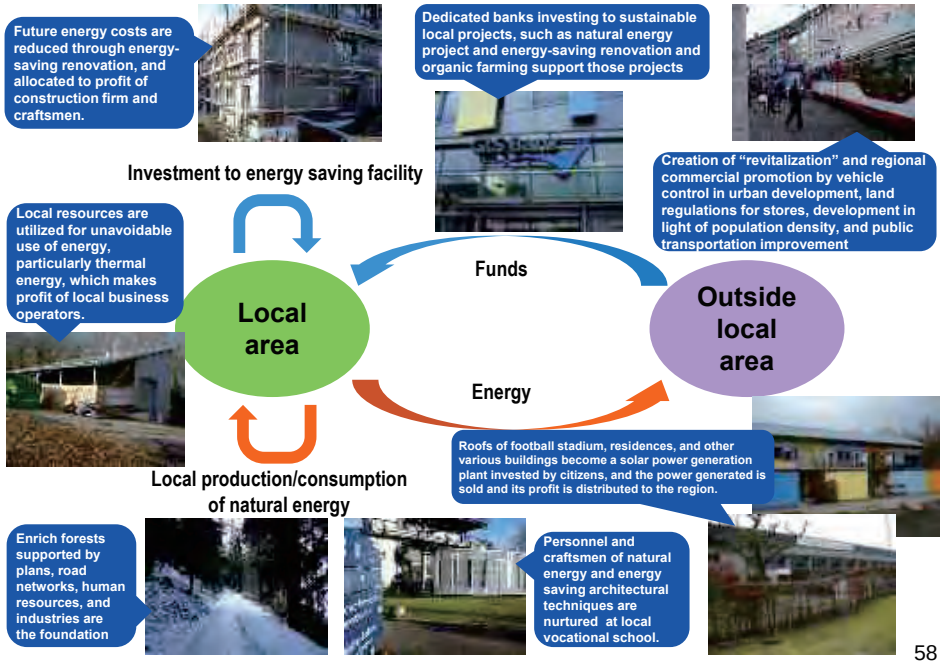


Principles that
“Nagano Prefecture Environment and Energy Strategy”
referred to in its planning process

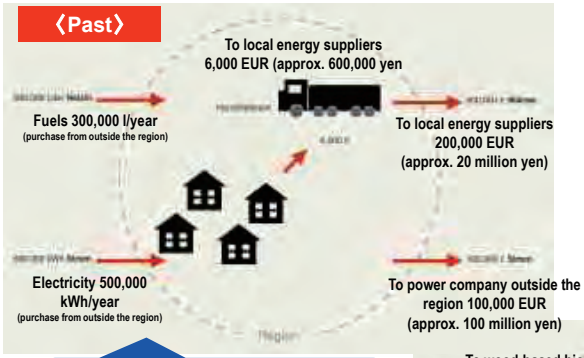
Local energy policy in Germany



Linkage between local energy policy and regional economic policy

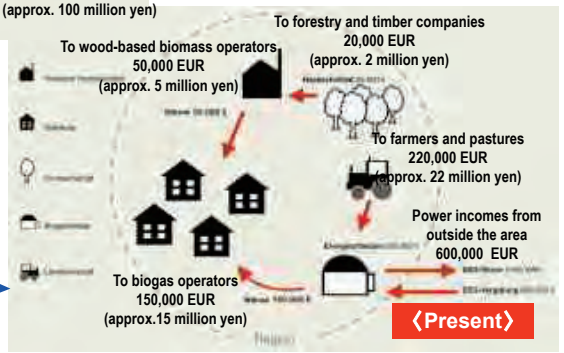


Local energy and regional economy: the case of Mauenheim village



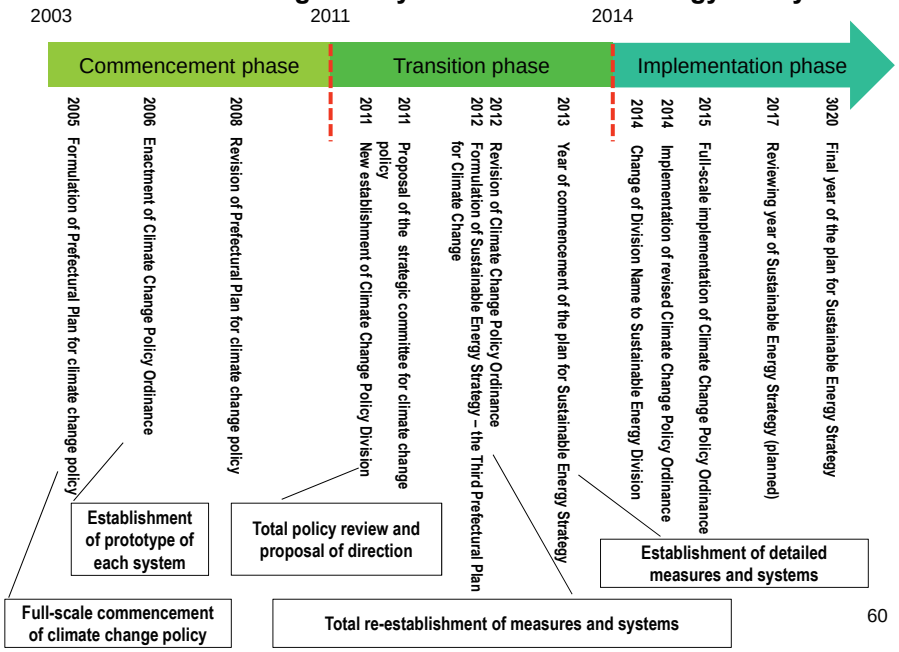
For the purpose of life and production activities, the village has purchased lots of energy from outside the region. This is the structure that the village funds outflows

A 400-population village located in Southern Germany. A local energy company (Solar Complex) implements a joint project with residents



Locally produce energy and sell to outside the region as well as supply to the region and the expenses are paid to local operators. This is the structure that money inflows into the region and circulates.

Footsteps of Nagano Prefecture's Climate Change Policy and Sustainable Energy Policy



Thank you very much for your attention.

Search

Sustainable Energy Division
Nagano Prefecture

(Slide 39)	System for consideration of sustainable energy performance of buildings			System for consideration of introducing natural energy to buildings			
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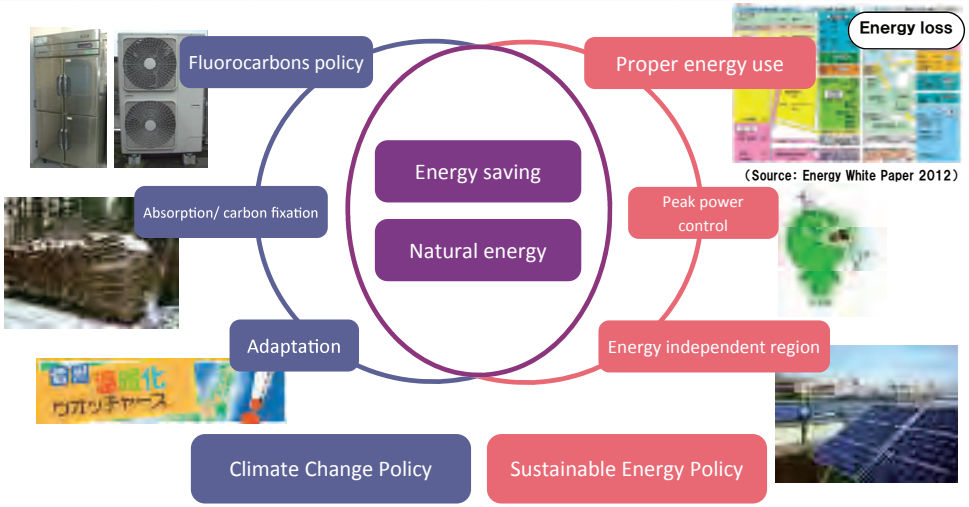
10,000m² ≥ 2,000m²	○	○ Obligation to make efforts	○	○	○ Obligation to make efforts	○	×
2,000m² ≥ 300m²	○	○ Obligation to make efforts	○	○	○ Obligation to make efforts	×	×
300m² ≥ 10m²	○ (Obligation to make efforts at transition period)	×	×	○ (Obligation to make efforts at transition period)	×	×	×
10m² or less Temporary buildings Cultural heritages No need for AC	×	×	×	×	×	×	×
Remarks	• Information is provided upon requested by building owner	• Present at entrance/exit, etc. • Detached house excluded	• Submission to Prefecture • Prefecture can publish and advice	• Information is provided upon requested by building owner	• Present at entrance/exit, etc. • Detached house excluded	• Submission to Prefecture • Prefecture can publish and advice	• Submission to Prefecture • Prefecture can publish and advice

Nagano Prefecture Sustainable Energy Strategy

～ Residenti's Plan for the Third Nagano Prefecture Climate Change Policy ～

Executive Summary

Overview of Strategy



(Source: Energy White Paper 2012)

Integrate Climate Change Policy and Sustainable Energy Policy

In accordance with Act on Promotion of Global Warming Countermeasures and Nagano Prefecture Climate Change Policy Ordinance

8-year plan from FY2013 to FY2020

Background of Strategy Formulation

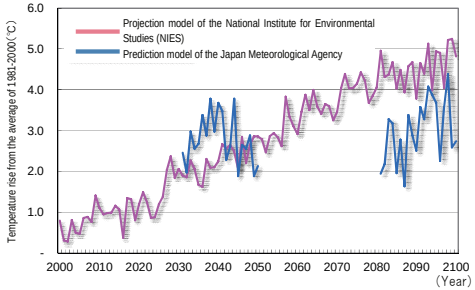
1 Climate change impacts

◇ There are growing concerns over impacts of climate change on biodiversity, agriculture and forestry, tourism, water use, disaster, human health and so on.

◇ Nagano prefecture is facing impacts of climate change.

Biological system in alpine zones being affected by climate change (Beaticola moshkarareppus comes to alpine plants)

【Future projection of temperature rise in Nagano Prefecture】



〈Source: prepared by Yasuaki Hijioka, NIES Chief Researcher〉

2 International energy trends

Energy price is expected to keep rising and remain high.

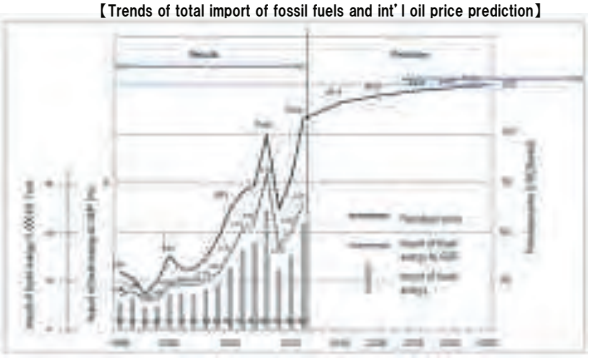
3 Drastic energy policy change

Due to the Great East Japan Earthquake and the nuclear power plant accidents, a drastic review of the current energy policies is needed.

4 Regional effects by Climate Change Policy

By Climate Change Policy, following major effects are expected in addition to environmental conservation.

【Trends of total import of fossil fuels and int' l oil price prediction】



【7 expected effects by local climate change policy】

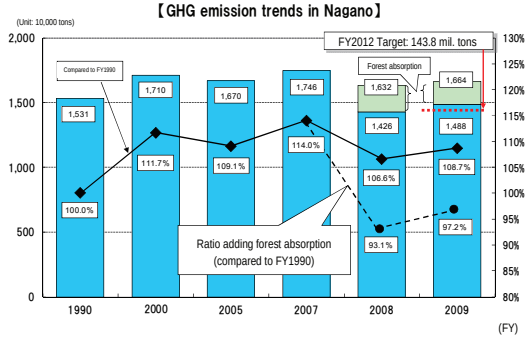
	Direct effects of climate change policy to the area		Expected ripple effect to the area
1	Prevention of outflow of local finance to overseas	⇒	Increase of funds of investment and consumption
2	Increase of investment to energy-saving/natural energy facilities	⇒	Expansion of investment and consumption
3	Natural energy supply to inside and outside the area	⇒	Increase of financial inflow to the region
4	Efficient energy use and increase of energy supply capacity	⇒	Enhance durability against overseas risks
5	Building of low-carbon and comfortable town	⇒	Increase of attractiveness of the region
6	Problem solution through collaboration with various actors	⇒	Stimulation of innovation
7	Strength of self-determination in the energy sector	⇒	Enrichment of local pride

5 Prefecture's initiatives

◇GHG emissions in Nagano prefecture in FY2009 increased by 8.4% compared to base year (FY1990) while the national figure showed 4.4% decrease.

◇Since reduction of GHG emissions has not been significantly progressed, it is necessary to shift conventional measures that focuses on awareness raising activities to highly effective initiatives to promote steady reduction.

【GHG emission trends in Nagano】



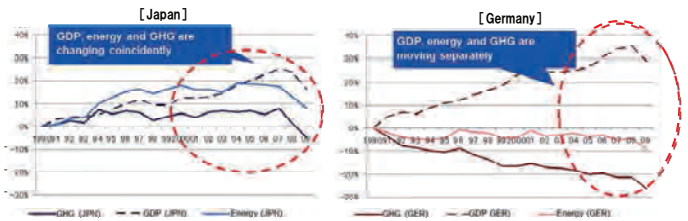
Vision and Goals

Basic goals To build a regional low-carbon and sustainable energy society

◇Aim to achieve economic and social structure which promotes reduction of total GHG emissions and energy consumption ("decoupling").

◇Germany and other European countries have realized such economic and social structure.

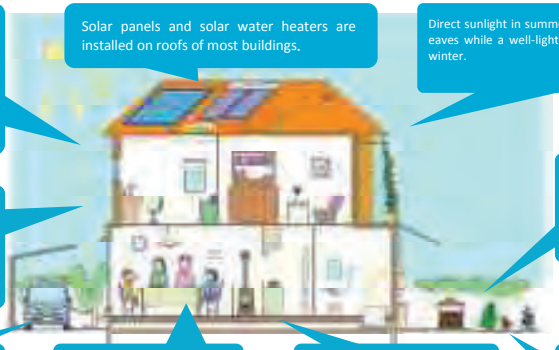
【Trends of GDP, Energy Consumption, GHG Emissions in Japan and Germany (1990-2009)】



〈Source: prepared by Ikuma Kurita, KIER Researcher〉

Visions in 2030

Residential life



Due to dissemination of houses with high insulation performance, residents can enjoy cool and warm indoor conditions in summer and winter, respectively.

Solar panels and solar water heaters are installed on roofs of most buildings.

Direct sunlight in summer can be prevented by installing eaves while a well-lighted condition can be enjoyed in winter.

High insulation mitigates the gap of indoor temperature so as to reduce the risk of heat-shock.

Woodshed and vegetable garden in a garden where residents enjoy agriculture and nature that is a lifestyle of Shinshu.

Next-generation car functions as a battery to reduce power consumption at peak.

A stove is located in wide living space which warms the whole house as well as creates a place for family members to sit together.

Solar heat, geo-heat, wood chip, and pellets are utilized for heating and hot water supply.

Kitchen waste is reused as compost for a farm which grows fresh and tasty vegetables supporting healthy life.

Community

Natural energy attracts many tourists.

Utilization of sustainable natural energy which vitalize agriculture and forestry is promoted. Livestock biomass and wood-based biomass⇒power generation⇒supply and selling of heat locally produced

Income from small hydro power generation by local residents is utilized for local town development activities.

Energy-saving houses utilizing woods of local origin are disseminated and house renovation is also promoted.

Public transportation is improved that make a town safer and more comfortable for pedestrians and bicycles.

Many houses, apartments, and buildings utilize natural energy and become a place for learning natural energy.

Increase of energy self-sufficiency contributes to develop disaster resilient town.

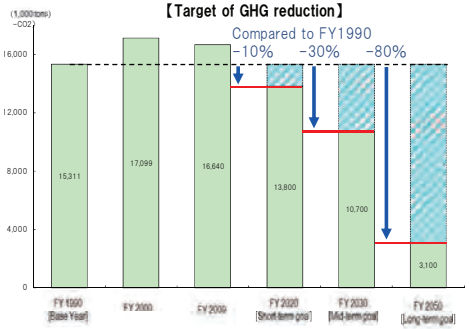
The number of users of low-carbon next generation vehicles is increasing. Car-sharing and park and ride is widely used.

Many business operators implement energy-saving and environmental business and natural energy project.

Locally-oriented natural energy business creates employment in the area and revitalizes local economy, and "energy independent area" at city and community level, which sustainably supports local independence, is emerged in the prefecture. Thanks to these development, residents can enjoy their comfortable life and fulfill social life.

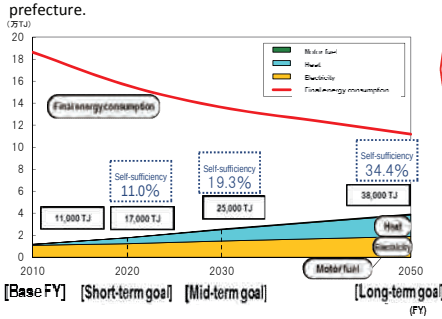
Targets

【Target of GHG reduction】

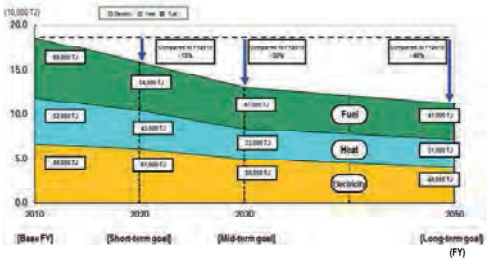


【Energy self-sufficiency (energy consumption)】

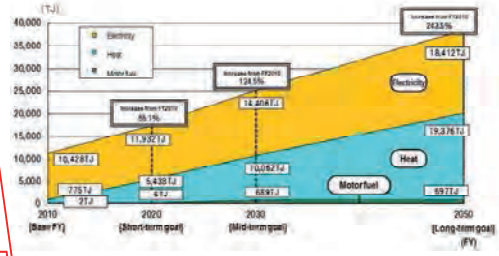
The indicator to understand the volume of renewable energy generated in prefecture to the annual energy consumption in prefecture.



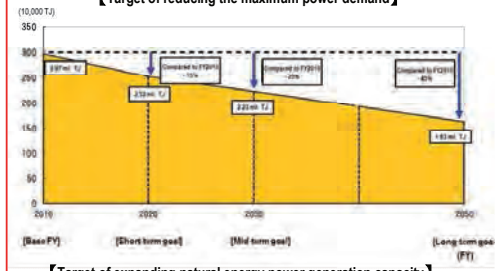
【Target of reducing final energy consumption】



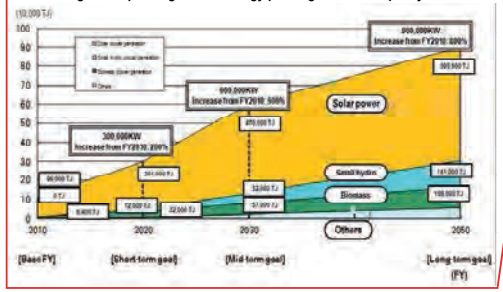
【Target of expanding natural energy introduction】



【Target of reducing the maximum power demand】

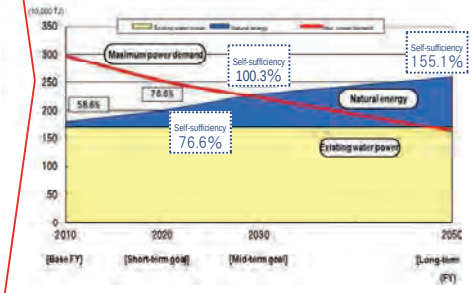


【Target of expanding natural energy power generation capacity】



【Energy self-sufficiency (power generation capacity)】

Indicator to understand the ratio of renewable energy power generation capacity to the maximum power demand in prefecture.



Policy

Household Energy Conservation Measures

Appliance Energy Efficiency Labelling System

In Nagano, retailers are required to put energy efficiency labels on all appliances.
In addition to air conditioners, televisions, and refrigerators, electric toilet seats and fluorescent lights have become subject to labelling.

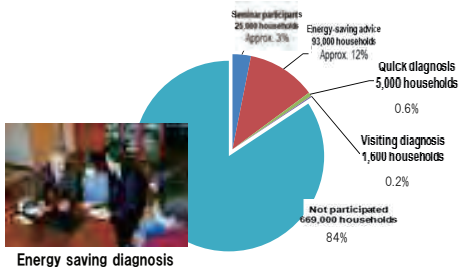
For electric toilet seats

For fluorescent lights

Home Energy Saving Support System

In addition to provide energy saving advice to each house (visiting diagnosis by experts, energy saving information provision, etc.) by dispatching energy saving advisors in collaboration with enterprises and organizations, energy saving seminars are organized.

Energy saving diagnosis



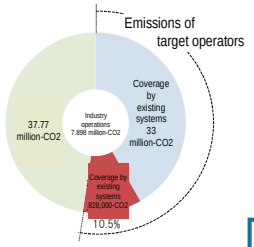
About 100,000 households in Nagano prefecture will be supported in 5 years (total number of households: 800,000)

➡ **Promote energy efficiency at home by encouraging individuals to shift to more energy-efficient appliances**

Industrial Energy Conservation Measures

Anti-global warming measures planning system for industry

◇Scope of the target operators of the planning system that promotes GHG emissions reductions, etc. associated with business activities is extended.



◇The prefectural government gives companies advice and guidance, and evaluates and awards them. This system also works as commuter & passenger transport, vehicle use, and logistics planning systems. This system accepts the voluntary submission of plans from small- and medium-size companies.

Energy saving diagnosis

Public-private partnership agreement system

The prefectural government makes partnership agreements with companies which set ambitious targets on energy conservation and GHG emissions reduction and assists them with their efforts to meet the targets.

Promotion of cooperation and collaboration between businesses

The prefectural government supports the activities of Shinshu Energy-saving Patrol Team, promotes the introduction of the environment management system, and facilitates business associations.

Hospital council for climate change policy

➡ **Providing multifaceted support to companies in their energy management and conservation efforts.**

Building Energy Conservation Measures

Environmental energy performance system for buildings

A building owner consider sustainable energy performance (insulation, etc.) before starting building work.

Natural energy installation system for buildings

A building owner consider introduction of natural energy facility before starting building work.

Detached house is also included. For a large building (>2,000m³), building plan and result of consideration should be submitted to Prefecture.

	Environmental energy performance system for buildings			Natural energy installation system for buildings			
	Performance analysis	Performance disclosure	Performance reporting	Energy analysis	Energy disclosure	Energy installation reporting	Energy utilization reporting
≥ 10,000m²	○	○ Obligation to make efforts	○	○	○ Obligation to make efforts	○	○
10,000m² ≥ 2,000m²	○	○ Obligation to make efforts	○	○	○ Obligation to make efforts	○	×
2,000m² ≥ 300m²	○	○ Obligation to make efforts	○	○	○ Obligation to make efforts	×	×
300m² ≥ 30m²	○ (Obligation to make efforts at transition period)	×	×	○ (Obligation to make efforts at transition period)	×	×	×
10m² or less. Temporary buildings Cultural heritages No need for AC	×	×	×	×	×	×	×
Remarks	• Information is provided upon requested by building owner	• Display at entrance • Detached house excluded	• Submission to Prefecture • Prefecture can publish and advice	• Information is provided upon requested by building owner	• Display at entrance • Detached house excluded	• Submission to Prefecture • Prefecture can publish and advice	• Submission to Prefecture • Prefecture can publish and advice

For particularly large building (>10,000m²), utilization of unused energy (exhaust heat, etc.) is also considered.

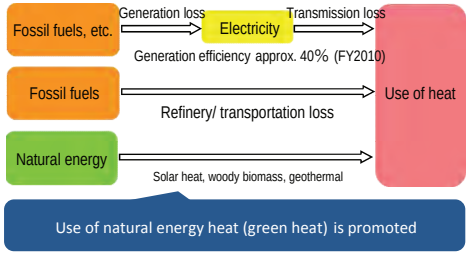
Target approximately 30,000 buildings in 5 years

Financial evaluation tools and installation manual are disseminated at seminars. Through Nagano Prefecture Housing Promotion Council, energy-saving technologies are also promoted.

➡ **Promote construction of buildings that have high performance of sustainable energy (insulation, energy efficiency, etc.) and that utilize natural energy**

Power Demand Control

Heat loss is covered by green heat

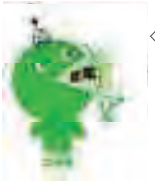


Use of natural energy heat (green heat) is promoted

Energy supplier climate change planning system

Energy supplier, etc. reports their initiative against climate change.

Shinshu Energy Saving Campaign (cut, shift, and change)



◇Prefectural residents altogether initiate energy/electricity saving in summer and winter.

◇Advance initiative of Shinshu Cool Share & Warm Share Spot which promotes residents to avoid using home air-conditioning system and visit warm (cool) place to share warmness (coolness) with others.

➡ **Aim to establish energy saving structure.**

Natural Energy Policy Package

Build bases for local natural-energy dissemination

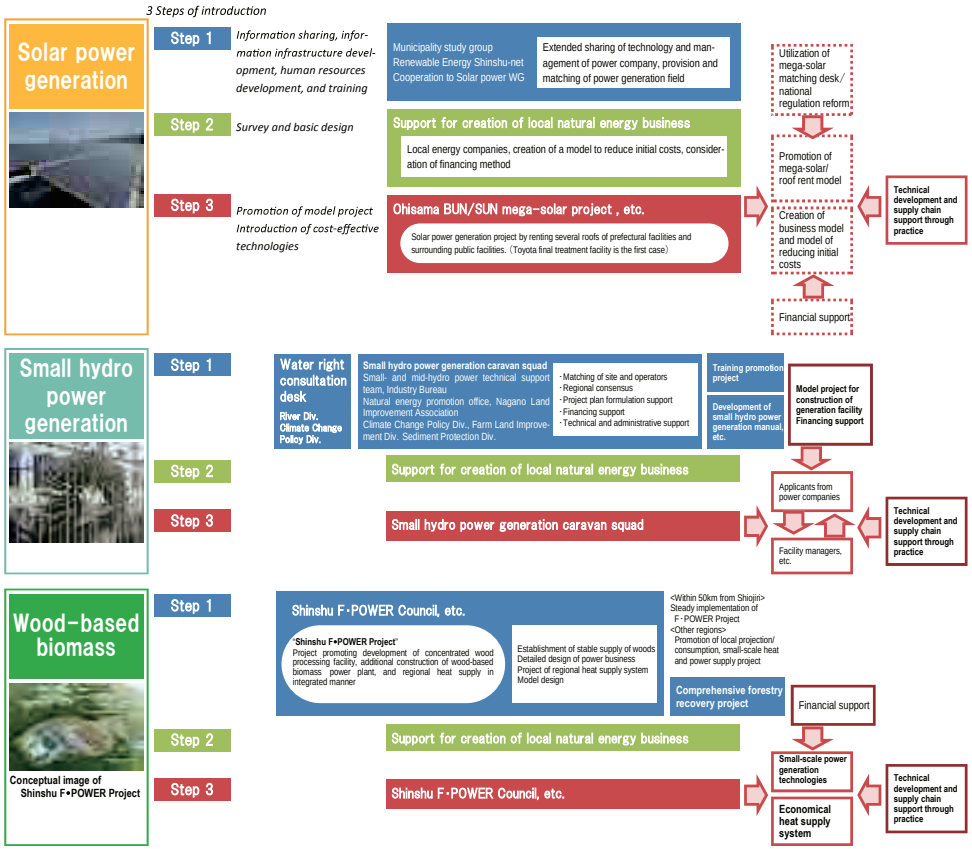
In collaboration with Renewable Energy Shinshu-network and regional councils, sharing of information and knowledge of natural energy is promoted.
Creation of the Regional Sustainable Energy Office" that provides know-how on natural energy projects is also accelerated.

Ohisama BUN/SUN mega-solar project
(Suwa Lake basin sewerage, Toyota final treatment facility, etc.)

Use prefectural facilities to promote creation of local business models with high publicness as well as promote human resource development and accumulation of know-how.

Through 1 Village 1 Natural Energy Project, accumulation of regional experience is supported so as to promote project formulation and reduce risks.

Promotion of natural energy type

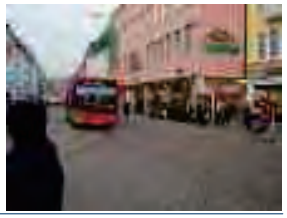


Promote local initiative to disseminate natural energy by using the Feed-in-Tariff scheme

Implementation

Expectation to prefecturl residents

[Living]
Energy saving at home, bring a reusable bag to shopping, try to select environmentally-considered eco-products.



[Mobility]
Use public transportation or bicycle, or go out on foot.
Purchase environmentally-friendly bicycle.
Try eco-drive.

[Houses]
Renovation of houses through insulation performance and energy efficiency improvement as well as natural energy

[Business]
Identify and reduce energy and environmental burden occurred in production, logistics, and delivery.
Proactive development of environmental business.

Residents' broad participation and activities are need-

Implementation structure in Prefecture

- ◇ Implementation organization is "Nagano Prefecture Headquarters of Energy-Saving and Natural Energy Promotion" led by the Governor.
- ◇ Coordination with cities, related organizations, residents and business operators.
- ◇ Monitor and publish the progress every year.
- ◇ Report the progress to the Environment Council (external experts) and obtain comments. Feed-back the comments to the Prefecture.
- ◇ The plan will be reviewed in the fifth year (FY 2107) and update as needed.

長野県 環境部 温暖化対策課
〒380-8570　長野市大字南長野字幅下692-2
TEL：026-235-7022　FAX：026-235-7491
長野県公式ホームページ：http://www.pref.nagano.lg.jp/
Eメール：ontai@pref.nagano.lg.jp

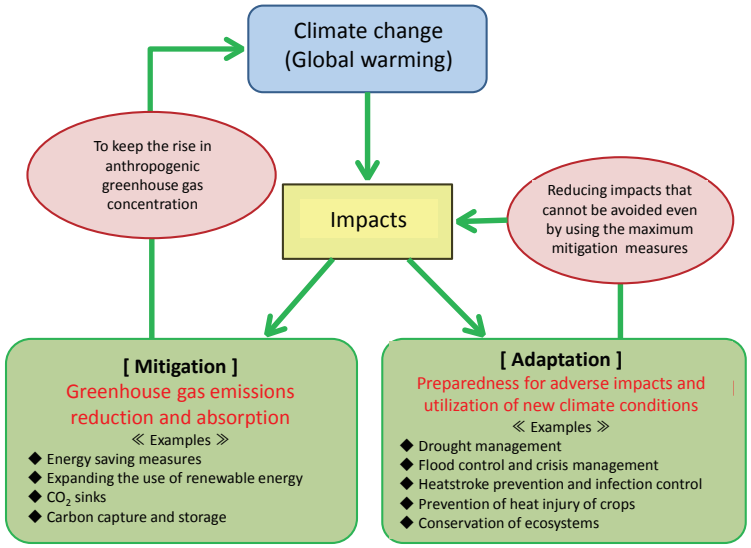
長野県　温暖化対策課　検索

2016 JICA Training in Japan for the Kingdom of Thailand
"Training course on climate change management for climate-resilient society development in Japan"

Nagano Prefecture's Approach to Promote Climate Change Adaptation

Takashi Hamada, Nagano Environmental Conservation Research Institute
April 21, 2016

Relationship between Mitigation and Adaptation



Source: Ministry of Education, Culture, Sports, Science and Technology; Meteorological Agency; Ministry of the Environment (2013): "Climate Change and Its Impact in Japan (Fiscal Year 2012 Version)

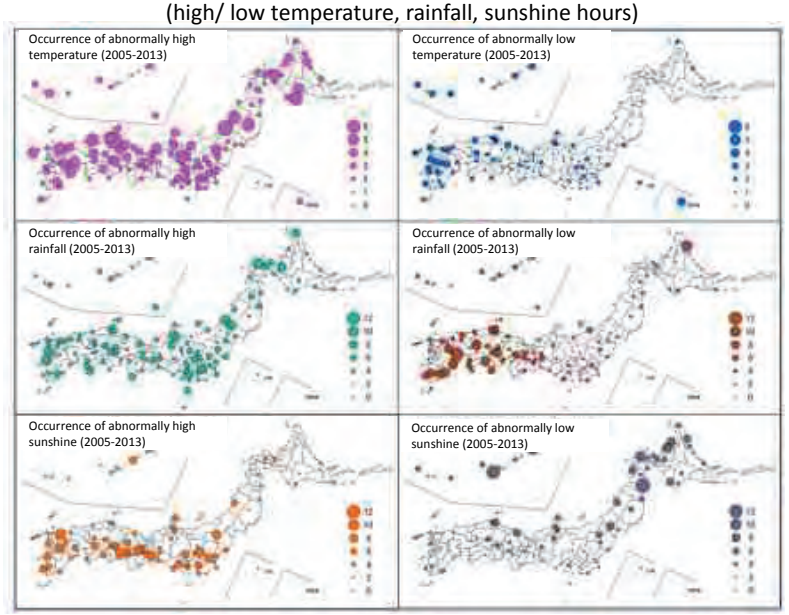
Impact of Climate Change and Adaptation Measures

- Mitigation is a global action
  - Contributing to the reduction of greenhouse gases to the atmosphere

- Adaptation is a local action
  - Contributing to the development of community's resilience to climate change

Regional Differences of Climate Change Impacts

(high/ low temperature, rainfall, sunshine hours)



Source: Meteorological Agency (2015): Report of Abnormal Weather 2014

Local Governments are the Main Actors in Climate Change Adaptation

- But...
- Many issues remain
  - Lack of information on how climate change is actually affecting the area
    - Insufficient number of observation points
  - Limitations of climate change projection
    - Global projects are too coarse

    → Downscaling to kilometers becomes possible only recently
  - Unable to provide communities with concrete information on climate change

Climate Change Adaptation in Nagano Prefecture

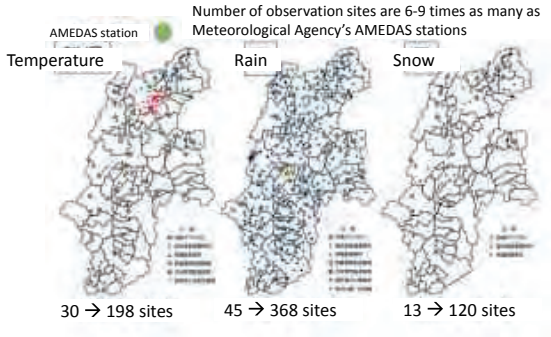
Presented in detail in the following slides

Observation and monitoring of climate change (to understand actual situation)	Since 2014
Projection of climate change impacts	Since 2015
Sharing of impact projection and other information, consider adaptation measures	Since 2016
Development of adaptation technologies	
Implementation of adaptation measures/ technologies	

Realization of a resilient society adapting to climate change

Observation and Monitoring of Climate Change

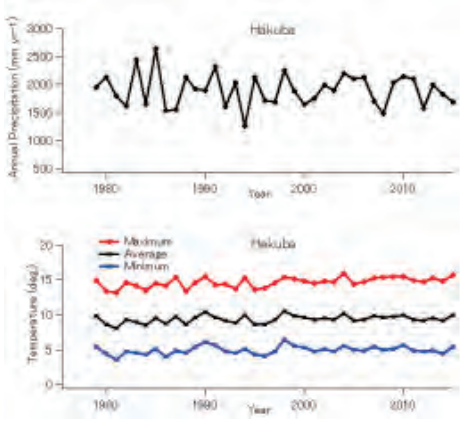
- Establishment of "Shinshu Climate Change Monitoring Network" (November 2014)
  - Centralized collection and compilation of meteorological data in Nagano Prefecture
  - Analysis of actual climate change using collected data
  - Participation of about 50 organizations in the Prefecture



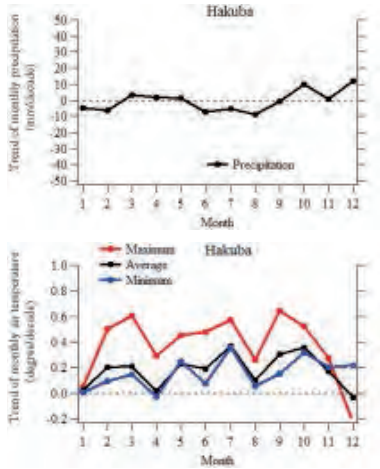
AMEDAS: Automated Meteorological Data Acquisition System

Analysis on Actual Situation (1)

Temperature and Precipitation over Years



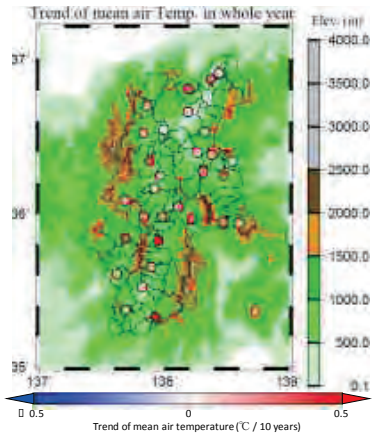
10-Year Changes in Temperature and Precipitation by Month



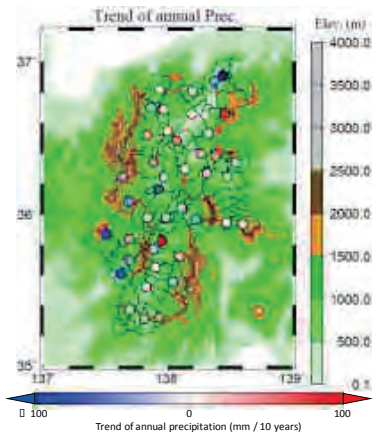
- Temperature shows increasing tendencies, particularly in March, July, and September.
- Precipitation shows no clear tendencies.

Analysis on Actual Situation (2)

Change in Annual Mean Temperature

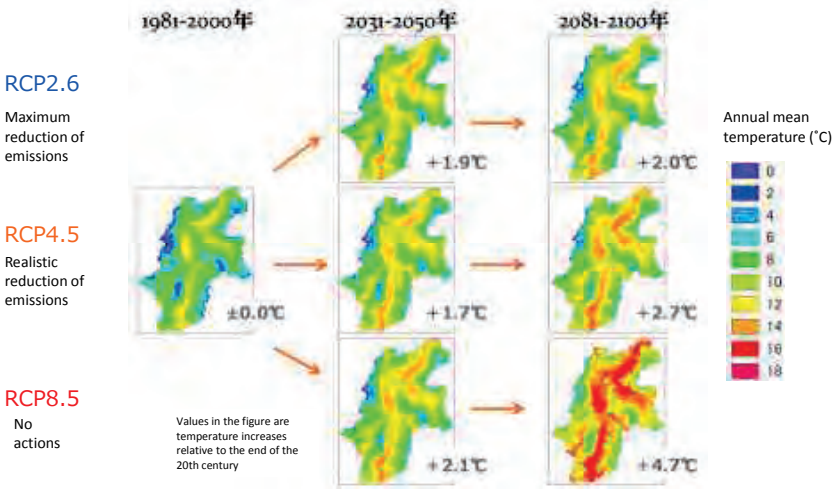


Change in Annual Precipitation



- Temperature tends to increase at all sites.
- Precipitation is increasing at some sites and decreasing at other sites.

Climate Change Projections



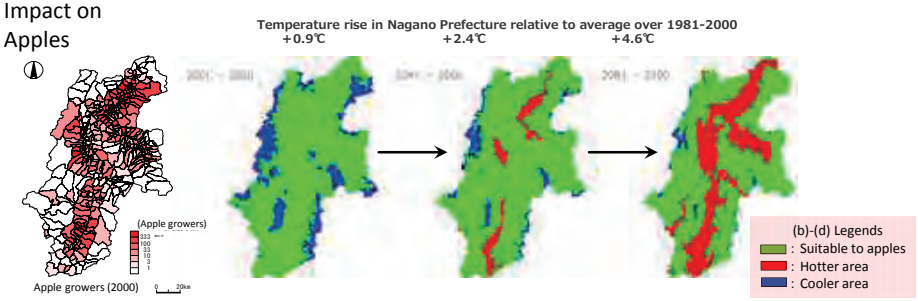
Mapped by Center for Environmental Science in Saitama and Nagano Environmental Conservation Research Institute based on the results of Environmental Research and Technology Developing Fund Project S-8 of Ministry of the Environment

- Climate change prediction data containing probability information are in the process of preparation (planned for release with the assistance of MEXT SI-CAT)

Evaluation and Assessment of Climate Change Impacts

*** Prediction from the model with relatively large temperature rise (MIROC) using the scenario with continuing high economic growth (A1B)** (Taking only temperature conditions into consideration)

Impact on Apples



(a) Actual distribution Number of apple growers (as of 2000)

(b) Areas suitable to apple growing in 2001-2020 (present state)

(c) Areas suitable to apple growing in 2041-2060 (projected)

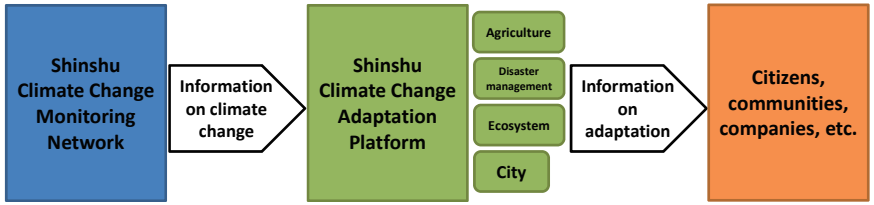
(d) Areas suitable to apple growing in 2081-2100 (projected)

Data from Center for Environmental Science in Saitama and Nagano Environmental Conservation Research Institute

- To be recalculated using a new impact evaluation model in the future (to be released with the assistance of MEXT SI-CAT)

Adaptation Information Sharing and Discussion

- Establishment of “Shinshu Climate Change Adaptation Platform” (planned for 2016)
  - A place to share and discuss climate change impact assessment and issues on adaptation
  - Consists of administrative organizations, research institutes, companies, etc.
  - Promotes the development of technologies and services for climate change adaptation



Thank you very much for attention.

Acknowledgement

Part of this material has been produced with the assistance of
“Social Implementation Program on Climate Change Adaptation Technology (SI-CAT)”
of Ministry of Education, Culture, Sports, Science and Technology (MEXT), Japan.

Using Cultivars to Counter the Spread of Wheat Yellow Mosaic under Climate Warming

Department of Breeding, Nagano Agricultural Experiment Station

1. Wheat Yellow Mosaic

(1) Overview

Wheat yellow mosaic is a soilborne viral disease typically occurring in winter wheat. The pathogen, wheat yellow mosaic virus (WYMV), is transmitted by the soilborne fungus *Polymyxa graminis* to cause infection. Because the virus-carrying soilborne fungus survives long in soil and this disease is generally very difficult to control using cultivation techniques, the employment of resistant cultivars is considered the most effective control strategy.

In Nagano Prefecture, the disease was detected first in the Nanshin region in 2008, and was confirmed to spread into major wheat production areas of the Prefecture by 2010, suggesting the expansion of disease with the warming of climate.

In response, Nagano Agricultural Experiment Station has been conducting studies on “Monitoring of Wheat Yellow Mosaic in Nagano Prefecture,” “Establishment of a Cultural Control Method,” and “Selection and Adoption of a Resistant Cultivar.”

(2) Symptoms and Damage

Wheat yellow mosaic infection manifests symptoms including yellow discoloration of bottom leaves after winter, and severely affected fields suffer yield losses. Different cultivars show different degrees of resistance to this disease. Resistant cultivars do not develop symptoms even after infection, and do not suffer yield losses.

A condition that seems to stimulate infection is long fall weather with relatively high temperatures, while relatively cool temperatures in spring appears to increase the severity of disease.

Despite recent warming trends causing warmer fall seasons, the timing of seeding remains as before. This is considered to have elongated the period of exposure to temperatures suitable to infection, resulting in the increase in damage.

2. Breeding of a Resistant Cultivar

Conventionally, the main cultivar planted in the Prefecture has been “Shirane Wheat.” Its resistance to wheat yellow mosaic is rated “weak,” and the frequent cases of yield losses due to the spread of this disease made it an urgent priority to create a resistant cultivar.

A field for the testing of this disease was set up in 2010 in an urgent project to establish the system to test the resistance of bred strains to this disease. As a result, we succeeded in the early breeding and popularization of a resistant cultivar “Yumekirari.”

We plan to continue the work aiming at higher stability of resistance and better quality through the use of multiple resistance genes.

Breeding of “Kazesayaka,” a New Rice Cultivar with Less Susceptibility to Heat Injury

Department of Breeding, Nagano Agricultural Experiment Station

Deterioration of product quality due to high temperatures during the ripening of grains is a matter of concern in the low-altitude (300-400 m), warm areas in the southern and northern parts of Nagano Prefecture. In 2010, when the mean temperature during the ripening period (August to September) was about 3°C higher than the 24°C in normal years, deterioration of the quality of brown rice emerged as a problem in these areas, as white immature grains occurred at a rate of about 20%. The effect of high temperatures on paddy-rice plants is known to cause deterioration of brown rice due to the occurrence of white immature grains when the daily mean temperature during 20 days after heading rises to about 26°C or more.

On the other hand, paddy-rice cultivation in Nagano Prefecture predominantly depends on the cultivar “Koshihikari,” which represents 75% of all crops of nonglutinous rice cultivars. As a result, the concentration of harvesting work in a short period tends to cause delays in harvesting, resulting in the problem of cracked rice kernels.

In this situation, Nagano Agricultural Experiment Station has developed a new cultivar “Kazesayaka” and is promoting its popularization. As this cultivar produces heads several days later than “Koshihikari,” it can avoid the risk of ripening during the hot period, and is less likely to produce white immature grains as a form of heat injury.

1. Breeding of “Kazesayaka”

This strain was produced in 2000 by the crossbreeding of “Hokuriku No. 178” as the mother and “Shinko No. 485” (later called “Yumeshinano”) as the father aiming at the goals of good taste, strong blast resistance, high yield, and labor saving. As the productivity and characteristics study starting from 2004 gave promising results, the strain was entered into the study to determine recommended cultivars, and the feasibility of cultivation in the Prefecture was assessed.

Although the high temperatures during the ripening period of 2010 caused deterioration of the quality of brown rice in general, “Kazesayala” showed little deterioration of the quality of brown rice, and its superiority was recognized.

It was applied for crop variety registration in 2011, and was registered in 2013.

2. Characteristics of “Kazesayaka”

- As compared with “Kinuhikari,” it is 3 days later in heading and 6 days later in ripening, making its earliness rating “medium-maturing, late-ripening.”
- Yield is high, producing 8% more than “Kinuhikari.”
- Stems are short and resistant to lodging.
- It is more resistant to rice head blast than “Kinuhikari.”
- It shows less occurrence of white immature grains due to high temperatures after heading than “Koshihikari.”

Because “Kazesayaka shows a higher rate of complete grains than “Koshihikari” and “Kinuhikari” and a lower rate of immature grains (percentage of brown rice grains with heat injury), it is classified as “strong” in the high-temperature ripening property. This is interpreted as the “ability to avoid high temperatures” in the sense that the plant produces heads after temperature has started to decrease and hence it is less likely to experience high temperature during the ripening period.

3. On the Cultivar Development Responding to Warming of Climate

While we need both cultivar development and cultivation techniques to cope with the warming of climate, future progression of the warming of climate is expected to increase the importance of cultivar development. We are working to breed cultivars that can withstand high temperatures and do not produce white immature grains (high-temperature resistant varieties).

Theme: Bleeding of an Apple Cultivar Responding to the Warming of Climate
Breeding of an Early-Ripening Apple Cultivar "Apple Choka 25"

1. Background and Purpose

While "Tsugaru" is the second most widely-cultivated early-ripening apple variety in Nagano Prefecture next to "Fuji," it is affected by the problem of poor color development mainly in low-altitude, warm areas as a consequence of the recent warming of climate. In addition, delayed harvesting after allowing more time for color development is also causing the problem of soft flesh and poor keeping quality.

Therefore, producers and distributors strongly want the breeding of early-ripening cultivars with good color development and long life under high-temperature conditions.

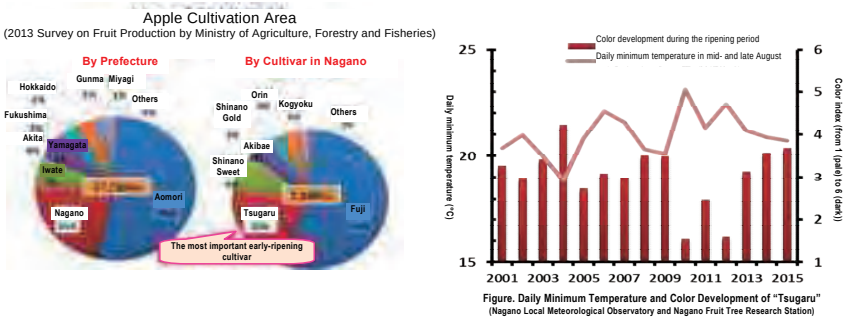


Figure. Daily Minimum Temperature and Color Development of "Tsugaru"
(Nagano Local Meteorological Observatory and Nagano Fruit Tree Research Station)

2. Description of Achievements

(1) "Apple Choka 25" is an early-ripening variety with good color development and taste, produced by the crossbreeding of "Senshu" and "Shinano Red."

(2) The time of flowering and the time of budding are largely the same as those of "Tsugaru." The time or ripening in the test orchard (Suzaka City) is mid-August, and is 5-10 days earlier than that of "Tsugaru." The time needed from full bloom to maturation is about 111 days.

(3) The fruit has a prolate shape and weighs about 300 g. It is colored almost overall in purplish red. Sugar content is about 14-15%, and acidity is about 0.4%. It has fuller coloration and richer taste than "Tsugaru." Storage life is about 7 days at room temperature and about 1 month under refrigeration.

3. Problems for the Future (Apple Choka 25)

(1) Because temperature is high during the harvest season, the practice of color management involves a risk of sunburn on the fruit surface. An appropriate color management method needs to be developed.

(2) Because color development occurs early, there is a risk of picking unripe fruits. The appropriate timing of harvest needs to be established considering the period of storage.

4. Future Directions of Cultivar Development Responding to the Warming of Climate

(1) Breeding of early-ripening cultivars with good color development under the conditions of even higher temperatures.

(2) Breeding of medium- and late-ripening cultivars with good color development under high-temperature conditions.

(3) Breeding of cultivars with good keeping quality under high-temperature conditions.

Training course on Climate Change Management for Climate-Resilient Society Development

17 April –23 April, 2016

Ms. Chayathorn Thanawattanadamrong
Technical Expert
Capacity Building and Outreach Office
TGO

Summary what we have learned during training

Niigata

1. Niigata prefecture/ Niigata city:
   - Good experience on climate change Mitigation Policies, measures and relevant initiatives at local level
2. Shinano River Ohkouzu museum:
   - Good practice on water management at regional level
   - The prefecture effort to control the flood
3. Uonuma City area: carbon offsetting activities for climate change through forest management
   - Good practice on Mitigation activities
   - co-benefit among government and community
   - show importance of community participation

Summary of what you have learned during training

Nagano

1. Nagano Environmental Conservation Research:
   - Good practice on Mitigation Policies and measures in local level
   - Good practice on initiatives climate change adaptation at local level
   - Importance of local information on climate change impacts
   - Importance of research networking and data sharing among local government agencies

2. Nagano Prefecture Agricultural Experimental Station:
   - Good practice of agricultural on climate change adaptation for local economic plant breeding

What/how to apply to TGO/CITC

- The knowledge on climate change policies and measures
  - Planning and implementation process
  - Actual climate actions
  - Challenges and lessons

- Apply the knowledge and good experience from Japan into main responsible on curriculum development and training program

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what I learned during training

As the citizen is important actor, awareness raising is a key to successfully achieve mitigation and adaptation targets.

Communication through media is more effective if it comes together with awareness raising activities/ events

how to apply to CITC

Thailand and ASEAN countries have the same situation so CITC may focus on awareness raising for citizen in the near future.

Expand the target (citizen) of CITC's awareness raising activities through media.

Effective media contents should cover good practices/ successful projects.

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Name: Areeya Lukthan

Title : Technical Officer, Strategy Office

Office : TGO

1. Summary of what you have learned during training

- Diagnose the problem on climate change mitigation and adaptation
- Try to find the potential solution
- Listen to the people.
- Plan and implement solution

"communication with stakeholder becomes one of the key success factors"

2. How to apply what you learned to your Agency

- the planning process and strategy related to climate change

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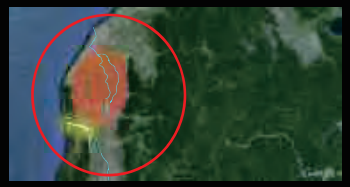
Fight against Climate Change…TOGETHER!!!

Training course on Climate Change Management
for Climate-Resilient Society Development
in Japan, 17-23 April 2016

Summary of what I have been learned and to apply from training

Thada Sukhapunnaphan
Royal Irrigation Department
THAILAND

Summary of what I have been learned from training



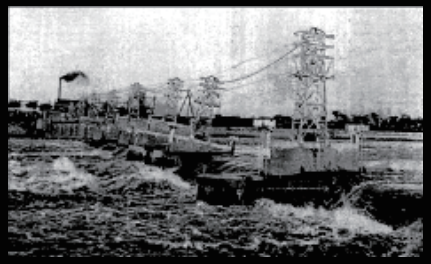
1. **OHKOUZU DIVERSION CHANNEL**

The experiences and lessons related to flood management policies and measures (prevention and mitigation) in Shinano River basin, Niigata Prefecture, especially about the Ohkouzu diversion channel are valuable and useful.

Summary of what I have been learned from training

1. **OHKOUZU DIVERSION CHANNEL**

The experiences and lessons related to flood management policies and measures (prevention and mitigation) in Shinano River area, Niigata Prefecture, especially about the Ohkouzu diversion channel are valuable and useful.



APPLICATION : The Knowledge could be applied in appropriately ways for regional level flood management Thailand both in structural implementation and public awareness. Many lessons from this man-made river construction should to be learned in various aspects.

Summary of what I have been learned from training

JAPAN

Chao Phraya River
THAILAND

APPLICATION : The Knowledge could be applied in appropriately ways for regional level flood management Thailand both in structural implementation and public awareness. Many lessons from this man-made river construction should to be learned in various aspects. In advance we need to redesign the diversion channels for dealing with the future effects of climate change as well.

THE CHAO PHRAYA RIVER

....to redesign the diversion channels for dealing with the future effects of climate change.

Summary of what I have been learned from training

2. SHINANO RIVER OHKOUZU MUSEUM

The center of information about the Shinano River and Ohkouzu diversion channel. Not only the chronology with the difficulties of the diversion channel construction, it is also the history of the people in this area, telling us about their fighting chance with the natural disasters for better living and sustainable development.

Summary of what I have been learned from training

2. SHINANO RIVER OHKOUZU MUSEUM

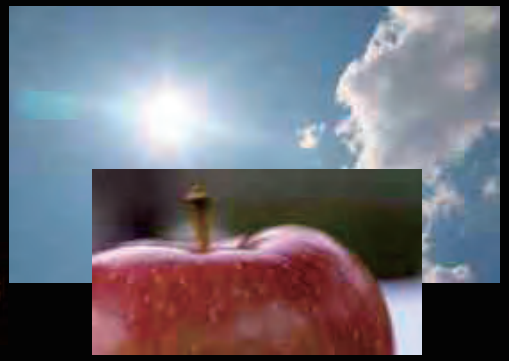
The center of information about the Shinano River and Ohkouzu diversion channel. Not only the chronology with the difficulties of the diversion channel construction, it is also the history of the people in this area, telling us about their fighting chance with the natural disasters for better living and sustainable development.

APPLICATION : The lessons from this chronology to be applied for Royal Irrigation Depart Thailand is establish the museum at the local irrigation head offices to create the public realization of participation and long vision to cope with natural or social problems via historical information .

Summary of what I have been learned from training

3. CLIMATE CHANGE IMPACTS ON NAGANO APPLES

Efforts on climate-resistant variety of agricultural products (i.e. apples) by Nagano Prefecture Agricultural Experiment Station to prevent the losses impacted by climate change..



Summary of what I have been learned from training

3. CLIMATE CHANGE IMPACTS ON NAGANO APPLES

Efforts on climate-resistant variety of agricultural products (apples) by Nagano Prefecture Agricultural Experiment Station to prevent the losses impacted by climate change..

APPLICATION : Integrate with Department of Agricultural Extension and Department of Agriculture to join Thai farmers in irrigation areas to prepare themselves to deal with the effects of climate change in advance.

The Summary of

Training Course on Climate Change Management for Climate – Resilient Society Development in Japan

17 – 23 April 2016

Somchai Boonpradub

Department of Agriculture

Ministry of Agriculture and Cooperatives

" What we learned during the training in Japan"

Environmental Model City : Niigata City

- The Action Plant during 2014 – 2018 :
- Target to reduce CO2 emissions : 15% in 2018 from the base year (2005)
  - Sustainable agriculture
  - Smart energy city
  - Low carbon transport
  - Low carbon lifestyle

Flood Management in the Shinano River : Niigata City

- Experience and lesson in flood management through the Ohkouzu Museum :
  - Severe flooding and destruction problems
  - History of flood management from the past to the present
  - To develop technology of Diversion Channel
  - Citizens in the City need flood management
  - Site visit of the project

Niigata J-Credit : Forest Management Project

- Forest management activity : planting, nursing, weeding, thinning, and insect damage.
- Benefits & Impacts :
  - Good management for forest and protection
  - Selling carbon credit and timber for economic
  - Travel through a forest : citizen in the City
  - Forest as " the Heritage of the City "

Nagano Prefecture : Sustainable Energy Strategy

- Problem: Import of fossil fuels / income decease
- To promote natural energy and energy saving :
  - GHG emission reduction / Shift from financial outflow to local investment
- Natural types : Solar power, small hydro power, biomass energy and green heat(i.e. geothermal)
- Pilot project : Promotion of various type of natural energy in city / village of Nagano
- Increase energy efficiency and saving energy saving at home, industry and business

Nagano Prefecture : Approach to Promote Climate Change Adaptation

- Analysis climate change situation : Actual situation & future scenario
- Evaluation and Assessment of climate change impacts (Hotspots) : Agriculture
- Climate change adaptation :
  - Shinshu Climate Change Monitoring Network
  - Shinshu Climate Change Adaptation Platform
    - Agriculture, Disaster management, Ecosystem and City

Nagano Prefecture : Climate Change Adaptation in Agricultural Sector

- Overview of the Experiment Stations in Nagano
- Breeding for climate – resistant variety of economic crops in Nagano Prefecture :
  - New rice and apple cultivars for heat tolerant and how to transfer new cultivar to farmers
  - A new wheat cultivar for WYMV resistant
- Field visit to apple breeding program for heat tolerant in experimental plot and greenhouse

“ How to apply learning and experience during the training to our Department”

Problem statement

- Agricultural productivity suffer severely due to high temperature, severe drought , flood conditions and soil degradation including pest damage.
- Farmers are low incomes because crop yield is often damaged from natural disaster throughout the country.
- Farmers need the new variety of crop which tolerant to climate change crisis.

Activities

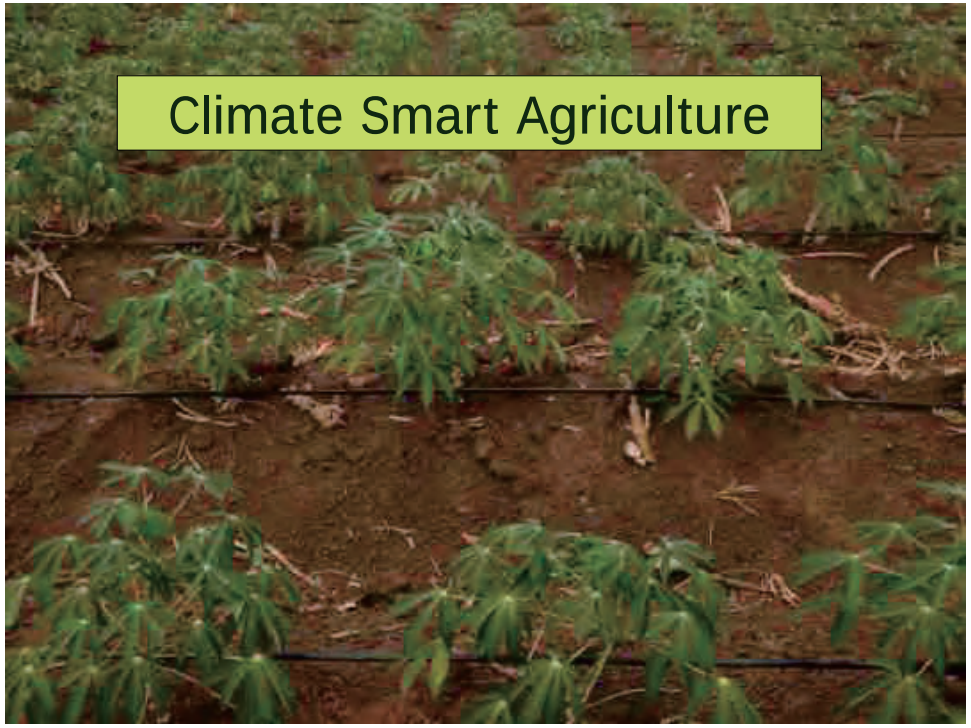
- To develop the new variety of economic crops i.e. cereal, legume and fruit crops for drought, flood and heat tolerant including pest resistant.
- To promote a climate – resistant varieties of crops to the hotspot area.
- To develop the young researcher particularly plant breeders through training course in the topic of breeding techniques for climate – resistant variety.

Problems statement

- To shift from the forest area to economic crops
  i.e. maize, upland rice, cabbage
- To burn agriculture residues from the previous crops to prepare land during dry season before a next crops are growing at the rain coming.
- Air pollution and global warming crisis

Activities

- To promote economic tree / fruit crops intercrop with Arabica coffee replacing mono-crops.
- To introduce local mushroom and herbal crops into the area for increasing income.
- To develop the new model for travelling in the forest and stray-overnight in the forest /community.
- To promote all products from forest/community to the Big City.

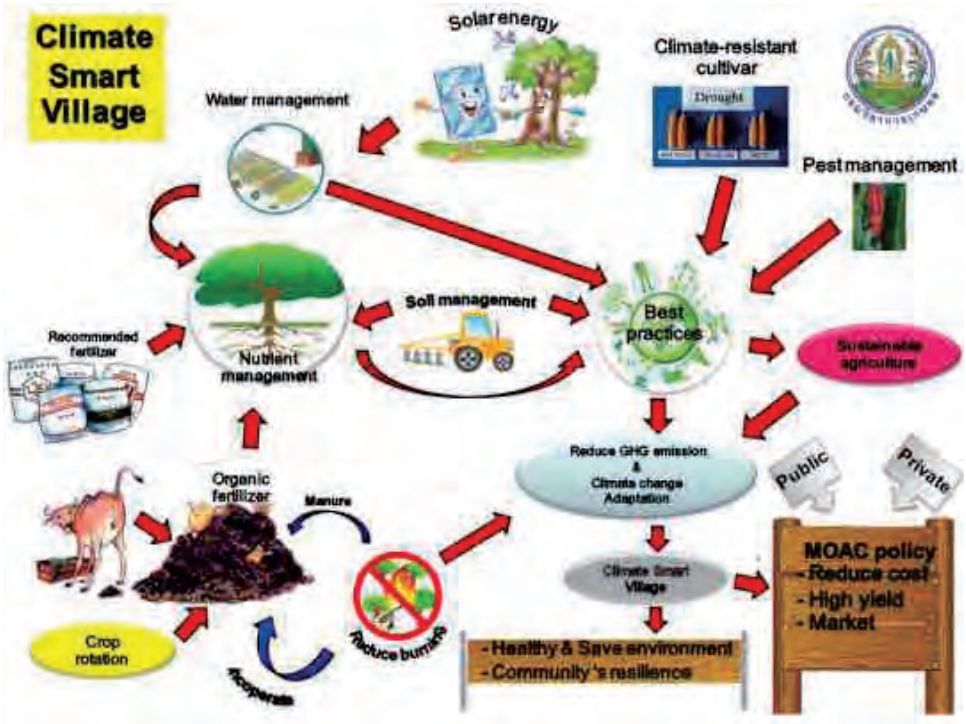


Problem statement

- Economic crops namely cassava, sugarcane, corn and rice is mostly grown in lowland / upland area by smallholder farmers in rainfed condition under unpredictable rainfall.
- Farmers normally apply more amount of chemical fertilizer for crop production.
- Fossil energy is also used in small machine for cultural practices including water application during the growing season.
- Low yield and high production costs
- More emission GHG from the field.

Activities

- Climate – resistant varieties
- Reduce tillage / Break plow pan
- Fertilizer applied by using soil analysis
- Reduce chemical fertilizer by using organic fertilizer / green manure / crop rotation
- Fertigation needs for high N use efficiency
- Water application by using solar energy and water savings by using drip irrigation
- Reduce soil erosion by using cover crops
- Use IPM for controlling pests



We need to be support from TGO / JICA

- Capacity building activity for DOA researchers:
  - Climate Change Adaptation/Mitigation Mechanism
  - Low carbon society for Agricultural sectors
- TGO / JICA Experts to support for " GHG emission methodology / How to reduce GHG emission from agricultural sectors"
- JICA Experts to support for " Breeding techniques for climate – resistant variety of economic crops in Thailand particularly heat tolerant.

Acknowledgements

I would especially like to thank TGO through CITC for nominating to the training course and JICA for financial support and accommodation during the training in Japan.

Training course on Climate Change Management for Climate-Resilient Society Development

17 April –23 April, 2016

Objective

- To *enhance* technical knowledge and related expertise related to climate change policies and measures (adaptation and mitigation) taken by subnational-level (prefecture/ province and city) in Japan, including:
  - Institutional and regulatory frameworks
  - Planning and implementation process
  - Actual climate actions
  - Challenges and lessons
- To *consider* applicability of policy/ measure and experiences in Japan to Thailand

Participants

Name	Organization	Title
1. Dr. Natarika Wayuparb Nitiphon	TGO	Deputy Executive Director,
2. Dr. Jakkanit Kananurak	TGO, Capacity Building and Outreach Office	Director
3. Ms. Apaphatch Hunsiritrakun	TGO, Capacity Building and Outreach Office	Technical Official
4. Ms. Chanyaphak Wathanachinda	TGO, Capacity Building and Outreach Office	Technical Expert
5. Ms. Chayathorn Thanawattanadamrong	TGO, Capacity Building and Outreach Office	Technical Expert
6. Mr. Thitipong Piboongulsamlit	TGO, Capacity Building and Outreach Office	Official
7. Mr. Rongphet Bunchuaidee	TGO, GHG Mitigation Technical Support Section	Manager
8. Ms. Areeya Lukthan	TGO, Strategy Office	Official
9. Ms. Wannapa Khlaisuan	Office of the National Economic and Social Development Board	Policy and Plan analysis- Senior Professional
10. Mr. Thada Sukhapunnaphan	Royal Irrigation Department	Expert on Hydrology
11. Mr. Somchai Boonpradub	Department of Agriculture	Senior Expert in cropping systems
12. Dr. Akaraon Houbcharaun	Office of Agricultural Economics	Economist

Training Destination

No.	List	Presenters
1	Niigata prefecture/ Niigata city	1. Mr. Thada Sukhapunnaphan 2. Dr. Jakkanit Kananurak 3. Ms. Chanyaphak Wathanachinda
2	Flood management museum (Branch of Ministry of Infrastructure)	1. Ms. Wannapa Khlaisuan 2. Mr. Thada Sukhapunnaphan 3. Ms. Chayathorn Thanawattanadamrong
3	Forestry project in Minami-Uonuma	1. Mr. Somchai Boonpradub 2. Mr. Akarapon Houbcharaun 3. Mr. Rongphet Bunchuaidee
4	Nagano prefecture	1. Ms. Wannapa Khlaisuan 2. Ms. Apaphatch Hunsiritrakun 3. Mr. Thitipong Piboolgulsamlit
5	Agricultural research institute of Nagano prefecture	1. Mr. Somchai Boonpradub, 2. Mr. Akarapon Houbcharaun 3. Ms. Areeya Lukthan

1. Summary of what you have learned during training

- Countermeasures and initiatives regarding on both mitigation and adaptation
- Knowledge dissemination activities and PR campaigns to communities and citizen is crucial
  - Niigata
    - Awareness raising events on low carbon lifestyle
    - Training program to promote energy efficiency at home
    - Campaign on point rewarding system
  - Nagano
    - Energy saving seminar
    - Energy saving advice
    - Visiting diagnosis

1. Summary of what you have learned during training

- Building the network with key stakeholders is important to implement project
  - Nagano
    - Limited capability on collecting necessary data on climate change issue
    - Develop the Climate Change Monitoring Network

2. How to apply what you learned to CITC ?

Public relations and knowledge dissemination

- Proactive PR/method - to raise awareness
- Suitable communication to specific targets – clear and easy to understand message
- Monitoring system, questionnaires to household

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Presentation contents

Evaluation and Opinion exchange session at JICA Headquarters

- Each training participant will be asked to *prepare and present* the following aspects on the final day of training to JICA (Friday, 22 April)
  - Up to 7 minutes per each presenter
  - PPTs to be prepared in English
  - PPTs to be completed and submitted to TGO by the morning of Friday 22nd April

1. Summary of what you have learned during training

2. Whether/ how to apply what you learned to your Agency/ CITC

1. Summary of Lesson Learned

- City and Prefectural CC Action Plan and strategy:
  - Niigata city's global warming action plan
  - Nagano Prefecture's sustainable energy strategy
- CC countermeasures: Mitigation actions
  - Renewable energy: Solar cells, biomass energy, and Electronic vehicle
  - Carbon offset: Forest management and carbon credit
  - Economic incentives: Point award system
  - Promotion and PR activities
- CC countermeasures: Adaptation actions
  - Planned adaptation: Water management (Ohkouzu Diversion channel in Shinano River area), and crop variety development
  - Autonomous adaptation: Communications (impacts and vulnerability), and Promotion-and-PR activities

1. Summary of Lesson Learned (cont.)

- Institutional arrangement at local community level

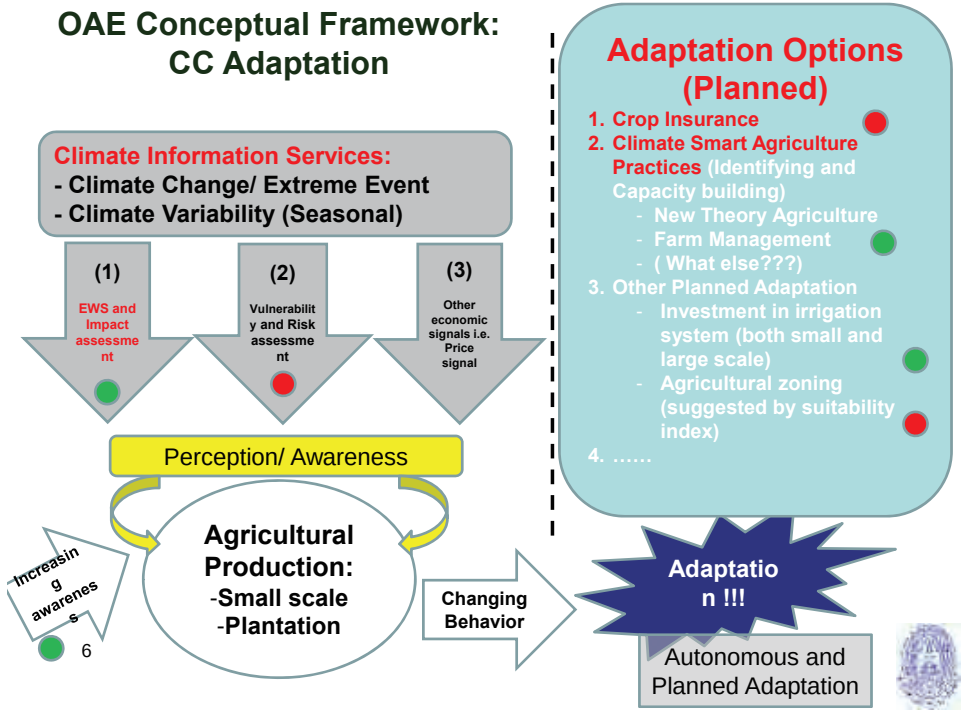
Niigata city:
- Joint promotion by citizens, companies, and administration
- Promotion by cooperation among administrative organizations: National gov'nt, Niigata prefecture, city government (Mayer)

Nagano prefecture:
- Shinshu CC monitoring network
- Shinshu CC adaptation platform

2. Whether/ how to apply what you learned to your Agency

- Initiating carbon credit project: GAP and N2O mitigation
- Economic incentives to promote mitigation and adaptation actions: Direct payment for sustainable actions
- Cooperations with local agencies to set up platform to communicate CC policies and actions at ground level.

OAE Conceptual Framework: CC Adaptation



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Overview of
Kochi Prefecture Action Plan against
Global Warming

Kochi Prefecture

Basic data

Area: 7,103.93 km^2

Population: 728,461

Annual daylight hours: 2,066 hours

Gross Prefectural Product: 2,158.4 billion yen

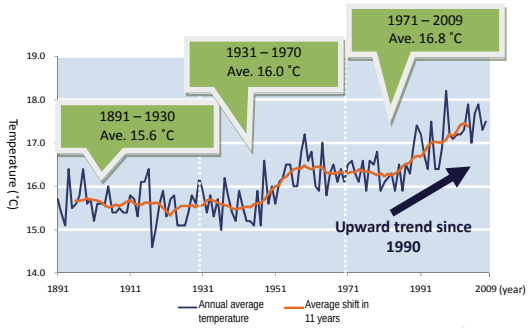
Ratio of forest area: 84%

Average temperatures: 16.8˚C

Annual precipitation: 2,985 mm

Current climate

[Increase of average temperature]

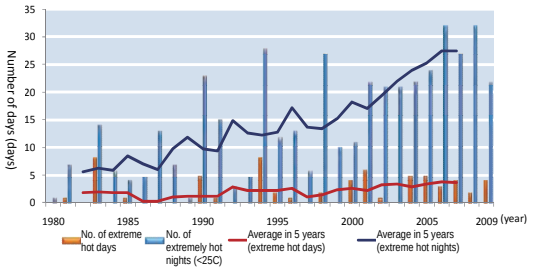


◆The average temperature of Kochi city has increased by 1.43˚C over the last 100 years

◆The average temperature of Tosashimizu city has increased by 1.34˚C while that of Muroto city has increased by 0.96˚C

* Not only global warming but urbanization is also considered as a factor of increasing temperature.

[Increase of the number of extremely hot days/ nights]



◆In accordance with the increase of average temperature, the number of extremely hot days and hot nights has also increased

◆Increase of the number of hot nights shows particularly remarkable trend.

[Source] Kochi Local Meteorological Observatory

Impact and damage

[Opacification of rice]

Opacified rice

◆Rice is “opacified” due to high temperatures, etc. in summer

◆It is regarded as a problem as it causes deterioration of brown rice quality

◆It is often found in warm, early crop rice areas

[Watercourse disorder of Nitaka pear]

Watercourse disorder of Nitaka pear

◆The case of “watercourse disorder” which fruit becomes water-soaked and its taste is degraded due to abnormal high temperature or desiccation of soil in summer has been increasing.

◆Unstable state, such as decrease of production and quality has been lasting.

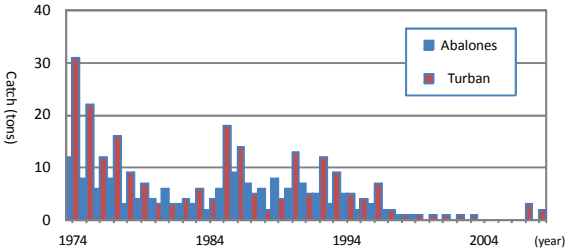
[Impact on fishery]

◆Due to the rising seawater temperature, withered seashore phenomena (decrease or disappearance of seaweed inhabiting area) have been broadened in the coast area of Kochi prefecture.

◆When withered seashore is broadened, the number of abalones and seashell such as turban which eat seaweeds decreases.

◆Since the high water temperature in 1998, the volume of caught abalones and turban has not reached to the market distribution volume, which could not maintain as fishery business.

Trend of catch volume of abalones and turban in Kochi prefecture



[Source] Annual statistics of Agriculture, Forestry and Fisheries in Kochi

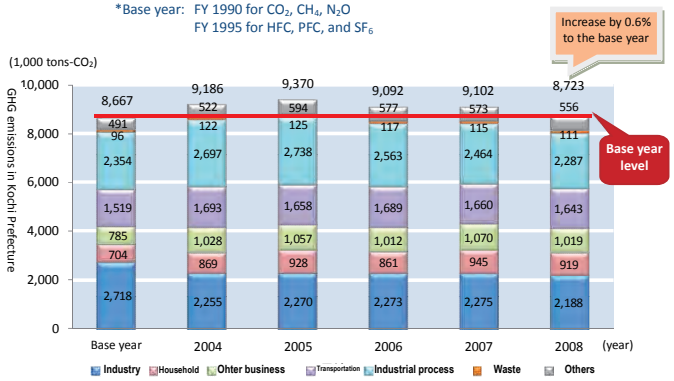
GHG emission trends

◆Emissions in 2008 were 8,723,000 tons-CO_2 which were 0.6% higher than the base year*.

◆After the emissions peaked in 2005, which were about 8% higher than the base year, the emissions have been declining in the subsequent years.

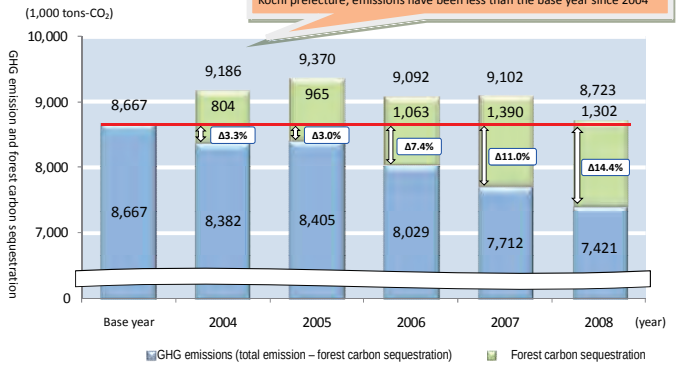
◆GHG emissions in Kochi prefecture account for approx. 0.7% of Japan's total GHG emissions in 2008 (1,281 million thousand tons-CO_2).

*Base year: FY 1990 for CO_2, CH_4, N_2O
FY 1995 for HFC, PFC, and SF_6



Forest carbon sequestration

Counting the amount of forest carbon sequestration into GHG emissions of Kochi prefecture, emissions have been less than the base year since 2004



◆Every single tree consisting of a forest performs photosynthesis by absorbing CO_2 in the atmosphere and accumulates carbon as organic matter in its trunk, branch, etc. to grow.

◆Followings are counted as forest carbon sequestration (according to the Kyoto Protocol)

1) Afforestation (planting of trees in an area where there had been no forest for the past 50 years)

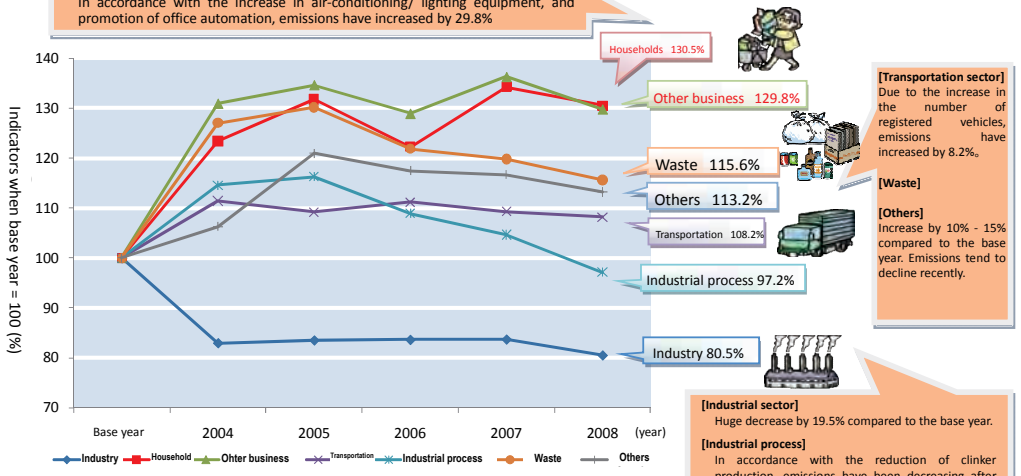
2) Reforestation (planting of trees in an area where there had been no forest as of 1990)

3) Forest Management (Artificial activities that allow forests to appropriately perform various forest functions in sustainable manners (such as management and conservation of forests))

Emission trends by sector

[Household sector]
In accordance with the increase in the number of households and the increasing size of household appliances, emissions have increased by 30.5% since base year

[Other business sectors]
In accordance with the increase in air-conditioning/ lighting equipment, and promotion of office automation, emissions have increased by 29.8%



[Transportation sector]
Due to the increase in the number of registered vehicles, emissions have increased by 8.2%。

[Waste]

[Others]
Increase by 10% - 15% compared to the base year. Emissions tend to decline recently.

[Industrial sector]
Huge decrease by 19.5% compared to the base year.

[Industrial process]
In accordance with the reduction of clinker production, emissions have been decreasing after the peak in 2005.

Target of GHG emissions reduction

GHG emissions reduction by 31% in 2020 from the base year.

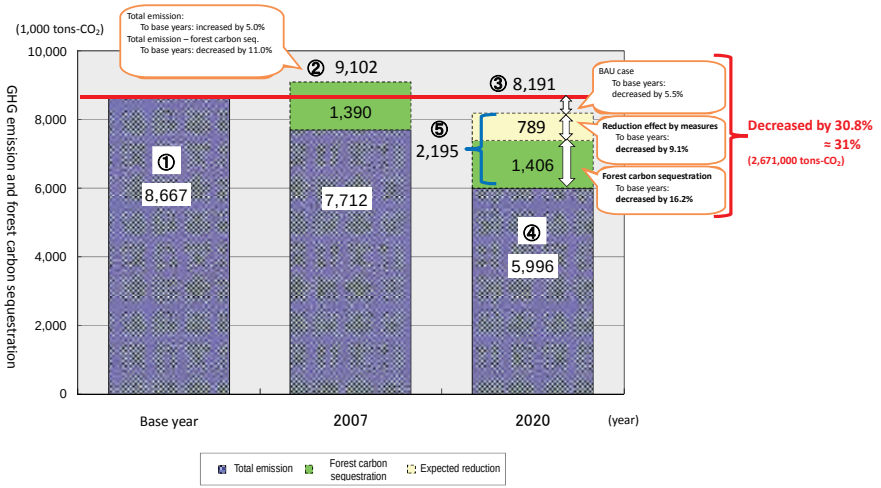
Base year: FY 1990 for CO_2, methane, and dinitrogen oxide, and FY 1995 for HFC, PFC, and SF_6

Emissions from the case where global warming countermeasures are not taken (business-as-usual: BAU case) are **expected to be reduced by 5.5% (8,191,000 tons-CO_2) from the base year in 2020**, due to the expected decrease in cement business activities, and reduced population and household numbers.

By adding **expected GHG reduction volume after taking global warming countermeasures (789,000 tons-CO_2)** and **forest carbon sequestration (1,406,000 tons-CO_2)** to the above reduction volume in the BAU case, (476,000 tons-CO_2), we aim to achieve **the goal of reducing GHG emission by 31% (2,671,000 tons-CO_2) from the base year.**

	Emissions (1,000 t-CO_2)				2020	Compared to base year
	Base year	2007	BAU case in 2020	Project case in 2020	Expected reduction volume (1,000t-CO_2)	Reduction rate (%)
Total emissions	① 8,667	② 9,102	③ 8,191	④ 5,996	⑤ 2,195	31

*BAU case refers to those not taking specific global warming measures from the current status

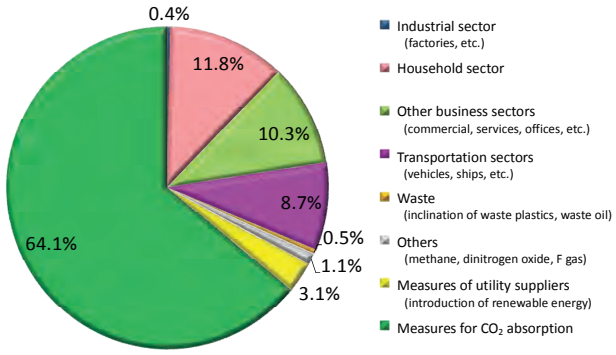


Expected reduction and reduction rate by sector

Sector	Expected reduction (1,000 tons-CO_2)	Ratio (%)
Industrial sector (factories, etc.)	9	0.4%
Household sector	260	11.8%
Other business sectors (commercial, services, offices, etc.)	226	10.3%
Transportation sectors (vehicles, ships, etc.)	192	8.7%
Waste (inclination of plastic wastes, waste oil)	10	0.5%
Others (methane, dinitrogen oxide, F-gas)	25	1.1%
Measures of utility suppliers (introduction of renewable energy)	68	3.1%
Measures for CO_2 absorption	1,406	64.1%
Total	2,195	100%

Note: the total of each item may not match exactly with the figure in the total because those figures are rounded

Reduction rate by sector



GHG Inventory of Kochi Prefecture

Calculated greenhouse gas emissions (GHG Inventory)

(1) Result of calculation

Calculation result of greenhouse gas (GHG) emissions in Kochi prefecture is shown in Graph 1 below.

Graph 1 Calculated greenhouse gas emissions

* Red figures show provisional value

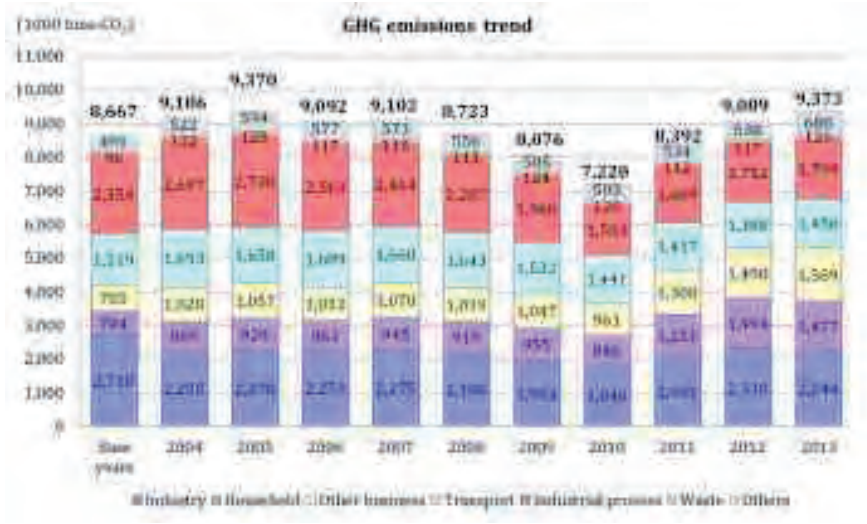
(Unit: 1,000 tons-CO_2)	1990 Base year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total emissions	8,667	9,186	9,370	9,092	9,102	8,723	8,076	7,220	8,392	9,089	9,373
Total emissions - Sequestration	8,667	8,382	8,405	8,029	7,712	7,392	6,745	5,797	7,145	8,488	8,185
Energy-related CO_2 emissions	5,726	5,845	5,913	5,835	5,950	5,769	5,487	5,094	6,057	6,682	6,760
Industry	2,718	2,255	2,270	2,273	2,275	2,188	1,953	1,846	2,081	2,310	2,244
Agriculture, forestry & fisheries	711	409	391	382	461	485	438	438	454	540	495
Construction and mining	169	146	141	155	112	104	93	105	126	130	119
Manufacturing	1,838	1,700	1,738	1,736	1,702	1,599	1,422	1,303	1,501	1,640	1,630
Household	704	869	928	861	945	919	955	846	1,251	1,494	1,477
Other business	785	1,028	1,057	1,012	1,070	1,019	1,047	961	1,308	1,490	1,589
Transport	1,519	1,693	1,658	1,689	1,660	1,643	1,532	1,441	1,417	1,388	1,450
Vehicles	1,193	1,545	1,506	1,533	1,500	1,501	1,399	1,297	1,280	1,260	1,307
Railways	24	19	21	21	21	20	20	19	19	20	22
Domestic vessels	253	77	71	71	75	62	59	66	60	55	58
Domestic airlines	49	52	60	64	64	60	54	59	58	53	63
Industrial process	2,354	2,697	2,738	2,563	2,464	2,287	1,960	1,503	1,689	1,752	1,799
Clinker production	2,282	2,568	2,613	2,428	2,338	2,173	1,862	1,395	1,578	1,652	1,693
Others	72	129	125	135	126	114	98	108	111	100	106
Waste	96	122	125	117	115	111	124	120	112	117	126
General wastes	65	72	76	71	68	72	78	78	70	79	85
Industrial wastes	31	50	49	46	47	39	46	42	42	38	41
Others	491	522	594	577	573	556	505	503	534	538	688
Methane	197	136	127	124	125	126	118	119	119	121	238
Dinitrogen monoxide	156	259	327	320	314	306	278	263	283	283	277
Hydrofluorocarbon	18	56	58	61	70	78	90	96	106	117	160
Perfluorocarbon	105	45	50	40	32	21	7	8	8	8	9
Sulfur hexafluoride	15	26	32	32	32	25	12	17	18	9	4
Sequestration	0	804	965	1,063	1,390	1,331	1,331	1,423	1,247	601	1,188

(2) Emission trend

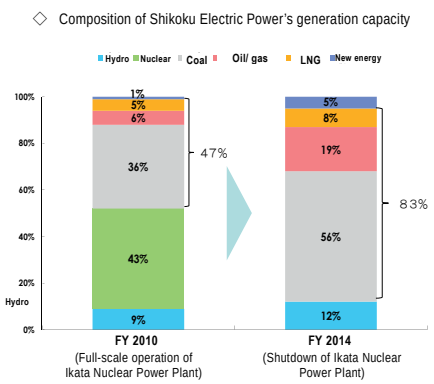
GHG emissions in Kochi prefecture for FY2013 were 9,373,000 tons CO2, 8.1% above the base year (FY1990) emissions (8,667,000 tons CO2).

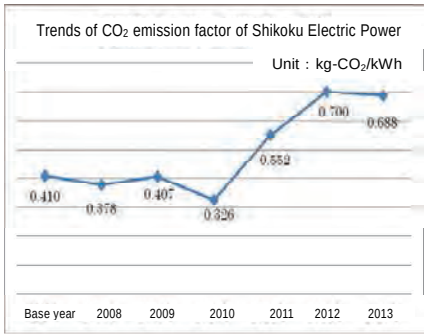
Emissions have followed a declining trend since 2005 before it began to rise in 2011. Emissions increased by 286,000 tons CO2 (3.1%) in 2013 compared to the previous year (FY2012). (See Graph 2)

Graph 2 GHG emission trend



* An upward trend in GHG emissions since 2011 is mainly due to increased dependency on thermal power generation after shut-down of all nuclear power plants across Japan following the Fukushima Daiichi nuclear power plant accident, posing a significantly negative impact to the CO_2 emission factor of electricity grid.



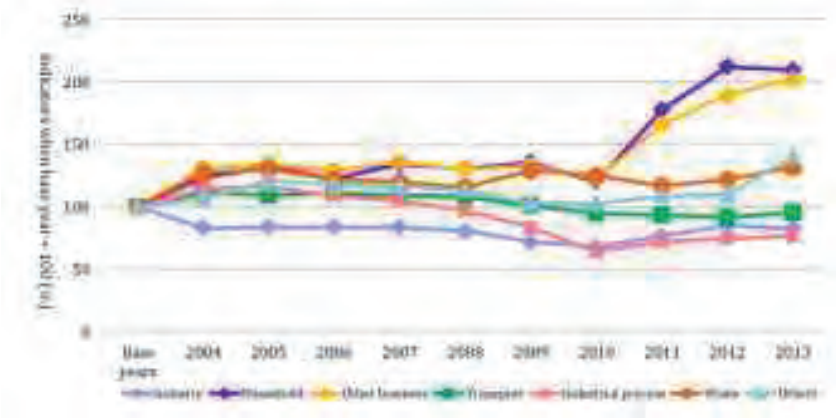


(3) GHG emissions by sector

Across sectors, industry, transportation and industrial process sectors are seeing a decline in emissions compared to the base year (FY1990), while emissions in the household sector, operation and others sector, waste sector, and others have increased from the base year, with a significant increase particularly in the household sector and operations and others sector.

Furthermore, in terms of changes in emissions levels from the previous year (FY2012), there has been an increase in the industry sector as well as non-household sectors (transportation sector, operation and others sector, industrial process sector, waste sector, and others sector). (See Graph 3)

Graph 3 Emission trend by sectors



Summary of Emissions

(1) GHG emissions

Graph 4 provides an overview of GHG emissions.

Observing the trend for GHG emissions, FY2004 through FY2008 saw increased levels compared to the based year (FY1990) before starting to decline in FY2009. However, emissions exceeded the base year level once again in 2012, with an 8.1% increase against the base year in FY2013, up 3.1% from the previous year (FY2012).

Higher emissions in recent years can be mainly attributed to the increased use of thermal power plants as the electricity sources due to the ceased operations in nuclear power plants, posing a significant negative impact on grid emission factors.

Graph 4 Summary of GHG emissions

	1990 (Base year)	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total emissions (1,000t-CO_2)	8,667	9,186	9,370	9,092	9,102	8,723	8,076	7,220	8,392	9,089	9,373
Compared to 1990 (%)	－	+6.0%	+8.1%	+4.9%	+5.0%	+0.6%	△6.8%	△16.7%	△3.2%	+4.9%	+8.1%
Compared to the previous year (%)	－	－	+2.0%	△3.0%	+0.1%	△4.2%	△7.4%	△10.6%	+16.2%	+8.3%	+3.1%

Emission tendency is summarized below for major emission sectors in Kochi prefecture that account for more than 10% of total emissions in FY2013.

[Summary of major sectors]

- **Industry sector**: Hit by the economic downturn arising from the global financial crisis in late FY2008, the sector's emissions have been affected by declining production activities and falling energy demand as well as proactive energy-saving measures, seeing emissions decline during FY2008 through FY2010. The trend of GHG emission decrease reversed in FY2011 due to the increase in electricity emission factor.

- **Household sector**: In addition to the increased number of households and increased size and varieties of home appliances, which have led to the increase in household electricity consumption, grid emission factor has worsened since FY2011 due to the increased dependency on thermal power generation, all contributing to the hike in emissions. While FY2013 saw emissions fall by 1.1% from the previous year (FY2012) thanks to the diffusion of energy-saving measures, it remained a 109.8% increase compared to the base year (FY1990).

- **Other business sector**: Emissions are on an upward trend due to increased energy consumption from increased numbers of air conditioning and lighting equipment to accommodate larger floor space for office and retail shops as well as the advancement in office automation. While electricity consumption in FY2013 was lower than the previous year (FY2012), emissions rose by 6.6% from the previous year (FY2012), up 102.4% when compared to the base year (FY1990).

- **Transportation sector**: As 90% of total emissions in the sector come from automobiles, number of vehicles owned and car usage have a significant impact on sector-wide emissions trends. In FY2013, the rise in automobile ownership contributed to increased fuel consumption, seeing emissions go up by 4.6% from the previous year (FY2012).

- In industrial processes, the majority of emissions come from cement production process. In FY2010, emissions fell due to economic downturn and closure of cement plants. From 2011 onwards, rising demand in the private sector including redevelopment projects and construction of apartment buildings in city areas mostly in the Kanto region has triggered a boost in cement manufacturing, followed by increased clinker production, prompting emissions to go up by 2.7% in FY2013 from the previous year (FY2012), while it was down 23.6% compared to the base year (FY1990).

(2) GHG emissions taking into account forest carbon sequestration

In order to be qualified as the “source of forest carbon sequestration” under Kyoto Protocol, forest has to meet the following criteria in addition to being subject to artificial work which took place in 1990 or onwards.

- Afforestation: trees were planted in an area where there had been no forest for the past 50 years
- Reforestation: trees were planted in an area where there had been no forest as of 1990
- Forest Management: human activities to appropriately perform various forest functions in sustainable manners (such as development and conservation of forests)

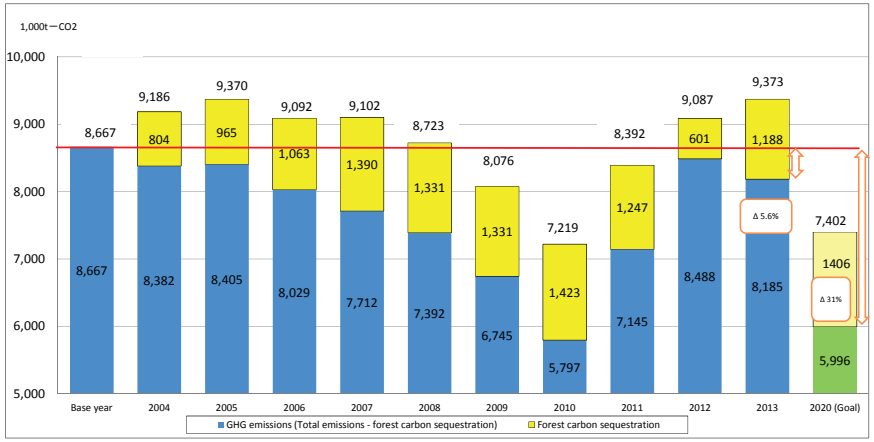
Graph 5 indicates GHG emissions for the base year in Kochi prefecture as well as emissions taking into account forest carbon sequestration (total emissions – forest carbon sequestration levels) from 2004 onwards.

Since 2004, GHG emissions taking into account forest carbon sequestration have consistently fallen below the base year level, with 2013 emissions down 5.6% compared to the base year, also down 3.5% from the previous year (FY2012).

Looking at figures since 2004, forest carbon sequestration levels peaked in FY2010 at 1,423,000 tons CO_2, however have been on a decline since due to factors including a significant decline in sequestration levels of nationally owned forests, down to 1,188,000 tons CO_2 in FY2013.

Graph 5 GHG emissions and forest carbon sequestration levels

(Unit: 1,000t-CO_2)	1990 (Base year)	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total GHG emissions	8,667	9,186	9,370	9,092	9,102	8,723	8,076	7,220	8,392	9,089	9,373
Forest carbon sequestration	0	804	965	1,063	1,390	1,331	1,331	1,423	1,247	601	1,188
GHG emissions (Total emissions - forest carbon sequestration)	8,667	8,382	8,405	8,029	7,712	7,392	6,745	5,797	7,145	8,488	8,185
Reduction rate (to base year)	-	△3.3%	△3.0%	△7.4%	△11.0%	△14.7%	△22.2%	△33.1%	△17.6%	△2.1%	△5.6%



(3) Progress against GHG emissions reduction target

“Kochi Prefecture Action Plan against Global Warming” sets out a goal to cut GHG emissions by 31% compared to the base year (FY1990) by FY2020.

- Action plan goal: –31.0% compared to FY1990 by FY2020
- Achievement status: –5.6% compared to FY1990 (as of FY2013)

Project for promotion of global warming prevention efforts by citizens in Kochi Prefecture (New Energy Promotion Division)

○Initiative overview

1. Kochi prefectural assembly on global warming prevention for promotion of global warming prevention measures

The prefectural assembly was launched in September 2008 for key stakeholders e.g. business operators, NPOs and the government to collaborate and cooperate in setting out a prefectural initiative for global warming prevention fully engaged by residents in the prefecture.

The assembly was originally composed by five groups: “group for residents’ initiatives promotion,” “group for plastic bags reduction activities promotion,” “group for encouragement of public transportation use,” and “group for carbon sink measures”; In May 2010, the assembly was restructured into following three groups, and as of the end of August 2015 involves 257 member bodies.

(1) Major activities by groups in JFY2015

[Residents’ initiative group]

The group facilitates household efforts for CO2 emissions reduction by making results visible and grasping opportunities to increase the number of residents who take on global warming prevention activities.

Main activity themes

- Efforts to reduce carrier bags
- Host moon night concerts
- Redistribute public transportation eco-point to the society and build public awareness
- Other projects as proposed

[Businesses Group]

The group facilitates efforts including reducing CO2 emission levels related to business operations whilst making results visible, and sets out a framework for sustainably increasing the number of businesses and employees that engage in global warming prevention activities.

Main activity themes

- Publicize and increase popularity of projects promoting businesses committed to stopping global warming
- Promote wider recognition of eco-friendly management through environmental forums
- Promote efforts on environment management such as Eco-action 21
- Publicize and dispatch energy-saving advisors
- Promote introduction of energy-saving equipment
- Other projects as proposed

[Administrative Group]

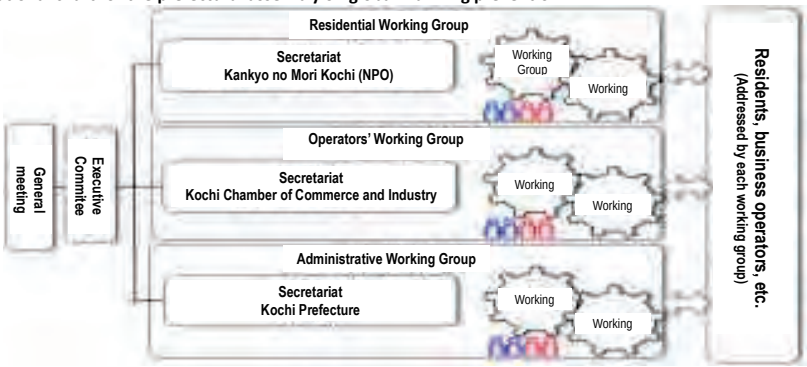
The government directly engages in global warming measures and promotes regional efforts through enhanced coordination with residents, businesses and other stakeholders in the prefecture.

グリーン購入

Main activity themes

- Develop and promote action plans in local public bodies
- Promote eco-friendly office activities
- Promote green purchases
- Utilize and coordinate with global warming prevention activity facilitators
- Educate residents on global warming prevention
- Foster use of renewable energy in public facilities

Organizational chart for the prefectural assembly on global warming prevention



(2) Achievements by the 3 groups in 2014

[Prefectural Group]

The group held four meetings in 2014.

Detailed anti-global warming measures involving residents were proposed through platforms such as a project monitoring committee for giving back to society with transportation eco-point utilization and a working group for reducing carrier bags.

The group made efforts to promote utilization of eco-bookkeeping in households by distributing leaflets for families, also offering in-school classes in elementary schools throughout Kochi to familiarize the idea of eco-bookkeeping for children.

In addition, as part of the “Moon Night SHIKOKU” light down campaign event, which is implemented through coordinated efforts by the four Shikoku prefectures, a “moon night concert” was held wherein audiences could enjoy the performance under the moonlight as well as increase awareness of CO2 emission reduction.

Eco-bookkeeping for households

Eco-bookkeeping for children

Moon Night Concert advertisement

- WG for reducing carrier bags (3 meetings)

The group reached out to businesses / bodies in the prefecture and set out the “Men (and women) should use my-bags too! campaign.”

During the two-month campaign period, 1,417 participants said no to unnecessary carrier bags, contributing to a total reduction of 2.67 tons CO2.

It also held a “supermarket competition challenge 2014 for least carrier bags” where 61 stores from 8 major supermarkets participated to compete which store had the highest percentage of customers not using carrier bags.

Campaign 2014 poster

Campaign 2014 sticker

- Transportation eco-point utilization and redistribution project monitoring committee (2 meetings)

As part of the project to redistribute eco-points generated through the “Desuka” IC card, a free “Desuka” card for grade-schoolers is lent out to elementary school students using trams and buses for external school activities, fostering awareness building on global warming prevention through use of public transportation.

In FY2014, the committee called on prefectural assembly bodies for donations to the project, successfully gathering 770,000JPY from 33 bodies as funding for project operations. As of March 2015, it consisted of 3,023 users.

External school activities using free Desuka cards

[Businesses Group]

The group held one meeting during 2014.

An environmental committee held one meeting as a working group, which decided on a policy to address environmental issues according to industry.

As part of publicizing and popularizing projects that promote businesses committed to stopping global warming, 15 businesses declared their commitment to unique efforts to prevent global warming.

In promoting wider recognition of environmentally friendly management, the “environment management forum” was held where 63 participants took part in keynote lectures and presentations on challenges in sustaining Eco-action 21 measures.

Regarding energy-saving advisors, they were dispatched free of charge to 6 corporations on 8 occasions, offering support on energy-saving measures.

In promoting efforts towards environment management systems such as Eco-action 21, the group held an elementary seminar with 14 participants for disseminating Eco-action 21.

Flier for the environment management forum

Flier for the Eco-action 21 elementary seminar

Flier for dispatching energy-saving advisors

[Administrative Group]

In FY2014, the group held two panel meetings and one working group meeting aimed at supporting the development of action plans by local municipal public bodies (concerning administrative projects).

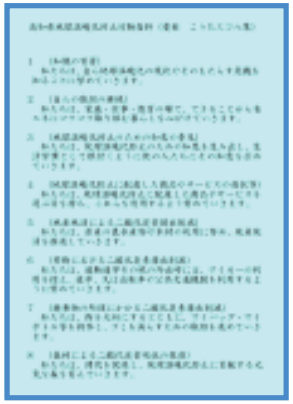
There were also efforts towards promoting environmentally friendly office activities and facilitating the development of basic policies for green purchases.

Regarding the utilization of and coordination with global warming prevention activity facilitators, 20 facilitators participated in events hosted by 3 municipalities and the prefecture that provided a wider platform for cooperation with such facilitators, in which they engaged in building public awareness on global warming prevention.

In enhancing awareness towards preventing global warming among residents in the prefecture, the group engaged in electricity/energy-saving efforts, calling for cutting down on electricity in 20 municipalities through PR magazines and implementing further energy-saving measures at public offices and facilities in 33 municipalities. Also, as an on-going effort from 2011, it encouraged participation in the campaign to reduce carrier bags through municipal PR magazines, which attracted 497 participants from 4 municipalities and prefectural office in the use-fewer-carrier-bags campaign, successfully cutting 0.652 tons CO2.

[Action agenda on global warming prevention in Kochi prefecture AKA Kochi’s 8 eco-plans]

To realize a low-carbon society capable of sustainable development with less burden on the environment, the action agenda on global warming prevention in Kochi was set out on May 21, 2010 in the general meeting of the prefectural assembly, promoting initiatives taken on by residents to prevent global warming.



2 Promotion of Cool-Biz Shikoku

[Jointly executed by the 4 Shikoku prefectures]

The Cool-Biz campaign encourages workers to dress lightly and keep air conditioning settings at 28˚C, in the aim of using less electricity and reducing greenhouse gas emissions.

In FY2015, the campaign was rolled out from May to October, and awareness-building flyers were provided to participating organizations.

3 Promotion of Warm-Biz

[Jointly executed by the 4 Shikoku prefectures]

The Warm-Biz campaign aims to cut greenhouse gas emissions from energy consumption by keeping indoor heating settings during winter at 20℃ (19℃ for the prefectural office).

In FY2014, the campaign was rolled out from November 2014 to March 2015, and awareness-building flyers were distributed.

FY2015 Cool-biz Shikoku poster

FY2014 Warm-biz poster

4 Promotion of Moon Night SHIKOKU

[Jointly executed by the 4 Shikoku prefectures]

During September 24 through 30, the week of harvest moon, a light down event “Moon Night SHIKOKU” was held as part of global warming measures, encouraging people to turn off unnecessary lighting.

September 28 was particularly designated as a special light down day, which called for lit up facilities to switch off their illumination simultaneously and households to turn off unnecessary lighting for the duration of two hours between 8pm and 10pm.

In FY2015, the campaign gained participation of 76 facilities and 34 bodies, successfully reducing energy consumption by 6,488KWH.

5 Promoting development of EV charging infrastructure

In terms of furthering penetration of electric vehicles, Kochi set out its “vision for developing next-generation EV charging infrastructure” in July 2013, facilitating the development of infrastructure for charging electric vehicles in the prefecture. As of March 2015, registration documents for EV charging equipment based on the vision have been issued in 19 municipalities for 53 rapid chargers and 42 regular chargers.

Forest sequestration and emissions reduction efforts in Kochi

(Division for Coexisting with the Environment)

1 Alternative fuel utilizing timber resources

(1) Overview

Kochi prefecture has worked on a regional model project for emissions trading from the perspective of effectively utilizing forest resources and tackling global warming. The project involves a power generation facility at the Kochi plant of Sumitomo Osaka Cement Co., Ltd. where blend fuel from left over timber is used as an alternative to coal fuel, the CO2 reduction levels from which are then monitored and assessed. Its aim is to effectively utilize forest resources and circulate funds by using the Offset Credit (J-VER) Scheme ※1 launched in 2008.

(2) Progress

(i) Development of facilities

In line with the "sun and forest" clean energy generation plan set out by Susaki city and from the viewpoint of contributing to global warming measures and promoting utilization of unused regional resources (thinning wood etc.), a power generation facility at the Kochi plant of Sumitomo Osaka Cement Co., Ltd. installed equipment for shredding, selection, storage and supply in order to use thinning wood for blend fuel as an alternative to coal. The project subsidized by the Ministry of the Environment entitled "FY2006 project for developing advanced regional introduction of renewable energy" was utilized.

(ii) Delegation of the timber resource energy utilization project

With the development of facilities using blend fuel from resources including thinning wood, the timber resource energy utilization project was delegated to Sumitomo Osaka Cement Co., Ltd. Kochi plant in October 2007. The objective was to become the forerunner of future domestic emissions trading where the prefecture undertakes the task of checking and certifying CO2 emission levels achieved through the use of timber biomass fuel and transacts with environmentally progressive corporations in the form of issuing emission reduction certificates on a negotiation basis.

In June 2008, the project was designated as a VER certified / managed pilot project of the domestic emission reduction initiative by the Ministry of the Environment, making it the first ever domestic Offset Credit (J-VER) project enabling issuance of tradable credits.

Specifically, utilization of unused timber in the region including thinning wood and leftover forest wood which are cyclic resources as timber-based biomass (5,000t of timber utilized in both 2011 and 2012, 5,700t in 2010, 3,300t in 2009, 2,200t in 2008, and 1,100t in 2007) contributes to reduced usage of coal, a type of fossil energy.

Timber offcuts remained in forest

Crushing and chipping timber offcuts

(3) Offset Credit (J-VER) Scheme

CO2 reduction at Sumitomo Osaka Cement Co., Ltd. Kochi plant are strictly monitored within the plant and reported to the prefecture. The prefecture then creates a monitoring report based on such results and submits this to a third party verification organization approved by the Scheme. The verification organization performs an on-site assessment, which result will be submitted as a report to the certifying organization, Certification Center on Climate Change. The prefecture will submit a certification request to the Certification Center on Climate Change, where the J-VER certification committee will make the evaluation. Credit issuance will take place upon approval.

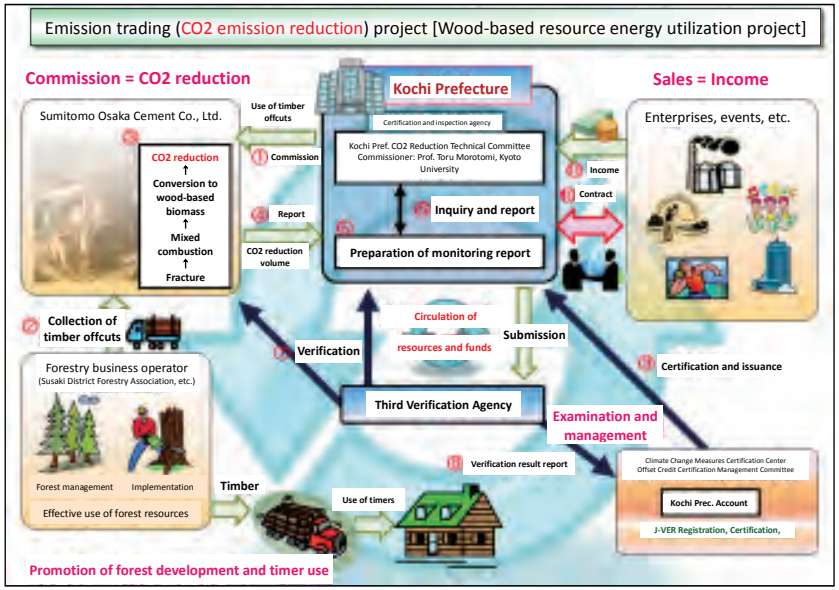
―Glossary―

*1 Offset Credit (J-VER) Scheme

The Scheme established by the Ministry of Environment. "J-VER" refers to Verified Emission Reduction (VER) in Japan. Unlike emission reduction credits of the Kyoto Protocol, J-VER is the voluntary right which meets a certain criteria and utilized for Carbon Offset*2.

*2 Carbon Offset

Carbon Offset is the idea concerning to unavoidable GHG emission including CO2 in daily life and economic activities to make up for GHG emissions by [1] making as much effort as possible on reducing emission volume, at first, [2] estimating GHG emissions despite of the effort, and [3] investing GHG reduction activities equivalent to the emission volume. In terms of promoting reducing effort of entities themselves performing offset, Carbon Offset is expected to promote initiatives of business and household sectors in which GHG emission have been increasing.



2 Efforts utilizing forest carbon sequestration

(1) Overview

Kochi is among the prefectures with the richest of forests, where woodland makes for 84% of its total area. Forest accumulation is as high as 180.08 million m3 (2013).

However, fewer numbers of caretakers and stagnating wood price levels have led to the degradation of artificial forests. In order to contain this problem and to increase forest carbon sequestration levels as a means to tackle global warming, further forest management is necessary.

In dealing with the issue, Kochi is working on a model project concerning forest carbon sequestration trading, wherein increased levels of forest carbon sequestration resulting from forest maintenance can be converted into credits.

In the project, additional levels of forest carbon sequestration from thinning prefecture-owned forests are monitored and verified through on-site surveys, which are converted into credits through the Offset Credit (J-VER) Scheme. This facilitates the circulation of funds into forest management.

Forests without thinning

Thinned forests

3 years after thinning

(2) Progress and effort

Since 2006, Kochi has been working on a forest-planning project in coordination with environmentally progressive corporations, implementing forest resource surveys for forest areas maintained through thinning and issuing CO2 sequestration certificates based on the prefecture's unique scheme design. On a national level, the Offset Credit (J-VER) Scheme relating to forest carbon sequestration was launched in 2009, which converts greening, thinning, and sustainable forest management efforts into credits. Project categories and details are as follows:

(i) Forest management projects

a. Projects designed to promote thinning

The goal is to securely achieve sequestration levels (3.8%) for the first commitment period of the Kyoto Protocol; aimed to specifically promote thinning

b. Projects designed to promote sustainable forest management

Aimed to secure long-term carbon sequestration levels through continuous forest management

(ii) Greening projects

Targeted towards sequestration levels for forests planted in areas falling outside the scope of forest planning zones set out in the Forest Act of April 1, 2008, which are eligible for integration into the planning zone prescribed in the Act.

Currently, Kochi is engaged in forest management projects designed to promote thinning which target prefecture-owned forest areas as part of a specialized effort to promote thinning.

Credit issuance （As of October 2015）

Offset credit issuance		22,562t－CO2
	(From emissions reduction)	20,257t－CO2
	(From forest carbon sequestration)	2,305t－CO2 (Buffer*3 68t-CO2)
Total carbon offsets		9,003t－CO2

－Glossary－

*3 Buffer

Amount equivalent to 3% of credit issued is secured as supplementing credit for "buffer management account" of the J-VER Scheme Secretariat to compensate losses associated with natural disturbance, unavoidable conversion of land use, etc.

This buffer rate, however, may be changed in response to situations of natural disturbance, conversion of land use, etc.

3 Sales of carbon offset credits

Issued credit has been utilized for carbon offsetting※2 initiatives through corporate activities, commodities, events, etc.

In 2004, offsets were applied to emissions from events such as the Casio World Open (golf tournament) as well as from public works. There have been 228 cases (of which 10 have been delegated) of offset credit sales so far.

Contract with the Casio World Open organizer

Carbon offset credit sales from 2014 onwards

（As of October 2015）

Credit purchased	Contract concluded	Offset activity
1	2014.4	Carbon offset publication
9	2014.4	Offsetting public works
6	2014.4	Offsetting public works
2(注 1)	2014.5	Offsetting events
1(注 1)	2014.5	Carbon offset pin badge
39(注 2)	2014.5	Carbon offset postcards
5	2014.5	Offsetting public works
5	2014.5	Offsetting public works
5	2014.5	Offsetting public works
3	2014.5	Offsetting public works
6	2014.5	Offsetting public works
4	2014.5	Offsetting public works
5	2014.5	Offsetting public works
5	2014.5	Offsetting public works
3	2014.5	Offsetting public works
1	2014.6	Carbon offset publication
23	2014.6	Offsetting public works
5(*1)	2014.6	Carbon offset forest machinery
34	2014.6	Offsetting public works
8	2014.6	Offsetting public works
4	2014.6	Offsetting print toners
4	2014.7	Carbon offset homemade lunches
10	2014.7	Offsetting public works
1(*1)	2014.8	Offsetting the summer cooling festival
3	2014.8	Offsetting the disaster prevention exhibition
3	2014.9	Offsetting partial replacement works on air conditioners
3(*1)	2014.9	Offsetting partial replacement works on air conditioners
1	2014.9	Carbon offset publication

6	2014.9	Offsetting public works
5	2014.9	Offsetting public works
16	2014.9	Offsetting public works
1(*1)	2014.10	Offsetting tours
6	2014.10	Offsetting public works
14	2014.10	Offsetting public works
9	2014.10	Offsetting public works
6	2014.10	Offsetting public works
7	2014.10	Offsetting public works
6	2014.10	Offsetting public works
20	2014.11	Offsetting shuttle service to event galleries
8	2014.11	Offsetting emissions in corporate office
6	2014.11	Offsetting public works
5	2014.11	Offsetting public works
26	2014.12	Offsetting public works
2(*1)	2014.12	Carbon offset forest machinery
8	2014.12	Offsetting public works
4	2014.12	Offsetting public works
3	2014.12	Offsetting public works
1(*1)	2015.2	Carbon offset commodities
13	2015.2	Carbon offset publication
1(*1)	2015.2	Carbon offset pin badge
25	2015.3	Offsetting of public works
13(*1)	2015.3	Offsetting emissions from election campaigns
20	2015.3	Offsetting emissions from transportation
20	2015.3	Offsetting public works
18	2015.3	Offsetting public works
4	2015.3	Carbon offset homemade lunches
6	2015.3	Offsetting public works
5	2015.4	Offsetting public works
4	2015.4	Offsetting public works
7	2015.4	Offsetting public works
3(*1)	2015.4	Offsetting events
10	2015.5	Offsetting community cycling
4	2015.5	Offsetting print toners
5	2015.6	Offsetting public works
7	2015.6	Offsetting public works
5	2015.6	Offsetting public works
37(*1)	2015.6	Offsetting public works
3	2015.6	Offsetting public works
6	2015.6	Offsetting public works
3	2015.6	Offsetting public works
30(*2)	2015.7	Offsetting emissions from activity projects
14	2015.7	Offsetting public works
15	2015.7	Offsetting public works
1(*1)	2015.7	Offsetting emissions from research activities
3	2015.7	Offsetting the disaster prevention exhibition
1(*1)	2015.7	Offsetting the summer cooling festival
7	2015.9	Offsetting public works
1(*1)	2015.9	Offsetting tours
11	2015.9	Offsetting public works

(*1) Forest carbon sequestration credits

(*2) Sales through delegation

4 Prospect and potential

Currently, Kochi and other prefectures are seeing emissions trading and Carbon Offset initiatives take off as part of wider measures addressing global warming. By utilizing abundant forest resources available throughout the prefecture, Kochi will continue to engage in various projects including those designed to reduce emission with wood pellet boilers or those executed through forest management. This will contribute to the vitalization of economic activities in the hilly and mountain areas as well as building awareness among individuals on global warming measures.

5 J-VER Scheme in Kochi prefecture

The Kochi J-VER Scheme received national accreditation in February 2010 as a scheme set out in accordance with the J-VER Scheme by the Ministry of Environment. It shares the same qualities as the J-VER Scheme, and not only does it allow the process of requesting / registering projects to be completed within the prefecture but also contributes to easing the burden on businesses by not charging administrative fees for project requests and credit issuance. Credits issued through the Kochi J-VER Scheme are recorded in the same register as that of the Ministry of the Environment's J-VER, and can be used as credits of equal quality.

It should be noted that the Kochi J-VER Scheme expired at the end of March 2013. Currently, there are ongoing efforts through the newly established Kochi J-Credit Scheme as a regional version set out in accordance with the new national J-Credit Scheme.

Kochi continuously aspires to facilitate the quantification of forest carbon sequestration as a way of creating new value for forest resources and foster further credit issuance, in so doing contribute to creating jobs and vitalizing the forestry industry by supporting forest maintenance.

Registered projects under the Kochi J-Credit Scheme (As of October 2015)

No. of cases	Project name	Project duration	Area covered (ha)	Estimated sequestration at registration (tons CO2)	Credit certification date	Credit certified (tons CO2)
1	Forest thinning promotion project in Ryoma, Tsuno town, Kochi	2010.5.11 ～2018.5.10	32.43	432	2011.2.4	28
					2012.3.15	192
					2013.10.18	273
2	Forest thinning promotion project in Shimanto Kuroshio, Nakatosa town, Kochi	2007.4.1 ～2015.3.31	142.24	3,006	2011.2.4	879
					2013.10.18	2,299
3	Forest thinning promotion project in Yutorisuto forest, Otoyo town, Kochi	2007.4.1 ～2015.3.31	22.08	808	2011.5.30	545
4	Forest thinning promotion project in Kumonoue, Yusuhara town, Kochi	2007.11.1 ～2015.10.31	154.55	2,845	2011.5.30	273
5	GHG sequestration project in artificial forests by Kochi forest maintenance authority ～Forest planning with fresh breeze from trees～	2008.4.1 ～2016.3.31	24.68	835	2011.3.28	531
6	CO2 forest sequestration project in Goiga forest, Aki city, Kochi	2010.10.1 ～2018.9.30	67.25	818	2012.3.15	401
					2013.3.25	468
7	Forest thinning promotion project "forests with glorious morning sunshine" in Tosa town, Kochi	2007.4.1 ～2015.3.31	14.24	296	2013.1.25	193
8	Shimanto town forest association GHG sequestration forest thinning promotion project ～vibrant mountains, rivers, ocean, nature and people～	2009.4.1 ～2017.3.31	100.03	1,446	2013.1.25	1,225
9	Ino town GHG sequestration forest thinning promotion project ～ protecting the fresh streams of Niyodo rive rthrough forest maintenance～	2011.4.1 ～2019.3.31	21.64	213	2013.5.31	236
10	CO2 sequestration project in Kochi city Yosakoi forest, Kochi	2009.4.1 ～2017.3.31	37.60	952	2012.3.15	715
					2013.3.25	341
11	GHG sequestration and forest thinning promotion project in Mihara village, Kochi	2009.4.1 ～2017.3.31	35.99	586	2013.5.31	607
12	Forest thinning promotion project for city-owned forests by Shimanto city office, Kochi	2014.4.1 ～2021.3.31	95.90	2,987	-	-
		Total	748.63	15,224		9,206

6 Eliminating double-counting of GHG emissions reduction and sequestration values

(1) Eliminating double-counting of GHG emissions reduction and sequestration levels by multiple certifying bodies

As greenhouse gas levels measured for emissions reduction and sequestration are not physically visible, there should be due consideration as to avoid double accreditation from other schemes such as issuance of CO2 sequestration certificates by local public bodies when certifying and issuing credits for greenhouse gas emissions reduction and sequestration under the project.

Under the Offset Credit (J-VER) Scheme, in case there is confirmed double-counting by other certifying bodies, either the GHG emissions reduction volume or sequestration levels will be nullified. If this proves difficult, the credit equivalent to the reduction/sequestration levels concerned will be compensated for.

(2) Eliminating double-counting of emissions publicized voluntarily in social/environmental reports

Kochi prefecture, through its website and White Paper on the environment, clearly sets out the Offset Credit (J-Ver) Scheme as well as offset credits issued and carbon trading/offset levels achieved through the project, thereby eliminating double-counting.

Promoting utilization of wood-based biomass in Kochi

(Wood Utilization Promotion Division)

○ Current status and challenges

Effective use of wood-based biomass not only contributes to reducing CO2 emissions through its carbon neutralizing property and to the rejuvenation of forest / timber industries, but is also expected to foster positive ripple effects to regional economies by preventing outflow of energy spending on fossil fuels sourced from other prefectures and nations and instead gearing towards a system for circulating energy and funds within the region.

For this purpose, Kochi has put "expansion of wood-based biomass use" as one of the pillars for its industry development strategy (forestry sector) in the "second-stage Kochi industry rejuvenation project" (developed March 2013), and is working on measures for vitalizing regional industries. As a quantitative goal, Kochi is aiming to boost levels of wood-based biomass use from 227,000 tons at project development up to 530,000 tons by 2021.

With the introduction of wood-based biomass boilers in the prefecture mainly for greenhouse horticulture, we estimate an annual reduction in heavy oil by approximately 5,000 kiloliters, equivalent to 13,600 tons worth of CO2 emissions reduction, which would account for emissions from around 2,600 households.

In addition to efforts towards utilizing energy generated from wood-based biomass boilers, two wood-based biomass power generation facilities in the prefecture have begun operation in 2015 that takes advantage of the Feed-in Tariff scheme, further accelerating use of renewable energy involving wood-based resources.

Meanwhile, for utilization of wood-based biomass energy, it is essential to secure stable supply of wood-based fuel by ensuring procurement of raw wood. In order to thoroughly respond to increasing demand, Kochi is putting in great efforts to build a framework for ensuring stable supply of raw wood in cooperation with forest-related stakeholders in the prefecture.

○Implementation of measures

(Implemented measures)

In FY2014, there were continuous efforts to support the introduction of wood-based biomass boilers for greenhouse horticulture and hot springs.

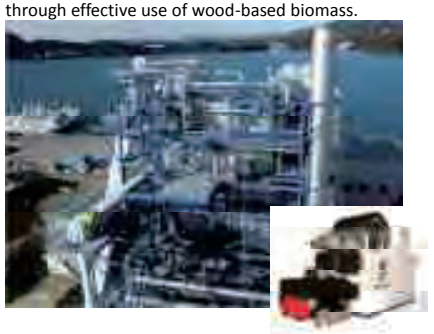
We also encouraged businesses to install wood-based biomass power generation facilities in line with the Feed-in Tariff Scheme.

- Supported introduction of 46 wood pellet boilers
- Supported installation of wood-based biomass power generation facilities in two locations

(On-going measures)

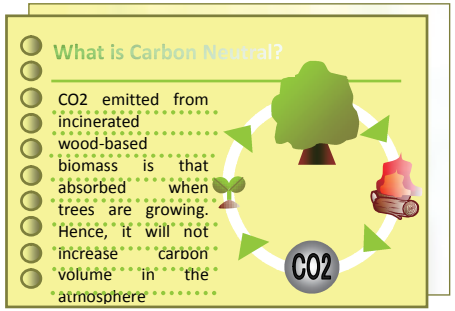
In FY2014, Kochi provided ongoing backing for the introduction of wood-based biomass facilities, also offering operational guidance support to sufficiently comply with national certification guidelines.

The situation concerning the application of wood-based biomass is drastically changing with the additional aspect of power generation to its conventional use in architecture / paper manufacturing and use of generated heat. Measures to fully utilize forest resources including unused wood would be essential in facilitating forest maintenance and vitalizing mountain village areas in the prefecture. Kochi will continue to set eyes on this trend and actively engage in efforts on regionally sourced and regionally consumed energy through effective use of wood-based biomass.



Wood pellet boiler (Shimoominagawa, Okawa village)

Wood-based biomass power generation facility (Niida, Kochi city)



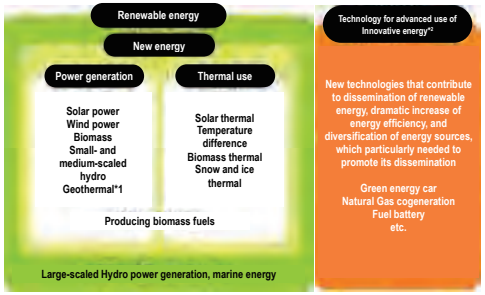
Promoting introduction of new energy
(New Energy Promotion Division)

○Overview

There is increased attention towards renewable energy sources such as solar photovoltaic and wind energy from the perspective of global warming measures and energy security.

Renewable energy is such that lessens the burden on the environment and can be repeatedly generated from the natural environment.

Among which, new energy means sources that are technologically available for practical use but still lacks maturity in terms of economics for wider application.



*1 Small- and medium-scaled hydro power generation should be less than 1,000kW, geothermal power generation should be those with binary system.
*2 Those not recognized as new energy but needed for being disseminated.

○Implementation of measures

1 Developing the vision for new energy

To facilitate the introduction of new energy involving regional resources such as sunlight, wind energy and forests in the prefecture, local municipalities and related bodies, a “regional vision for new energy" was developed to address regional characteristics and potentials for each area.

Currently, in addition to the prefecture, 17 municipalities and 2 wider regions have developed their own regional vision for new energy.

On a prefectural level, the “Vision for new energy in Kochi” was set out in March 2011, detailing measures towards the introduction of new energy in the aim of fully utilizing abundant new energy resources and contributing to combating global warming, as well as supporting industry revitalization and enhanced quality of life for Kochi residents. (To be revised in March 2016)

[Development of the vision on new energy]

Prefecture / municipalities	Title	Period of formulation	Remarks
Kochi Pref.	Shikoku Region Energy Vision [priority theme] “Shikoku 4 prefectures Common Vision for Promotion of Wind Power Generation”	Feb. 2005	
	Tosa Bay Regional Energy Vision [priority theme] “Utilization and survey of offshore wind energy”	Feb. 2005	Prefectural Institute of Fishery
	Kochi Prefecture New Energy Vision	Mar. 2011 (revised in Mar. 2013) To be revised in Mar. 2016	Mar. 1997 Formulation of Kochi Prefecture Regional New Energy Vision

Prefecture / municipalities	Title	Period of formulation	Remarks
Kochi city	Kochi City New Energy Vision	Mar. 2013	
Muroto City	Muroto City Regional New Energy Vision	Feb. 2006	
Aki City	Aki City Regional New Energy Vision	Feb. 2003	
	Aki City Regional New Energy Vision [priority theme] “Study on concrete forest biomass utilization”	Feb. 2006	
Tosa City	Tosa City Regional New Energy Vision	Mar. 1998	
Susaki City	Susaki City Regional New Energy Vision	Feb. 2006	
Shimanto City	Nishi-Tosa Village Regional New Energy Vision	Mar. 2002	
	Nishi-Tosa Village Regional New Energy Vision [priority theme] “Possibility of cascaded use of biomass”	Feb. 2004	
Konan City	Konan Kami Regional New Energy Vision	Feb. 2008	
	Konan Kami Regional New Energy Vision [priority theme] “Regional revitalization and realization of low-carbon society by utilization of used forest biomass”	Feb. 2009	
Kami City	Kahoku Town Regional New Energy Vision	Mar. 2001	
	FY2007 Konan Kami Regional New Energy Vision	Feb. 2008	
	FY2008 Konan Kami Regional New Energy Vision (priority theme) “Regional revitalization and realization of low-carbon society by utilization of used forest biomass”	Feb. 2009	
Toyo Town	Toyo Town Regional New Energy Vision	Feb. 2003	
	Toyo Town Regional New Energy Vision [priority theme] “Feasibility survey of bio-diesel fuel project”	Feb. 2004	
Tano Town	Tano Town Regional New Energy Vision	Feb. 2005	
Yasuda Town	Yasuda Town Regional New Energy Vision	Feb. 2004	
Ino Town	Ino Town Regional New Energy Vision	Feb. 2006	
Naka-Tosa Town	Naka-Tosa Town Regional New Energy Vision	Feb. 2004	
Sakawa Town	Sakawa Town Regional New Energy Vision	Feb. 2007	
Yusuhara Town	Yusuhara Town Regional New Energy Vision	Mar. 2009	
	Yusuhara Town Regional New Energy Vision [priority theme] [Survey for eboshiyama wind power generation project”	Feb. 2007	
Shimanto Town	Taisho Town Regional New Energy Vision	Mar. 1998	Former Taisho Town
Otsuki Towen	Otsuki Town Regional New Energy Vision	Feb. 2003	
14 municipalities in Western Kochi *1	Western Kochi Prefecture Regional New Energy Vision	Feb. 2004	
5 towns and villages in Ryohoku region *2	Kochi Prefecture Ryohoku Regional New Energy Vision	Jun. 2004	

*1: Former Nakamura city, Sukumo city, Tosa-shimizu city, former Kubokawa town, Yusuhara town, former Onomi village, former Higashi-tsuno village, former Saga town, former Taisho town, former Okata town, Otsuki town, Former Towa village, former Nishi-Tosa village, Mihara village
*2: Motoyama town, Otoyo town, Tosa town, Okawa village, former Hongawa village

2 Introduction of new energy

For new energy sources including wind power, solar thermal energy and wood-based biomass, various measures have been set out on a national level to support application.

In Kochi, the introduction of new energy is being facilitated such as through utilizing the national subsidy scheme for facilities and equipment so as to contribute to the global environment as well as to boost popularity and build awareness.

◆Abundant forest resources

84% of forests rate the highest in Japan!!

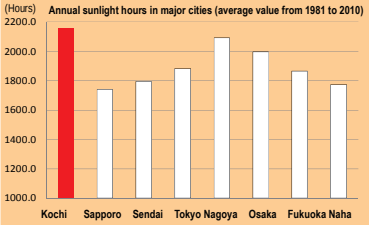
Table: Forest rate by prefecture (top-5 prefectures) As of Mar. 31, 2012

Prefecture	Forests rate (%)	Forest area (ha)	Land area (ha)
Kochi	84%	596,783	710,516
Gifu	81%	861,636	1,062,117
Nagano	79%	1,069,673	1,356,223
Shimane	78%	525,589	670,796
Yamanashi	78%	347,689	446,537
Nationwide	67%	25,081,390	37,291,870

Source: Website of Forestry Agency
http://www.rinya.maff.go.jp/j/keikaku/genkyou/index2.html

◆ Long sunlight hours

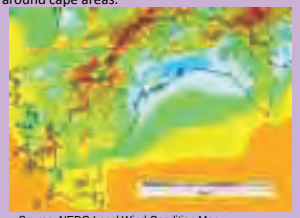
2,373 hours in 2013 are the highest level in Japan!!
(Observed at Kochi Meteorological Observatory)



Source: Website of Japan Meteorological Agency
http://www.jma.go.jp/jma/menu/report.html

◆Good wind conditions

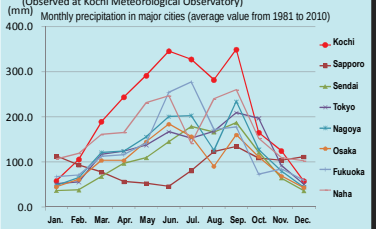
Relatively good conditions in mountainous regions and around cape areas.



Source: NEDO Local Wind Condition Map
http://app8.infoc.nedo.go.jp/nedo/

◆Plentiful precipitation

2,327 mm of annual precipitation in 2013 is the highest level in Japan!!
(Observed at Kochi Meteorological Observatory)



Source: Website of Japan Meteorological Agency
http://www.jma.go.jp/jma/menu/report.html

◆ Introduction status in the prefecture

[Wind power generation facility]

Municipality	Plant	Implementing body	Output
Kanan city	Noichi wind power plant	Kochi prefecture	250kW× 1 unit
Kami city	Hokigamine wind power plant	Kochi prefecture	750kW× 2 units
Otoyo town	Otoyo wind power plant	Kochi prefecture	600kW× 2 units
Tsuno town	Hayama wind power plant	Hayama Wind Power Plant Co., Ltd.	1,000kW× 20 units
Yusuhara town	Yusuhara wind power plant	Yusuhara town	600kW× 2 units
Otsuki town	Otsuki wind farm	Otsuki Wind Power Co., Ltd.	1,000kW× 12 units

[Solar PV power generation facility]
(Accounting for all certified equipment between July 2012and April 2015)

Certified equipment	No. of cases	Introduced capacity
Below 10kW	6,037	29,237kW
10kW and above	5,496	676,666kW
Of which mega solar (1,000kW and above)	108	455,221kW

[Small hydro power plants (below 1,000kW)]

Municipality	Name	Implementing body	Output
Muroto city	Kiragawa power plant	Shikoku Electric Power Co., Inc.	256kW
Aki city	Namuragawa power plant	Shikoku Electric Power Co., Inc.	420kW
Shimanto town	Matsubakawa power plant	Shikoku Electric Power Co., Inc.	320kW
Shimanto town	Tsuga power plant Unit no.3	Shikoku Electric Power Co., Inc.	550kW
Kami city	Shinkai power plant Unit no.2	Shikoku Electric Power Co., Inc.	800kW
Yusuhara town	Yusuhara small hydro power plant	Yusuhara town	53kW
Okawa village	Shirataki power plant	Okawa village home village authority	60kW
Okawa village	Ohira power plant	Sumitomo Kyodo Electric Power Co., Ltd.	150kW

[Biomass power generation facility]

Municipality	Name	Implementing body	Output
Kochi city	Kochi waste disposal plant	Kochi city	9,000kW
Kochi city	Tosa power plant	eREX New Energy Co., Ltd.	29,500kW
Kochi city	Tosa power plant	Tosa Green Power Co., Ltd.	5,650kW
Sukumo city	Sukumo biomass power plant	Green Energy Laboratory Co., Ltd.	5,800kW
Susaki city	Kochi plant daiichi power plant	Sumitomo Osaka Cement Co., Ltd.	133,000kW
Aki city	Wider Aki melting center power plant	Wider Aki municipality area office association	1,700kW
Shimanto city	Hata clean center	West Kochi environmental facility association	1,800kW

Kochi Green New Deal Fund (funding project for promoting introduction of renewable energy)

(New Energy Promotion Division)

○Overview

In 2013, Kochi established the "Kochi Green New Deal Fund" which was funded by the national subsidy for projects dealing with CO2 emissions reduction. Utilizing the fund, Kochi will encourage introduction of power generation facilities using renewable energy in regional disaster prevention centers and evacuation sites, fostering the "development of a low-carbon, disaster-resistant community."

[Fund total] 1.8 billion JPY

[Project implementation] FY2013～2015

○Subsidy for projects promoting introduction of renewable energy etc.

Subsidizes costs for introducing power generation equipment etc. using renewable energy in disaster prevention centers, evacuation sites and others.

■Subsidy coverage ratio

Municipalities, some administrative associations: 10/10, 2/3 for some

Private businesses: within 1/3

■Examples of equipment eligible for the project

(1) Equipment for renewable energy

(i) Solar photovoltaic, (ii) wind power, (iii) small hydropower, (iv) earth thermal energy, (v) energy from waste and geothermal energy, (vi) biomass and (vii) others (including solar thermal energy / snow and ice thermal energy)

(2) Associated with renewable energy

(i) Storage cells

(ii) Streetlamps / road lamps (applicable only to LED streetlamps incorporating renewable energy or storage cells, and long-life streetlamps such as those using LED lighting with light-control features)

(iii) In-door ceiling lighting (applicable only for replacing mercury lighting, which requires high voltage to turn on, to long-life lighting such as LED lamps)

(iv) High efficiency lighting/air conditioning (applicable only for installing renewable energy systems etc. at facilities to efficiently utilize generated energy)

(v) Others (fuel cells etc.)

Solar photovoltaic systems and fuel cells need to be installed at the same time in order to securely provide electricity during nighttime when energy is not generated.

Installment of fuel cells alone at facilities already equipped with renewable energy power generation systems would also be eligible.

■Eligible facilities

Regional disaster prevention centers as well as facilities necessary to sustain city functions essential for the lives of regional residents

<Example of eligible facilities>

Municipal offices	Fire departments / HQ
Police HQ / stations	Health clinics
Water / wastewater facilities	Waste disposal facilities
Community center	Gymnasiums
Welfare facilities	Schools
Parks	Public transport facilities
Lodging facilities (*)	Convenience stores (*)
Welfare evacuation sites (*)	

(*)Limited to sites with potential use for evacuation sites in emergency situations such as disasters

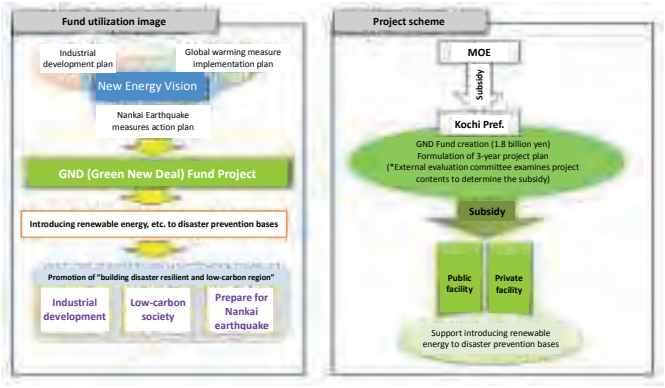
■Projects to be implemented

External appraisal committee will be held in FY2013 regarding selection of eligible facilities, for which introduction is slated to be carried out by FY2015.

<Breakdown of the number of eligible facilities and operators>

Prefecture *	Municipality etc.	Private	Total
13	64	1	78

*Development of prefectural facilities will be funded as contract costs for works etc., not through subsidies



Kochi-style in-community benefit sharing renewable energy project

(New Energy Promotion Division)

○Current status and challenges

Through the Vision for New Energy in Kochi (set out in March 2011), the prefecture is working to facilitate the introduction of renewable energy. Kochi also seeks to utilize renewable energy resource abundantly available in the prefecture for planning industry revitalization, in the aim of reviving the industry and rejuvenating the community.

Against such backdrop, the "Act on Special Measures Concerning Procurement of Electricity from Renewable Energy Sources by Electricity Utilities" was enforced in July 2012, instituting the Feed-in Tariff Scheme wherein power utilities purchase generated electricity at a fixed price over a fixed period of time.

In order to take full advantage of the momentum arising from the Feed-in Tariff Scheme, Kochi is working on the "Kochi-style in-community benefit sharing renewable energy project" in which the prefecture, local municipalities and corporations in the prefecture jointly set up a power generation company and circulate profits back into the community as much as possible.

○Expected benefits

This prefecture-driven initiative would encourage interested municipalities and private-sector firms in the prefecture to enter into the power generation market, by complementing the lack of business know-how and lowering barriers for funding.

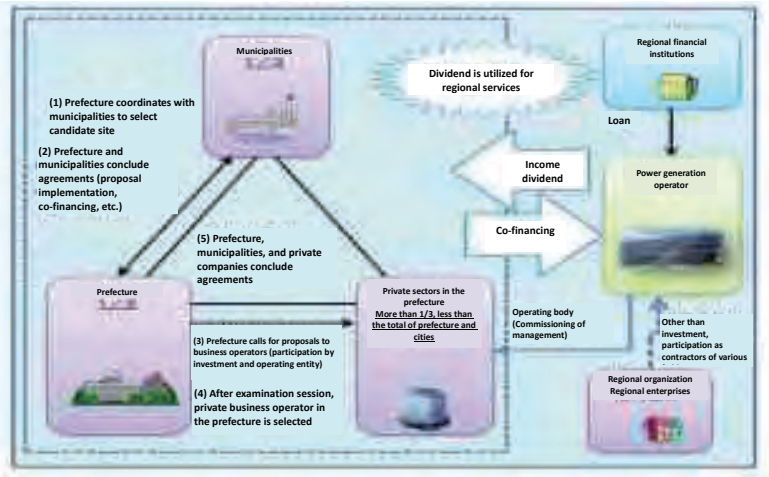
Active participation in the power generation market would allow local municipalities to capture returns generated from the business, which can be used for rolling out new public services. Private-sector firms in the prefecture would also benefit from increased opportunities for receiving contracts to provide works or maintenance and management as well as potential expertise to be gained.

○Implementation of measures

Utilizing this business scheme, solar photovoltaic power generation projects with total capacity of approximately 10MW are being rolled out at 7 locations in 6 municipalities.

	Output capacity	Estimated power generation	Start of operation
Age city	Approx. 4.5MW	Approx. 5.4mil kWh (Equivalent to app. 1500 households)	2014.11.21
Tosa town	Approx. 1.2MW	Approx. 1.28mil kWh (Equivalent to app. 350 households)	2015.4.1
Sagawa town	Approx. 1.3MW	Approx. 1.42mil kWh (Equivalent to app. 400 households)	2014.10.17
Kuroshio town	Approx. 0.5MW	Approx. 0.67mil kWh (Equivalent to app. 180 households)	2014.10.20
Hidaka village	Approx. 1.4MW	Approx. 1.47mil kWh (Equivalent to app. 410 households)	2015.1.19
Tosashimizu city	Approx. 1.2MW *total output for 2projects	Approx. 1.25mil kWh (Equivalent to app. 350 households)	2015.4.7 2015.5.25

Profits from power generation will be redistributed to regional efforts such as vitalization of the economy and energy-related measures.



Solar PV power generation project
(Park Wastewater Division / Noichi zoo park)

○ Overview

In 1995, a solar photovoltaic system was installed at the parking lot of Noichi Animal Park with the aim of raising environmental awareness among Kochi residents, and this showcased the practicality of solar photovoltaic power generation to the wider public. Performance in 2014 is shown as below.

There will be ongoing power generation projects and awareness-building activities.

1 Power generation project

Electricity generated by solar photovoltaic power makes up for around 5 to 6% of total energy consumption in the park.

Achieved in FY2014: approximately 78,000 KWH

2 Awareness-building activities

The park has set up a power generation display panel for visitors, showing the live status of electricity being generated, so as to increase interest in environmental issues.

A guided session explaining the overview of the project is available for groups upon advance request.

Solar PV system (Noichi animal park)

Wind power generation
(Public Enterprise Bureau, Electricity and Water Works Division)

○ Overview

Wind power generates energy through turning wind turbines. Since the system uses naturally occurring wind to generate electricity, it is a clean, environmentally friendly method that does not emit carbon dioxide. Construction of wind power plants is underway throughout the nation.

According to a research by New Energy and Industrial Technology Development Organization (NEDO), total installed capacity nationwide as of March 2014 was 2.71 million kW with 1,934 turbines. In Kochi prefecture, installed capacity at wind power plants as of March 2015 was 36,150kW with 39 turbines (6 wind farms), and the prefecture is likely to see a substantial increase in installation given the kickoff of the Feed-in Tariff Scheme for renewable energy in July 2012. Meanwhile, wind power plants need to meet various regulatory requirements such as obtaining development permits and meeting structural standards for earthquake-resistance before they can be constructed.

Furthermore, as turbines are often placed on mountains with sufficient wind conditions, they are prone to natural disasters such as being hit by a lightening which could inevitably force turbines to cease operation for a certain amount of time to perform repairs. Public institutions and other bodies are taking on research to prevent/mitigate such damage.

While wind energy has its challenges, it is an area that needs to be actively explored since it is considered one of the clean energies that can contribute to combating global warming.

Hokigamine wind power plant (Tosayamada town, Kami city)

Hybrid power generation
(Public Enterprise Bureau, Electricity and Water Works Division)

○ Overview

Power generation systems combining different sources such as solar photovoltaic energy, wind power and hydropower are called hybrid power generation. The most common is a small-scale hybrid system incorporating solar cells and wind turbines, which works to supply electricity by mutually complementing their power generation features.

In 2004, the Public Enterprise Bureau installed a “wind-solar PV hybrid streetlamp/street clock” at its control center (Kamobe, Kochi city) with the main objective of increasing penetration of and building awareness towards power systems using natural energy.

The streetlamp, mounted by a wind turbine and solar cell panels, provides lighting using electricity generated by wind power and solar photovoltaic energy, and will serve as emergency lighting in case of power outage caused by disasters such as earthquakes.

Recently, corporations in the prefecture have developed streetlamps with a similar concept designed to offer backup in case of disasters, which are certified by the prefecture as disaster-prevention related products.

Park & Ride (P&R) project
(Transportation Policy Division)

○ Overview

In the Kochi city area, the national government, prefecture and city as well as private companies and transportation operators are working together on the P&R project.

The project provides parking space in suburban areas and encourages people to get off their vehicles at the car park and take trams or busses to their final destination.

This is expected to shrink the inflow of cars into central areas of Kochi city, thereby easing congestion, fostering efficient use of energy through utilizing public transportation, and offering positive environmental impact such as reduced levels of exhaust fumes and noise.

※Conditions apply for using the park-and-ride scheme, such as purchasing a commuter pass for trams or busses

○ Implementation of measures

(Implemented measures)

In 2014, Kochi publicized the P&R project through its website in the aim of promoting use of public transportation.

The status of P&R usage as of August 1, 2015 is as follows.

[Tram usage]

	Available parking	Parking space occupied	Monthly commuter pass prices into Kochi city center
Prefectural Museum Doori	193 cars	193 cars	7,150JPY
Tokiden Transportation Sanbashi tram garage	31 cars	27 cars	7,150JPY
Tosaden Transportation Gomenmachi station	86 cars	78 cars	16,940JPY
Tosaden Transportation Ino tram park	15 cars	10 cars	16,940JPY

[Bus usage]

	Available parking	Parking space occupied	Monthly commuter pass prices into Kochi city center
Tokiden Transportation Ikku branch	20 cars	20 cars	9,740JPY
Family Mart Kochi Yokohama store	5 cars	4 cars	11,420JPY
Family Mart Harigi store	5 cars	0 cars	16,130JPY

*At Ikku branch, parking is available for express coach users

P&R at Museum Doori

Measures regarding fluorocarbons
(Environmental Measures Division)

○Overview

In the aim of ensuring the collection and disposal of substances such as fluorocarbons that destroy the ozone layer, the "Law on ensuring implementation of recovery and destruction of fluorocarbons in specified products (Law concerning the recovery and destruction of fluorocarbons)" was enacted and issued in June 2001.

However, given the changing environment surrounding fluorocarbons, such as stagnating recovery rate of refrigerating agents and serious leakage of such agents in using cooling devices, a new approach was deemed necessary.

In order to comprehensively address the overall life cycle of fluorocarbons from manufacturing to destruction/regeneration, beyond the scope of fluorocarbon recovery and destruction in the past, a revised legislation on recovery and destruction of fluorocarbons was enacted on April 1, 2014 entitled "Law on streamlined use and appropriate management of fluorocarbons (Law concerning fluorocarbons emissions control)."

This requires managers (users) in charge of commercial refrigeration and air conditioning equipment to comply with "criteria for users" which sets out obligations regarding the installation, use and disposal of such equipment.

Users will also be required to be aware of the fluorocarbon leakage status, and in cases where a leakage in the amount of 1,000 tons CO2 or above occurs under the users' watch within the fiscal year, they will be obligated to report calculated leakage for each corporation to the Minister overseeing the business by the end of July in the following fiscal year.

Furthermore, in addition to the preexisting registration requirement for fluorocarbon recovery operators, the new legislation obliges fluorocarbon charge operators to be registered as well.

Given the fact that fluorocarbons contribute to global warming, it is essential to properly grasp the amount of fluorocarbons being recovered and charged, and as such Kochi will make efforts to gain accurate information on such by raising awareness towards process management schemes among registered fluorocarbon charge and recovery operators.

Registered operators based on the Law concerning the recovery and destruction of fluorocarbons

(As of March 31, 2015)

Category of registered operators	Registered operators
Class-1 fluorocarbon recovery operator*	227

*April 1, 2015 onwards, Class-1 fluorocarbon charge and recovery operators based on the Law concerning fluorocarbons emissions control

○ Criteria for users

■ Proper placement of installed equipment

(1) Do not place oscillatory sources near equipment
(2) Ensure availability of work space around the equipment to perform inspection / maintenance
(3) Clean equipment areas

■ Equipment inspection

Basic inspection	
Performed on	All commercial refrigeration and air conditioning equipment
Frequency	Once every 3 months
Method	Visual inspection
Look for	・Unusual noise ・External damage, corrosion, rusting, oil bleeds ・Frosting of heat exchangers
Performed by	Not specified (no qualification necessary)

Regular inspection	
Performed on	Commercial refrigeration and air conditioning equipment for which rated output for compressor motors exceeds a certain capacity
Frequency	Once a year, or at least once every 3 years (depending on product category or rated output)
Method	Visual inspection by specialized operators
Inspection details	System leakage inspection, specialized refrigerant leakage inspection using direct and indirect leak detection methods
Performed by	Inspectors with sufficient knowledge on methods for charging fluorocarbons (qualification needed)

■ Dealing with leakage of fluorocarbons

(1) Specify/inspect/repair leakage areas
(2) Prohibit additional charging of fluorocarbons until repair is performed

■ Record/keep maintenance and inspection logs

(1) Record and keep logs for equipment inspection/repairs and charge/recovery of refrigerants
(2) Disclose relevant records as requested by maintenance operators for equipment maintenance

Efforts to maintain and recover seagrass beds / intertidal flats / coral reefs
(Fisheries Promotion Division)

○Current situation and challenges

Seagrass beds*, intertidal flats and coral reefs are fishing grounds for reef resources such as abalones and clams, and also serve as nurturing grounds for various fish and shellfish. Furthermore, they offer public benefits providing water purifying functions and relaxing space for residents.

In recent years, however, coastal regions in Kochi have been affected by the loss of seagrass beds caused by a phenomenon known as "sea desertification" as well as the decline in clam resources due to functional decline in intertidal flats, raising concerns for the fishing industry. The maintenance/recovery of seagrass beds, intertidal flats and coral reefs is a pressing matter to be addressed.

○ Implementation of measures

(Implemented measures)

While various factors including changes in the marine environment can be accounted for the loss of seagrass beds, surveys/research by national, prefectural and university institutions have found that overgrazing of seagrass by sea urchins and fish that feed on algae is one of the major causes.

Prefectural efforts in combating sea desertification have shown that removing sea urchins from seagrass beds to prevent overgrazing is effective in areas where seagrass still exists.

Based on findings from tests/research implemented in the prefecture up to 2007 combined with their verification results, Kochi developed the "Guideline for addressing sea desertification in Kochi" to be used as reference for fishing businesses and regional residents to take on measures against sea desertification.

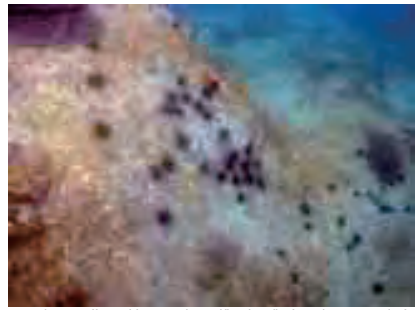
In 2009, as part of a national project, Kochi started to back efforts to preserve seagrass beds/intertidal flats etc. undertaken by a group comprised of fishers and regional residents through a national project.

Similarly, since 2013, Kochi has utilized the national project (project for enhanced performance of multifaceted roles by fisheries) to support activities by groups engaging in the maintenance/recovery of functions in seagrass beds and intertidal flats. Furthermore, Kochi conducted ad-hoc and post-hoc surveys in marine areas undergoing conservation measures so as to better grasp the benefits of such measures and effectively facilitate further implementation, and found exuberant algae growth and inhabitance of fisheries-relevant species such as Japanese spiny lobster.

In the aim of improving functions in intertidal flat areas and recovering clam resources, large-scale seabed cultivation as well as surveys on clam resources and research on species that heavily prey on clams took place in the Tennozu area. In the research, an actual stingray was caught which confirmed its feeding on clams.

(Measures to be implemented)

There will be ongoing support for the implementation of ad-hoc and post-hoc surveys in marine areas carrying out conservation measures on seagrass beds/intertidal flats/coral reefs. In addition, Kochi will conduct research on clam resources and species that heavily prey on them, at the same time rolling out large-scale "cover nets" which have been proven to significantly increase the survival rate of clams.

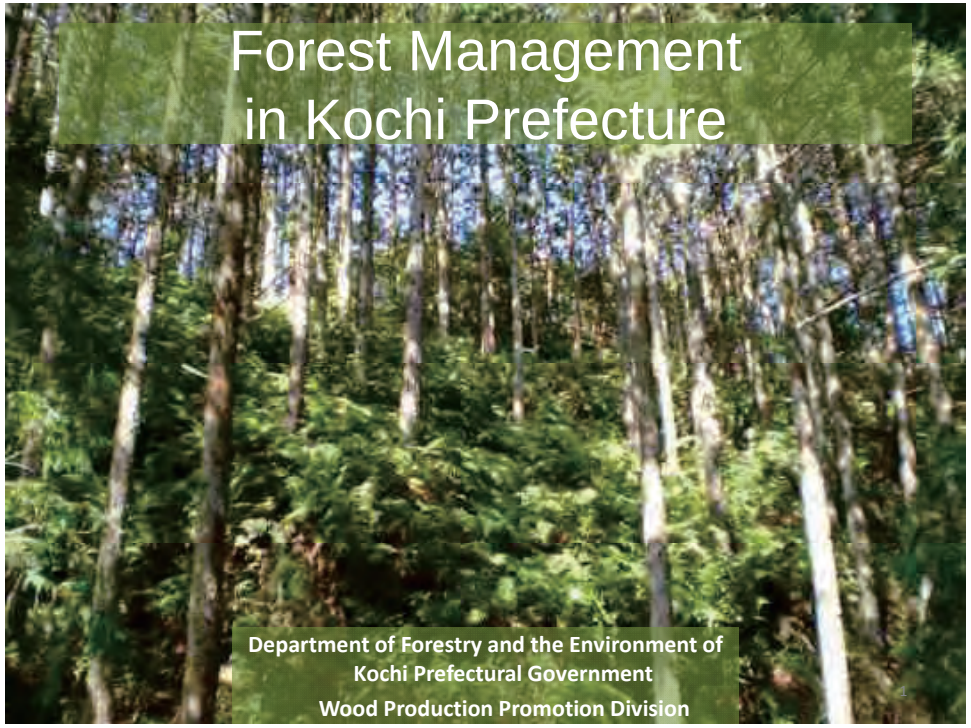


Surveyed area affected by sea desertification (before the removal of sea urchins)
(Ikenoura area, Susaki city in 2010)

Surveyed area where seagrass beds have formed (after the removal of sea urchins)
(Ikenoura area, Susaki city in 2013)

Testing installation of cover nets
(Tennozu, Uranouchi bay in 2014)

―Glossary―
* Seagrass bed
Seagrass bed is where seaweeds grow in luxuriance.



Forest Management in Kochi Prefecture

Department of Forestry and the Environment of Kochi Prefectural Government

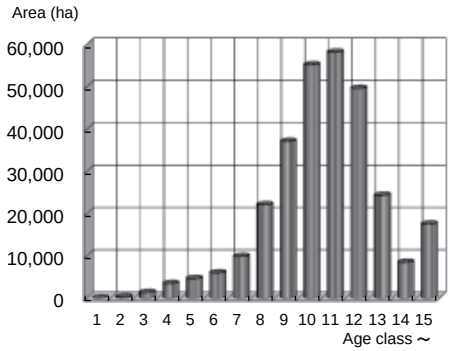
Wood Production Promotion Division

Forest Resources in Kochi Prefecture

◆ Current condition of forest resources (FY2014)

Classification	Total	Private and communal forests			National forests		
		Total	Artificial forest	Natural forest, etc.	Total	Artificial forest	Natural forest, etc.
Area (ha)	595,601	469,426	297,998	171,428	126,174	90,723	35,451
	100%	79%	(63)	(37)	21%	(72)	(28)
Growing stock ($1,000 m^3$)	185,574	158,146	136,767	21,379	27,427	22,861	4,566
	100%	85%	(86)	(14)	15%	(83)	(17)

◆Age class distribution of private artificial forests (FY2014)



The forest/forestry sector can contribute to fighting against global warming through such measures as planting of new trees, sustainable forest management, and reduction of deforestation.

Kochi prefecture is the most forest-rich prefecture in Japan as 84% of the prefecture's area is covered with forests.
Utilizing the most of this characteristic, the prefectural government is making advanced use of forest resources and promoting adequate forest maintenance in order to ensure exercise of multiple functions of forests such as global warming prevention and water resources conservation.

* Sources
Private and communal forests: Forestry Promotion Division of Kochi Prefecture
National forests: Shikoku Forest Management Bureau

Issues surrounding Forestry in Kochi

Lumber price drop

・Large price increase can not be expected for lumber as an internationally-traded product.

Many small-scale and dispersed forests

・Difficult to carry out efficient operation
・Difficult to carry out planned and stable management

No advancement of adequate forest management (such as thinning)

Decrease in and aging of labor force

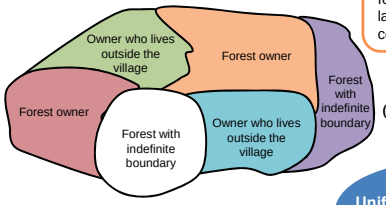
Forestry workers

Promotion of Conversion of Small-scale Forests into Large-scale Plots ("Forest Factory")

Efforts are in progress to convert small-scale and distributed forests into large-scale plots, and certify them as "forest factories" to realize planned, efficient forest operation and management.
At the same time, the work system is being improved to carry out the current work at low costs to meet the challenges of lumber price drop and forestry labor shortage and carry out adequate maintenance of forests.

Promotion of effective, integrated operation

Group of small-scale forest owners



<What is integration?>
To maintain small-scale forests collectively as a large block with the consent from all owners

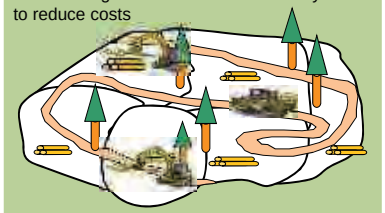
Integration (forest cooperative, etc.)

Unification of measures for integrated operation

Five-year plan approved by the prefectural government
⇒
Implementation of various assistance measures

"Forest Factory" for integrated operation

Constructing efficient roads and work systems to reduce costs



<Forestry business entity>
Stable management and employment

<Forest owners>
Healthy forest Lumber revenue

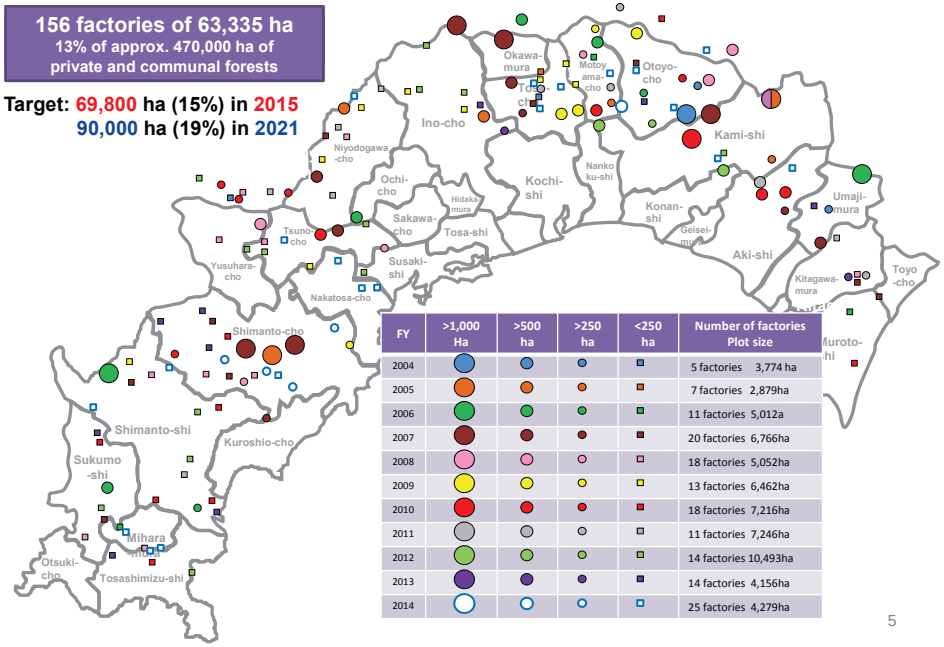
Effect on the community

Stable supply of lumber
Improvement of public welfare functions of forests

Map of “Forest Factories” (as of the end of March 2015)

156 factories of 63,335 ha
13% of approx. 470,000 ha of private and communal forests

Target: 69,800 ha (15%) in 2015
90,000 ha (19%) in 2021



FY	>1,000 Ha	>500 ha	>250 ha	<250 ha	Number of factories Plot size
2004					5 factories 3,774 ha
2005					7 factories 2,879ha
2006					11 factories 5,012a
2007					20 factories 6,766ha
2008					18 factories 5,052ha
2009					13 factories 6,462ha
2010					18 factories 7,216ha
2011					11 factories 7,246ha
2012					14 factories 10,493ha
2013					14 factories 4,156ha
2014					25 factories 4,279ha

Enactment of Urgent Thinning Promotion Ordinance and Implementation of Thinning

The citizens of the Kochi prefecture are receiving great benefits from forests, which have multiple functions such as producing lumber, preventing global warming, maintaining the natural environment, preserving the prefectural land, and conserving water resources. As a result of the Kochi prefectural government’s positive efforts for afforestation of Japanese cedar and cypress, many artificial forests have been built, making it one of the forest-rich prefectures in Japan.

Many of the forests in the prefecture are becoming more mature as resources. However, in the middle of extremely difficult challenges faced by forests and forestry, such as decrease of forestry workers due to depopulation and aging of mountain villages and prolonged lumber price drop, adequate maintenance such as thinning is not adequately performed on an increasingly larger number of artificial forests, causing concerns about the deterioration of multiple functions of forests and occurrence of disasters.

In view of these circumstances, the Kochi prefectural government recognizes it to be an important task for the citizens of the Kochi prefecture to ensure sustainable exertion of multiple functions of forests including prevention of global warming and therefore enacted the Urgent Thinning Promotion Ordinance to promote adequate thinning urgently.

Phase 1 (FY2003 to FY2007)

Classification	2003	2004	2005	2006	2007	Total
Planned (ha)	15,000	15,000	15,000	15,000	15,000	75,000
Actual (ha)	16,583	17,178	15,589	12,537	10,850	72,737

Phase 2 (FY2008 to FY2012)

Classification		2008	2009	2010	2011	2012	Total
Planned (ha)		14,000	14,500	15,000	15,500	16,000	75,000
Actual (ha)		8,799	10,717	10,193	11,541	6,419	47,669
	Tending thinning	6,989	8,702	7,972	9,416	3,858	36,937
	Commercial thinning	1,810	2,015	2,221	2,125	2,561	10,732

Phase 3 (FY2013 to FY2017)

Classification		2013	2014	2015	2016	2017	Total
Planned (ha)		7,300	7,700	8,000	8,000	8,000	39,000
Actual (ha)		6,028	5,259				
	Tending thinning	3,701	2,990				
	Commercial thinning	2,327	2,269				

Support for Forestry Workers

Employees

◇ Provision of forestry engineer training courses
- Portable forestry machine training, vehicle-type construction machine driving skill training, slinging skill training, etc.

◇ Improvement and reinforcement of prefectural forestry schools
- Improvement of facilities (school building, etc.)
- Capacity building through basic courses (improve personnel skills to immediately ready for work) and short-term courses (training for various forestry workers)

◇ Improvement of work environment
- Assistance for purchasing of protection gear for safety, protection against bee stings, and training for safe work skills

Small-scale foresters

◇ Promotion of small-scale forestry
- Partial support to cities to cover the costs required for practical skill training and integrated operation
- Dispatching of field advisors and assistance to safety inspection patrol, etc.

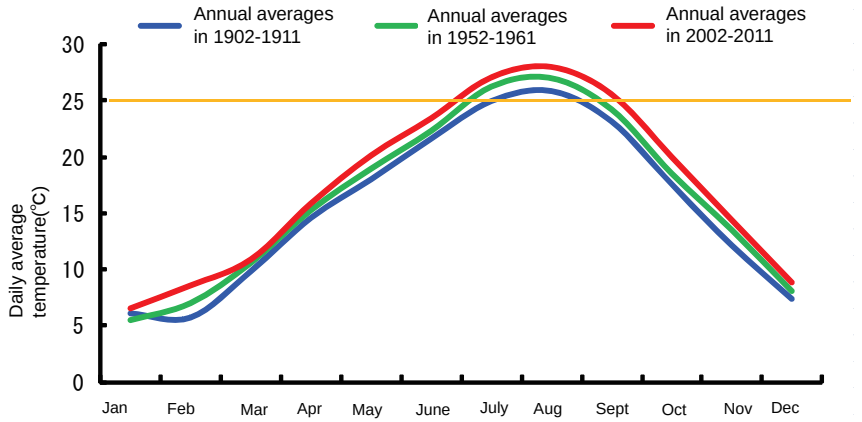
Special-use forest products industry workers

◇ Capacity building and secureing of workers for special-use forest products industry (such as Tosa Binchotan charcoal, etc.)
- Partial support to cities that provide assistance to applicants to this industry

Adaptation Measures against Global Warming

Environmental Agriculture Promotion Division,
Department of Agricultural Development,
Kochi Prefecture

Temperature Changes in Kochi Prefecture



* The annual average temperature is higher than that of 100 years ago by 1.9℃ and that of 50 years ago by 1.0℃ (higher than the nationwide average).
* The temperature has risen significantly in February (+2.9℃), September and October (+2.5℃).

Fruit Trees: impacts from global warming

● Global warming causes high temperatures and dry weather in summer, and insufficient dormancy in winter

Watercore disorder

Watercore disorder lowers fruit quality and <u>increases abnormal flower opening and germination</u>

Abnormal flower opening and germination

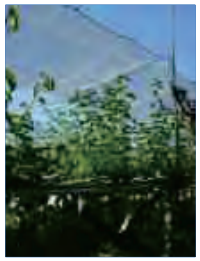
If such damages can be reduced;
・Shipping volume will increase by 10 to 30%
・Economic effect of 150 to 500 million yen

Fruit Trees: countermeasures against impacts

● Global warming-induced high temperatures and dry weather in summer, and insufficient dormancy in winter

・Reduction of temperature rise in summer and securing of a low-temperature period in winter by shading

Development of a vertical stretching method for shading materials



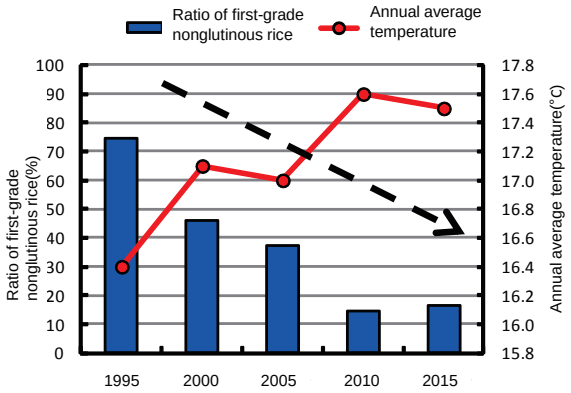
Shading of pears on trellises

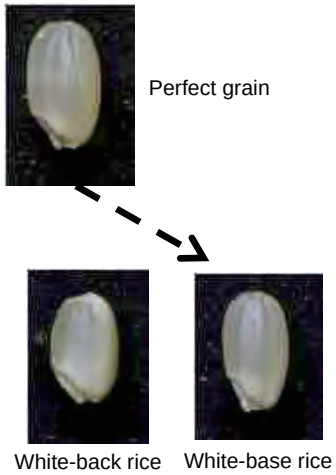
Development of temperature rise prevention technologies!

Paddy rice: impacts from global warming

- Global warming decreases production of first-grade rice

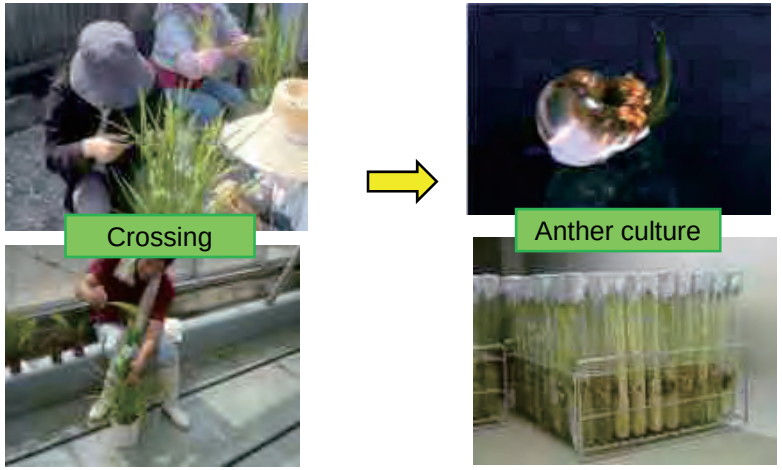
Daily average temperature higher than 27 or 28°C during 20 days after sprouting increases the risk of producing white-back and white-base grains.





Paddy rice: countermeasures against impacts

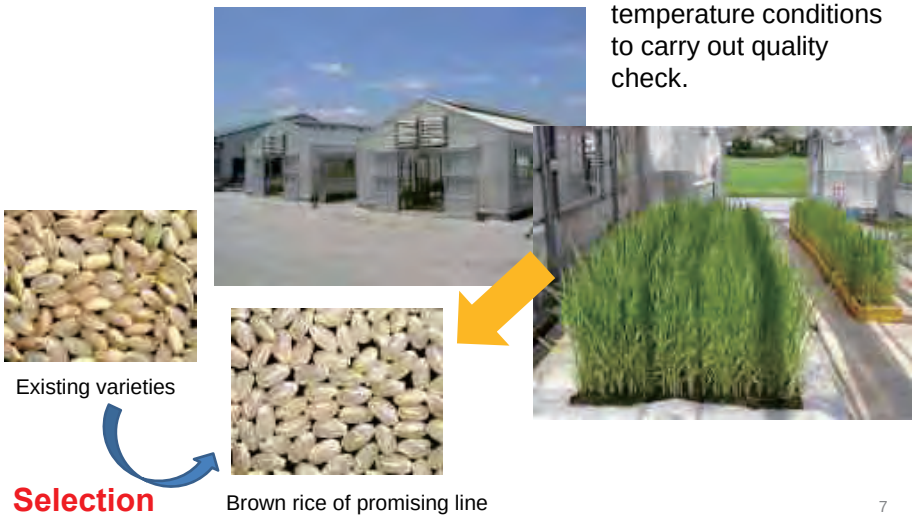
- Selection of heat-resistant varieties
  - Breeding using DNA markers
  - Crossing and anther culture
  - Adaptability test of strains



Paddy rice: countermeasures against impacts

- Selection of heat-resistant varieties
  - Simple and efficient quality check-

Artificially create high temperature conditions to carry out quality check.



Overview of coastal protection facility development project for directly-controlled area in Kochi Coast

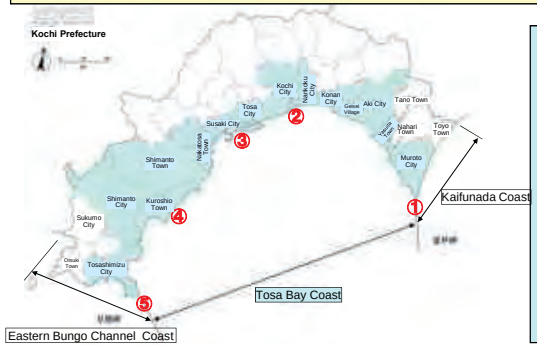
27 April, 2016

Kochi Office of River and National Highway
Shikoku Regional Development Bureau
Ministry of Land, Infrastructure, Transport and Tourism,

View of Nagahama Section – Tobara Section

Coasts in Kochi Prefecture

Overview of coasts in Kochi Prefecture
The coastline in Kochi Prefecture stretches a distance of approximately 713km from the east to the west, and is divided by Cape Muroto and Cape Ashizuri sticking out to the south into three sections: Kaifunada Coast; Tosa Bay Coast; and Eastern Bungo Channel Coast. Most of the eastern area of the Niyodo River, which runs through the center of the prefecture, is elevated coasts while the plains around Urado Bay is an exception. In the western area of the River, there are many bays and coves, e.g. Uranouchi Bay and Susaki Bay as well as deeply indented coastlines formed by settling with mountains and steep cliffs.



Overview of Tosa Bay Coast
- Tosa Bay Coast extends from Cape Muroto to Cape Ashizuri in Kochi Prefecture in the southern part of Shikoku, and faces the Pacific Ocean. In the east and west of the Niyodo River, a class A river in the prefectural center, coastal features vary: In the east, there are many rock reefs around Cape Muroto, and pebble beaches from the Cape to the center area of the coast, with large open sandy beaches.
- Kochi Port as an important port, forms the center of regional development, and is a distribution hub for production and consumption activities in economic zone in this area. In addition, the region boasts abundant tourism resources that utilize local coastal resources, e.g. Katsurahama Beach and the Yokonami Peninsula.
- The coastline between Niyodo River and Cape Ashizuri is deeply indented, featuring breathtaking natural scenery where the mountains look out over the Pacific Ocean. In addition, there are a number of sandy beaches, e.g. Irino Beach and Oki Beach for leisure and various recreational activities.


⑤ Cape Ashizuri (Tosashimizu City)


④ Shirahama Beach (Kuroshio Town)

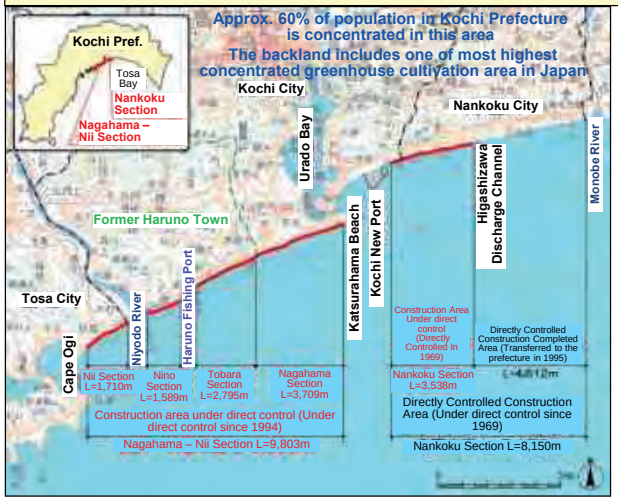

③ Yokonami Peninsula (Susaki City)


② Katsurahama Beach (Kochi City)

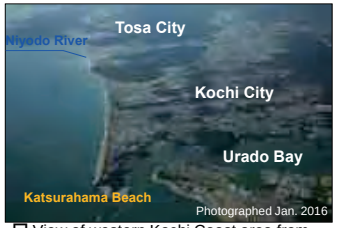

① Cape Muroto (Muroto City)

Overview of Kochi Coast

■ The Kochi Coast is a sandy coast in length of approximately 30 km, in the center of Kochi Prefecture and the inner part of the Tosa Bay. The Niyodo River and Monobe River flow into the bay in the west and east, respectively, and Urado Bay and Kochi New Port are located in the center of the Coast.
■ Shore erosion is currently in progress in the Coast, due to the reduced amount in sand supply and blocked coastal drift sands and other reasons. In addition, The Coast has seen several damages due to high waves and high tides due to frequent typhoon damages in this region.
■ It is predicted that there is a 70% probability of an earthquake centered in the Nankai Touch in the next 30 years. There are concerns that this will result in ground subsidence over a wide area and extensive damage due to a tsunami after the earthquake.



☐ View of eastern Kochi Coast area from direction of Katsurahama Beach



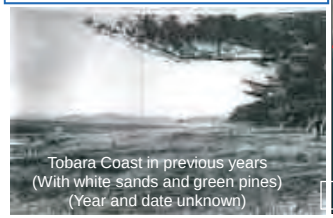
☐ View of western Kochi Coast area from direction of Katsurahama Beach

Coastal erosion in Kochi Coast: current situation

The most likely factors of coastal erosion in Kochi Coast include reduction in the amount of sand supply from nearby rivers, reduction in the volume of sand supply to the coastal area as result of sand collection in river mouth areas, and blockage of sand drift as a result of port facilities construction. In recent years, the amount of sand supply to the coastal area has been in increase as result of reduced river sands collection and implementation of backfilling of sand collection holes in river mouth areas. Furthermore, coastal protection facilities in the Coast area has contributed to mitigation of coastal erosion over the past few years.

Main factors of coastal erosion
(1) Reduced sand supply due to river sand collection.
(2) Reduced sand supply to overall coast area due to sand collection in the river mouth of Niyodo River.
(3) Blockage of sand drift as a result of breakwater construction for Haruno Fishing Port

Status of coastal erosion in recent years
(1) Sand flow in stabilization as result of reduction in river sand collection
(2) Increased trend of sand supply to coastal area along with implementation of backfilling of excavated holes
(3) Beach nourishment efforts since 2009 contributes to increased sand amount in coastal area

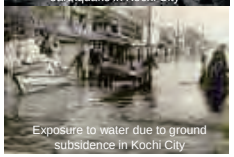

Tobara Coast in previous years (With white sands and green pines) (Year and date unknown)

Contribution of coastal protection facilities in Nino Section, Kochi Coast

Damage to Kochi Coast: current situation

Coastal area of Tosa Bay in which Kochi Coast is located has suffered from extensive damage for a number of times in previous years since the area is frequently hit by typhoons. The Nankai Great Earthquake in 1946 caused damage from tsunami and ground subsidence. Afterwards, there has been a number of impacts including i) significant costal erosion as result of reduced sand supply volume, ii) increased run-up height of waves due to recession of shorelines, and Iii) collapse of sea banks due to wave overtopping and erosion of their foreshore.

Damage from earthquake and tsunami



Damage by high tides and erosions

Wave overtopping due to high waves

Project overview

■ In accordance with the "Tosa Bay Coastal Protection Master Plan (Kochi Prefecture)", the "Coastal Protection Facility Development Plan for directly-controlled area in Kochi Coast" has been in progress with the objective of prevention of damage due to high tides, wave overtopping, erosion and earthquakes/tsunami.
● To prevent wave overtopping to avoid extensive damage from wave immersion through "provision of high breakwater" and "formation of sandy beach".
● Coastal erosion countermeasures: To prevent shoreline recession to avoid extensive erosion through countermeasures of "headland", "detached breakwaters", "artificial reefs" and "beach nourishment". Furthermore, protect habitats of seaside plants, sea turtles and other species.
● Anti-Seismic and liquefaction measures: To prevent extensive damage due to earthquake/tsunami originating in Nankai Trough by advance prevention of subsidence of sea wall by means of earthquake/liquefaction measures e.g. anti-seismic measures for sea walls.

Plan specifications

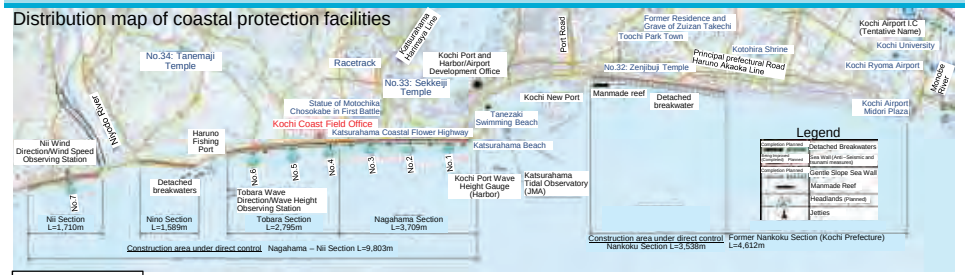
Coastal protection facility development project for directly controlled area in Kochi Coast	High tide erosion countermeasures	Tide level	Syzygy mean high tide	T.P.+0.74m	(Old elevation)
			Planned deviation	1.46m	Deviation calculated for Typhoon on Sept. 7, 1902
			Planned high tide	T.P.+2.20m	(Old elevation) Syzygy mean high tide + planned deviation
		Ocean wave (Offing wave/ significant pulse)	Planned wave height	13.0m	30 year probability wave Height and period calculated with ocean wave estimation Data and observation data
			Planned cycle	15.5sec	
			Predominant wave direction	SSW-SE (Nankoku) SSW-ESE (Nagahama – Nii)	Past record wave direction
	Anti-seismic/ liquefaction measures	Subject earthquake		Central Disaster Prevention Council (2003) Tonankai/Nankai Linked Earthquake	
		Designed tsunami water Level		Nankoku Konan Region Coast T.P.+8.0m (New elevation)	
				Kochi Central Region Coast T.P.+8.0m (New elevation)	

Plan overview

Section	Type	Unit	Quantity
Nankoku Section	Gentle slope sea wall	m	3,538
	Beach building work	$1,000m^3$	173
	Detached breakwaters	No.	21
	Artificial reef	m	310
	Anti-seismic / liquefaction measures.	m	3,538
Nagahama – Nii Section	Headland	m	1,900
	Gentle slope sea wall	m	9,803
	Beach building work	$1,000m^3$	2,100
	Detached breakwaters	No.	4
	Optical fiber	m	10,900
	Anti-seismic / Liquefaction measures	m	9,803

High-tide erosion countermeasures

Distribution map of coastal protection facilities

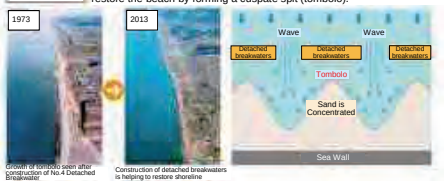


History of Project

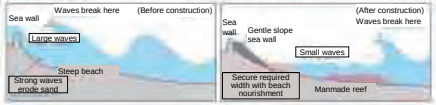
- In 1969, construction works were started in Nankoku and Former Nankoku Sections in range of approx. 8.15km (from the mouth of the Monobe River to the boundary of Kochi Port) after the Sections were designated as a directly-controlled coastal project site. In 1995, the completed detached breakwaters were transferred to Kochi Prefecture. The offshore facilities in the Nankoku Section were completed in 2004.
- In 1994, construction works were started in Nagahama, Tobara, Nino and Nii Sections in range of approx. 9.80km (from Katsurahama Beach to Cape Ogi) after the Sections were designated as a directly-controlled coastal project site. Currently, high-tide erosion countermeasures with headlands, detached breakwaters and beach nourishment are in progress.

Major coastal protection facilities

Detached breakwaters Structures made from blocks and other materials are being built away from the coastline in order to reduce the size of the waves reaching the shore and restore the beach by forming a cuspate spit (tombolo).



Artificial reefs A structure that has the wave absorbing functions of a coral reef is being artificially built, and is superior from both the perspectives of coastal environment conservation and coastal usage promotion since it is under the water.



Headlands

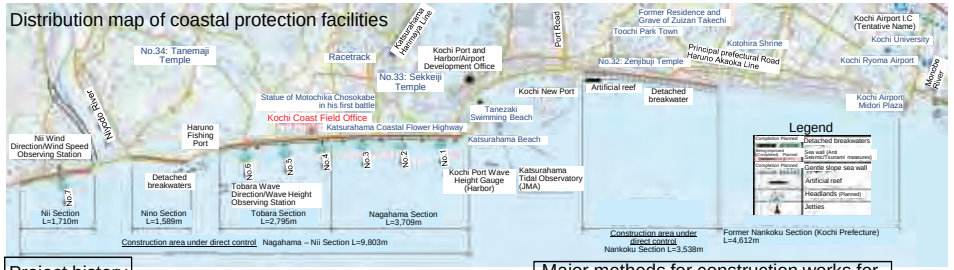
Headlands are effective in stabilizing the flow of the reduced volume of sand supply to a wide area, and has the following features.

- Stabilize the seashore by dividing the long coastline into a number of pocket beaches.
- The shielding effect of the top of the headland enables a quiet region to be formed behind it.

Beach nourishment works Stabilization and utilization of the beach are promoted by maintaining and restoring the seashore by means of artificially supplying sand.

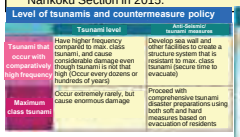
Anti-seismic/ Liquefaction Measures

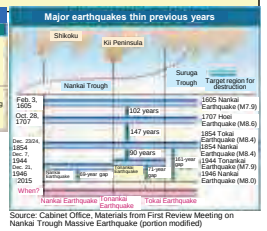
Distribution map of coastal protection facilities



Project history

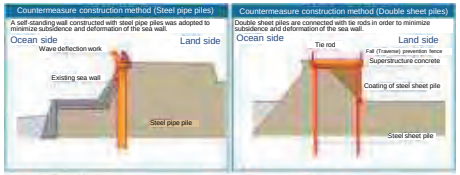
- The national, prefectural and municipal governments are in collaboration for comprehensive countermeasures in Kochi Prefecture to prepare for an earthquake and tsunami with center in the Nankai Touch with probability of approximately 70% in the next 30 years.
- Implementation of anti-seismic/liquefaction measures against earthquakes and tsunamis for sea walls in Kochi Coast area was commenced in JFY2011 to minimize subsidence and deformation of the sea walls due to liquefaction, and prevent flooding by tsunamis Construction Work has been completed in the Nino Section and Nii Section, with work started in the Nagahama/ Tobara Section in 2014 and in the Nankoku Section in 2015.





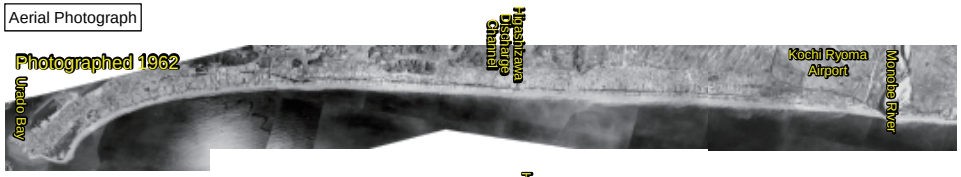
Source: Cabinet Office, Materials from First Review Meeting on Nankai Trough Massive Earthquake (portion modified)

Major methods for construction works for anti-seismic/liquefaction measures

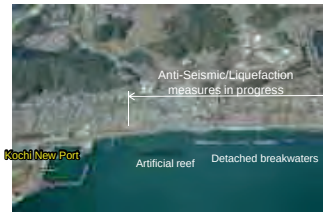


Current status of Kochi Coast (Nankoku Section)

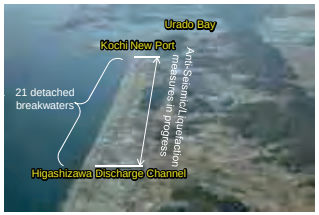
Aerial Photograph



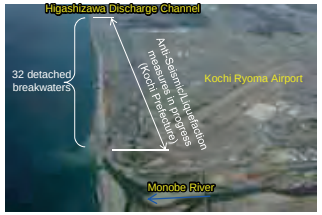
Current status of major coastal protection facilities



Nankoku Section



Nankoku Section



Former Nankoku Section

Current status of Kochi Coast (Nagahama – Nii Section)

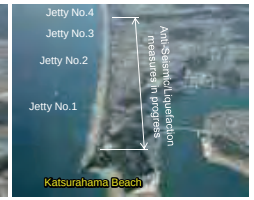
Aerial Photograph

Current status of major coastal protection facilities

Nii Section

Nino Section

Tobara Section



Nagahama Section

Alignment with related projects and regional cooperation scheme

■ Regional cooperation scheme: Requests for project completion at early stage are received from Kochi Prefecture, Nankoku City, Kochi City, Tosa City and "Alliance for promotion of development of Kochi Coast area in direct control" and other organizations. Projects for further collaboration with local stakeholders will be promoted.
■ Use of coast area: Kochi Coast is expected available for marine recreation, local events and tourism, and efforts to facilitate coastal area use in an optimum manner will be promoted.
■ Coastal environment: It is observed that sea turtles are coming ashore every year to lay their eggs. Protection activities targeted for sea turtles are popular, and local elementary schools and organizations with permission from the Governor of Kochi Prefecture in accordance with the Kochi Prefecture Sea Turtle Conservation Ordinance conduct such sea turtles protection activities.

Situation of the region: Partnership for coastal cleaning

Sightseeing in surrounding area of coasts: Katsurahama Beach

Release of baby sea turtles

Use of coasts: People enjoys fishing

Local event: Kochi Ryoma Marathon

Situation of sea turtles (They come ashore to lay eggs.)