Komatsu IR Day in 2018: The Third ESG Meeting

December 11, 2018
10:00 - 11:30

[Komatsu participants]

Yuichi Iwamoto, Senior Executive Officer (Senmu), Chief Technology Officer (CTO), Supervising Research & Development and Environment

Naoki Fujita, Senior Executive Officer (Jomu), Vice President, Production Division

Yoshie Ideura, General Manager, Environmental Affairs Department

Norio Mitani, Chief Editor, Innovative Project Department, Awazu Plant

Contents

ESG Efforts

We will further strengthen our efforts to meet social needs in the areas of Environment, Society and Governance based on The KOMATSU Way.

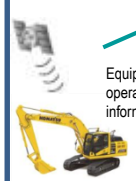
Environment

Lifecycle of construction equipment

Manufacturing accounts for about 2% of total CO2 emissions.

Use of machines accounts for about 90% of total CO2 emissions.

CO2 reduction from machines in use



Customers

Equipment operating information

- Construction management
- Construction cost
- Fleet management

Accurate servicing

Distributor

- Optimized maintenance proposition

Work site

Vehicle Information Management System (KOMTRAX)

25% reduction per Work volume*1

*1: New models to be sold in 2025 as compared to 2007

CO2 reduction in manufacturing

Japan: 57% reduction*2

Overseas: 32% reduction*2

*2
- Target rate of reduction in 2020
- Improvement rate of unit per mfg. value
- Benchmark years: 2000 in Japan, 2010 overseas
- Applicability: Komatsu Group's main plants worldwide

Society

Improvement of safety at customers' jobsites

Complete unmanned operation

ICT-intensive construction

Working for no accidents at customers' jobsites by developing technology to improve safety

Social contribution efforts

Komatsu-made demining machine in Cambodia

School built in March 2015. 6th one in Cambodia

Growing with local communities

Assistance to welders' school in India

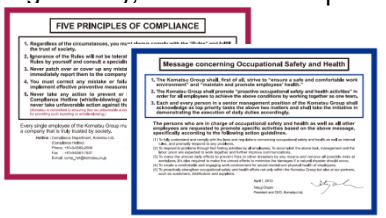
Science class for children at Komatsu-no-mori

Governance

Corporate governance

- Reinforcement of corporate governance
- Reinforcement of internal control
- Global management system
- Promotion of diversity

Thorough safety, health and compliance



- Health promotion plan

Risk management

- Risk Management Committee
- BCP*3
- Information security
- Identification of potential risks

*3: BCP stands for Business Continuity Plan, and we have developed it to continue important operations or make a quick recovery from damages of natural disasters or accidents.

Improvement of corporate governance | **Reinforcement of competitive manufacturing** | **Brand Management**

The KOMATSU Way

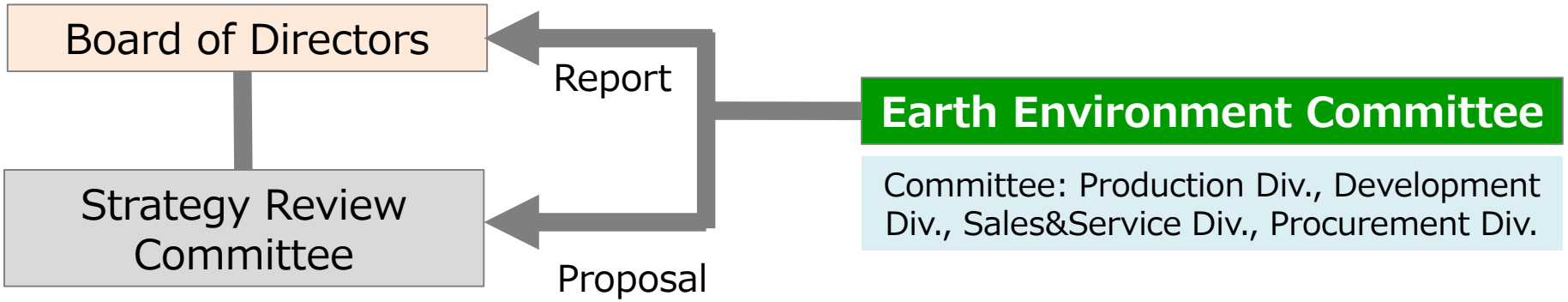
Ⅰ. Efforts for Environmental Affairs

Environmental management Structure

Environmental Affairs Department directly under the president oversees the entire company's environmental activities, and promote discussions on activities at the “Earth Environment Committee" consisting of executives from major business divisions.

Structure

Committees concerned



History of Komatsu's Environmental Activities

Along with the world trend, Komatsu has been promoting environmental activities.

	~1990	~2000	~2010	~2018
World	1972 UNEP (UN Environment program) 1988 IPCC	1992 United Nations Conference on Environment and Development "Earth Summit" <UNFCCC>	2005 Kyoto Protocol 2007 IPCC AR4 <Clarified that global warming is due to anthropogenic CO2>	2016 Paris Agreement
Japan	1971 Environment Agency	1993 Basic Environment Act <From pollution, nature conservation to environmental administration>	2001 Ministry of Environment <To create a sustainable society>	2012 Renewable energy feed-in tariffs <Reexamination of measures against global warming based on nuclear accident>
KOMATSU		1991 Establish **Earth Environment Committee** →		
		1992"Earth Environment Charter"	2003 Revised "Earth Environment Charter" →	
			2003 **Management Planning Div.**, **Environmental Affairs Dept.** 2009 Independent as **Environmental Affairs Dept. directly under the president** →	
		《Energy saving activities》 →		
			《3 indicaters of Products(CO2, Recycle rate, Hazardous substance)》 →	
				《Biodiversity activities》 →

Today's Topic

Reduction of CO2 emission from Products and Manufacturing

Water Risks in Manufacturing Sites

Regulatory Compliance in China

CDP A LIST 2017 CLIMATE

CDP A LIST 2017 WATER

Reduction of CO2 emission

Komatsu states CO2 reduction in Mid-term Management Plan

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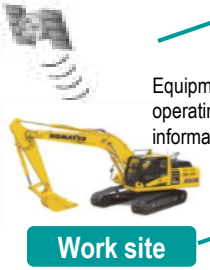

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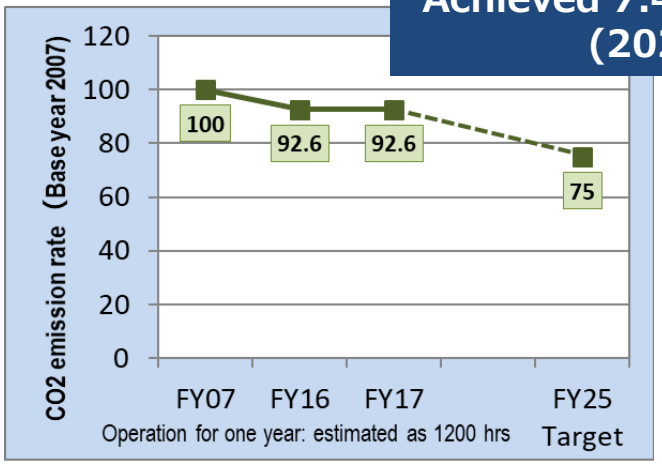
Reduction of CO2 emission from Products in Use

Reduction of CO2 emission from Products is going steadily

■ FY2017 : Reduction of CO2 emission from Products（Improvement in Fuel efficiency of New Models)

Achieved 7.4% reduction in FY2017: 210kt-CO_2
(2025 target : 25% reduction)



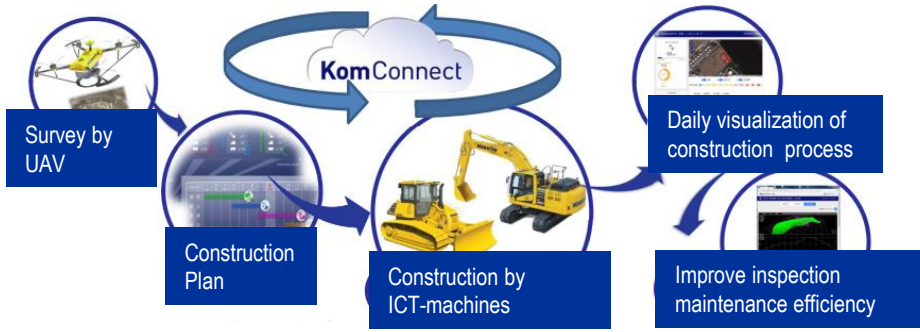
■ Improvement in Fuel Efficiency

- **Improvement by Model Change**
  Higher Fuel Efficiency of Tier4-Final
- **Hybrid Machine**
  30% Improvement
  (vs. conventional : PC200-10)

HB205-3
(Hybrid:Tier4-F)

■ CO2 Reduction by “Smart Construction”

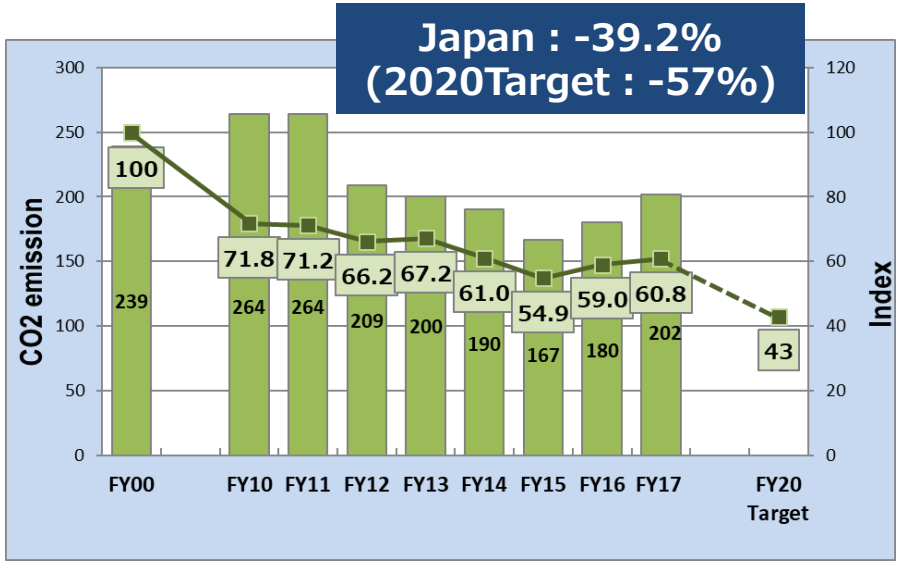
CO2 reduction by ICT-machines (～30%)
Evolution and Expansion of Smart Construction

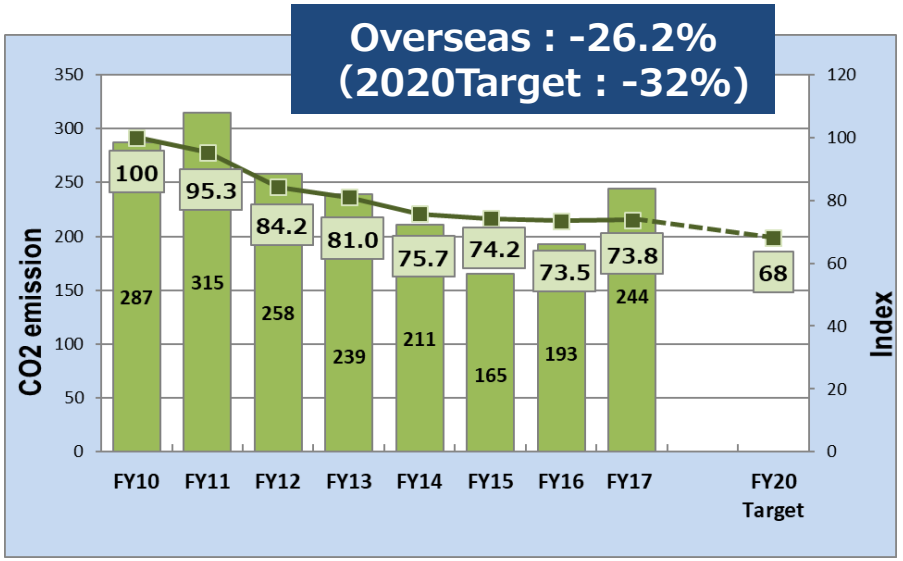


Reduction of CO2 Emission in Manufacturing

Reduction of CO2 emission in manufacturing is underway with effort

■ FY2017 : CO2 Emission in Manufacturing





■ Osaka plant, New Heat Treatment Factory

- Energy saving heat treatment factory that separates people and facilities taking safety and environment into consideration

・Gasification of furnace heating.

・In an unmanned area where heat treatment facilities are concentrated, air conditioning and lighting are eliminated and energy saving is realized.

・Energy saving efficiency (-38% improvement) :
CO2 reduction 3,700 t / year.

New heat treatment factory

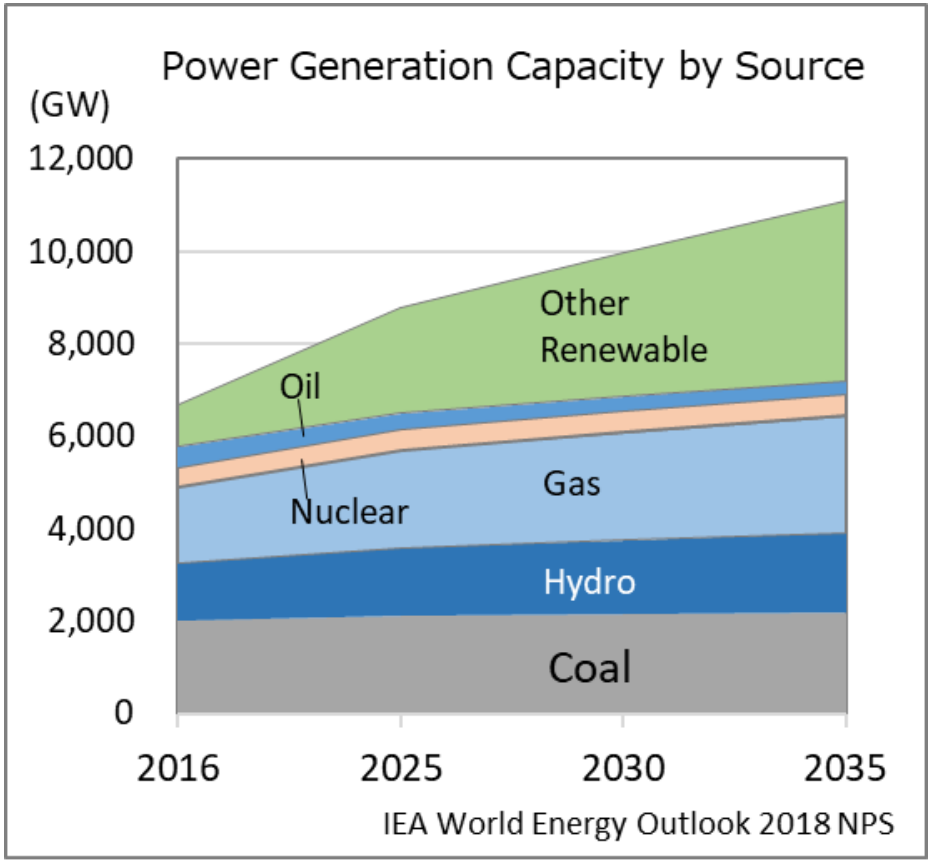
Unmanned area

Approach to Coal risk

18% of Komatsu's sales are for coal mines.
Because coal demand for energy source does not decrease sharply, the business risk is evaluated as small.
Komatsu will continue to provide efficient machines and aim for CO2 reduction in the life cycle.

Sales Ratio (approximate)

Power Generation Capacity by Source

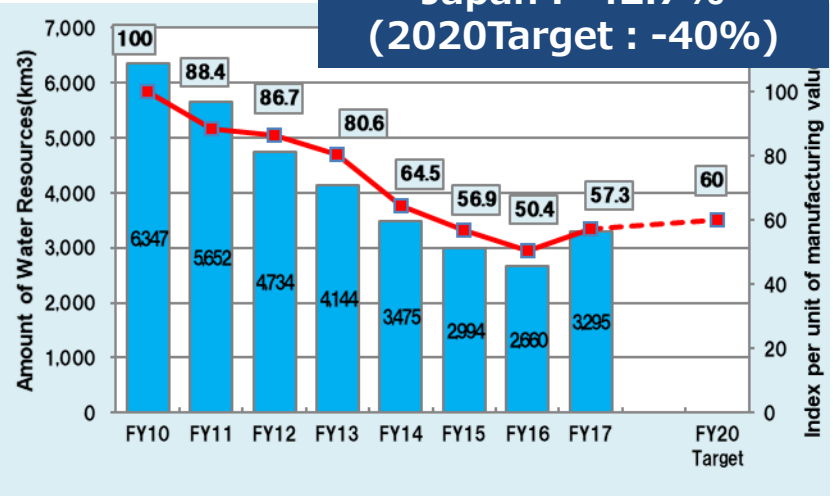


Reduction of water usage

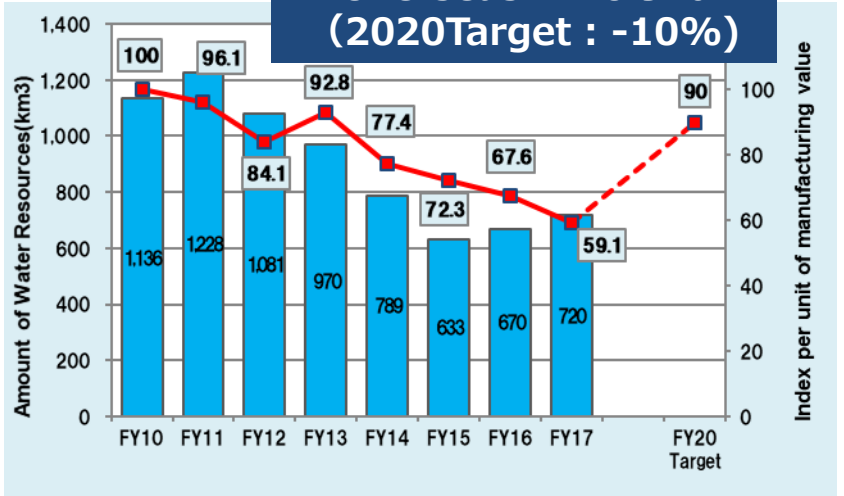
Reduction in water usage is proceeding smoothly

■ FY2017 : Water usage in manufacturing

Japan : -42.7%
(2020Target : -40%)



Overseas : -40.9%
(2020Target : -10%)



An Example of improvement (Osaka plant)

Water purifier for process water

①Water purifier for process water
②Sensor control for well water (Reduce useless water intake)
③Prevent leakage from bath in rest house

FY2017 Water intake
-5% (vs previous year)

Collaboration with suppliers
Share water reduction know-how with “Midori-kai”.

Guidance to Midori-kai company

Water risks

Based on the water risk analysis, flood risk is high in Japan and Indonesia, and China has high water quality risk

Water risks in Komatsu Plants (Analyzed with Aqueduct)

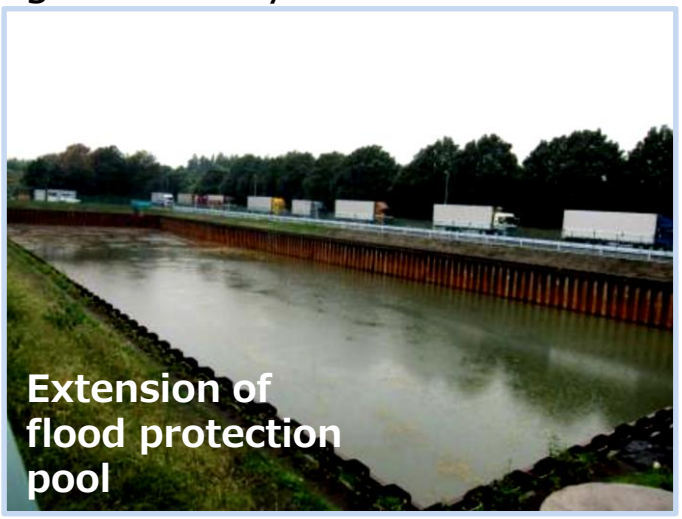
Examples of countermeasures for water risks

We are implementing countermeasures mainly in high-risk areas

Indonesia (KI) : Measures against flood

KI flood countermeasure
① Extension of wastewater pond
② Emergency Doors for Employees
③ Introduction of drain gate
④ Installation of water pump for flood.

Japan (Oyama) : Measures against heavy rain



Chine (KSC) : Waste water treatment

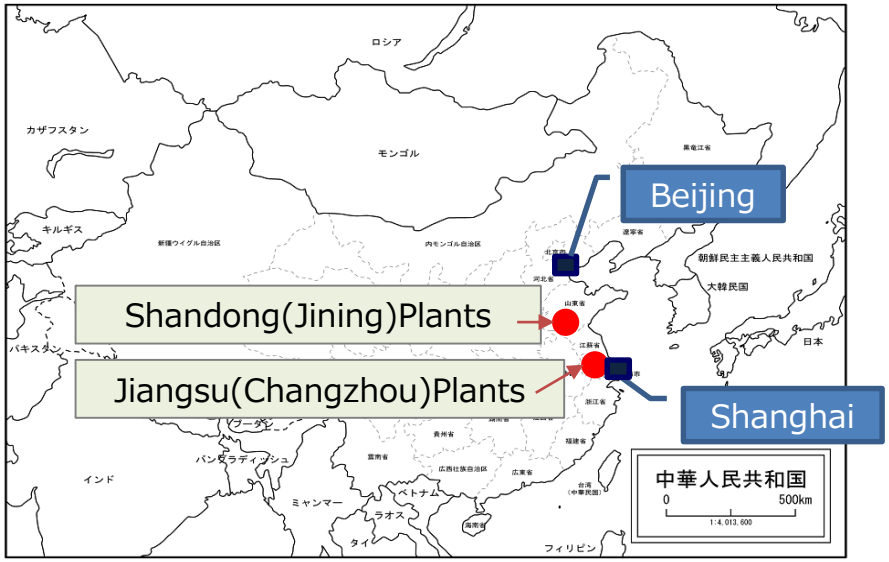
KSC countermeasures
①Drainage purification equipment
②Reuse of purified water

The situation of China environmental regulation

Since last year, in China, as a measure against air pollution (especially PM), production at the factories in specific areas were stopped by the instruction of the authorities. Regardless of the exhaust cleanliness of the factory, instructions are issued simultaneously to the factories in the area.

Instructions to stop production to Komatsu and supplier companies

	FY2017 2nd-Half	FY2018 1st-Half
Shandong(Jining)Plants (KSC, KSD)	Instruction to stop operation (Stop : 55days)	Instruction to stop all or partial operation (Stop : 7.5days)
Jiangsu(Changzhou)Plants (KCF, KCCM)	-	Instruction to stop all or partial operation (Stop : 12days)



Approach to China environmental regulations

As a result of the measures against the exhaust, KSC, KSD and 11 major supplier companies are included in the "target outside the environmental regulations (environmentally-friendly companies)" notified by Jining City by December 7th, and operation stop of these companies will be relieved

1. Measures against soot in welding : KSC(Shandong Jining)

Establish enclosure to prevent soot diffusion, 99% collection with dust collector

2. Measures against VOC* in painting

・VOC reduction by use of water soluble paint (KCCM)
→1/5 of VOC in paint
・VOC removal by adsorbent and combustion equipment (KSC)
→1/10 of VOC in exhaust

VOC removal equipment （KSC)

*VOC: Volatile Organic Compounds （Paint solvents etc.）

3. Cooperation with regional companies

At KSC, an environmental information sharing event was held by the proposal of the city, showing the measures of Komatsu, and Komatsu received high evaluation. (a total of 80 supplier and other companies in the region participated)

Introduction of Komatsu's activities

・Komatsu has improved on-site safety and productivity and reduced environmental impact by implementing solutions that utilize ICT and IoT, which are the strengths of Komatsu Group.
・We will continue to steadily engage in ESG activities that society requires.

II. Assistance Efforts for Agricultural and Forestry

Background and Policy of Assisting Agriculture and Forestry

Policy of Assisting Local Agriculture and Forestry in Ishikawa Prefecture

【Komatsu's basic stance on CSR efforts】
By defining CSR efforts as business activities for which we can take advantage of our strengths, we will respond to social needs through our core business activities.

【Getting the Awazu Plant involved in CSR efforts】

〈The Plant will assist the agricultural and forestry industries jointly with them by applying our technologies of construction equipment and manufacturing engineering, and continue to promote practical efforts to improve productivity and earnings.〉

Kunio Noji, Chairman, Komatsu Ltd. (second from the left)
Hon. Tanimoto, Governor of Ishikawa Prefecture (third from the left)

- **Signed the comprehensive partnership agreement with the Ishikawa Prefectural Government**
  1) Comprehensive partnership agreement concerning agriculture (Feb. 2013)
  2) Comprehensive partnership agreement concerning forestry (Feb. 2014)

→【Specific contents】

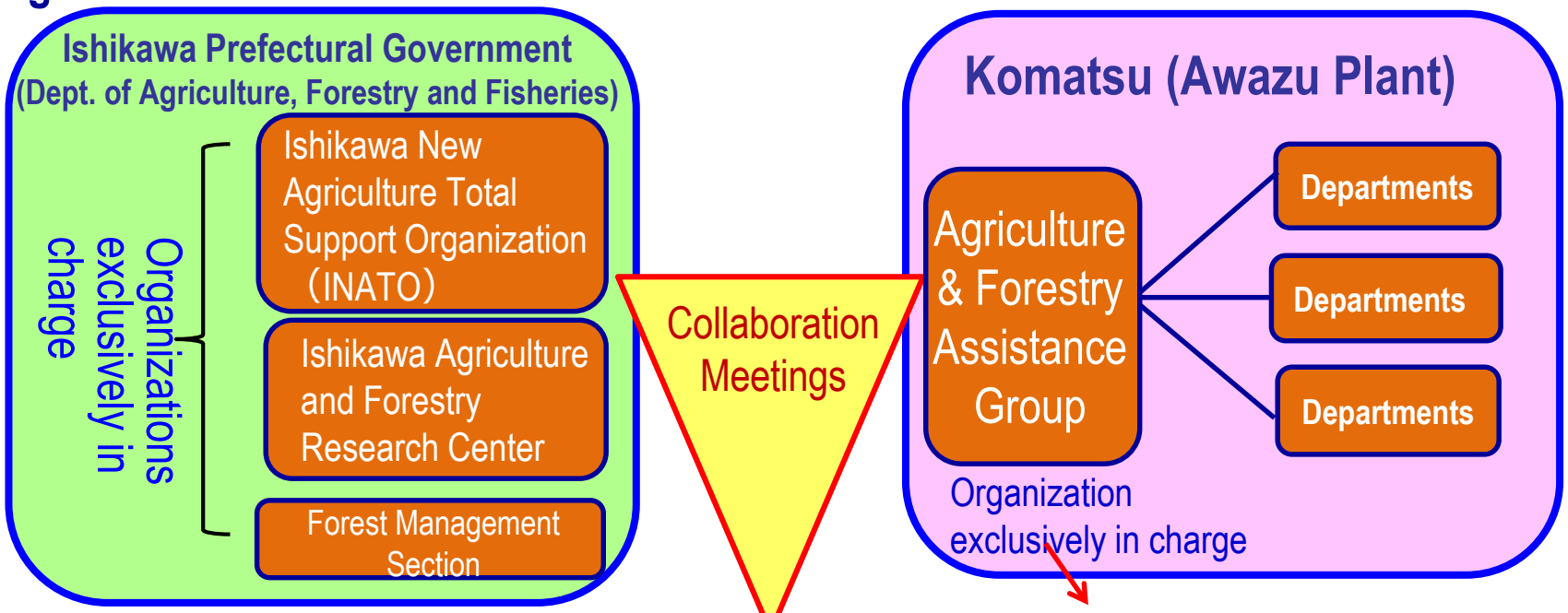
We will assist agricultural and forestry people to improve their productivity and earnings by means of innovation.

(We will assist them to improve their productivity and earnings mainly by developing new methodologies and technologies based on our technological expertise in ICT-intensive construction equipment, as we collaborate with the Ishikawa prefectural government, agricultural and forestry people, local universities and companies.)

Outline of Local Collaborations and Provided Assistance for Agriculture and Forestry

Promotion Setup of Komatsu and Ishikawa Prefectural Government for Assisting Local Agriculture and Forestry

- Organizational framework



Ishikawa Prefectural Government has allocated employees exclusively in charge of the project to INATO

Agricultural corporations, forestry cooperatives, companies, universities, etc. in Ishikawa

- Senior employees (60 years old and older) with rich experience work as coordinators.

- **Komatsu has built a new organization to promote assistance to local agriculture and forestry jointly with the local government, etc., as it utilizes the experience and technical skills of its senior employees.**
- **First-in-Japan organizational project → Highly evaluated by Japan's Ministry of Agriculture, Forestry and Fisheries as well as Ministry of Internal Affairs and Communications**

Organizational Framework of R&D Projects for Agriculture and Forestry in Ishikawa Prefecture

Funds to support R&D expenses

- Prefectural Government
- Hokkoku Bank
- KOMATSU

Local collaboration (industry-academia-government)

Funding

- Prefectural Government
- Komatsu
- Agricultural Exp. Stn.
- Kanazawa Institute of Technology
- INATO

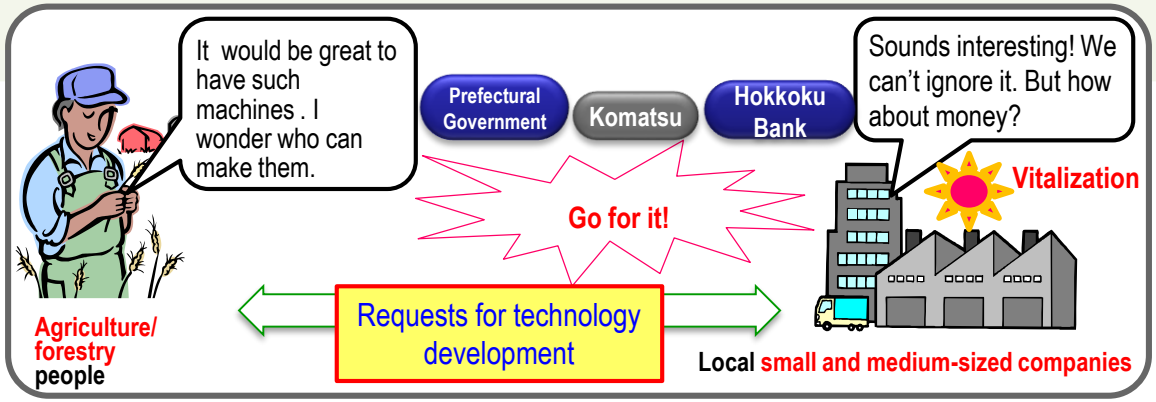
Requesting development

- Agricultural corporations, manufacturers, universities, etc. in Ishikawa

Problem solving & technology development (local collaboration, agriculture & forestry innovation)

Feedback
Diffusion of technologies

Research topics and improvement ideas of agricultural corporations



Outline of Assistance Provided for Agriculture & Forestry in Ishikawa

・**Assistance for developing new methods and technologies mainly by using our ICT-intensive construction equipment and applying our IoT and manufacturing engineering expertise. (Assistance for innovation)**

Popularization and expansion of rice cultivation by direct seeding by means of multi-functional ICT-intensive dozers


Leveling


Plowing


Puddling


V-furrow direct seeding machine

40% reduction of cultivation costs by means of ICT-intensive dozer＋
V-furrow direct seeding＋New variety

Large-scale farming by means of multi-functional wheel loaders


Plowing


Fertilizer spreading

Very convenient as one wheel loader can handle a variety of farming tasks, such as plowing, sowing and transporting.

Commercialization and diffusion of high-profitability greenhouse farming (low-cost year-round cultivation) in Ishikawa

Developed year-round cultivation technology for tomatoes by introducing ICT devices＋ groundwater-used cooling (our technology) : Yield up 50%

Local industrial-government collaboration


Groundwater-used cooling device
Cooling inside the greenhouse in summer


Honda Farm (Komatsu City)
Mr. Masahiro Honda

Assistance for forestry by expanding the use of thinnings

Using neglected local wood as fuel by means of our biomass boilers

・Energy saving of the Awazu Plant
→ CO_2: reducing 2,000～2,500 tons per year

Collaboration among Prefectural Government, Forest Association and Komatsu


Biomass boilers at the Awazu Plant and wood chips

Labor saving and assistance for meeting labor shortage of forestry by promoting smart forestry

1) "Visualization" of resource volume by analyzing drone-used photos
2) "Visualization" of production and distribution by ICT-intensive harvesters

Collaboration among Prefectural Government, Forest Association and Komatsu

Drone photography　LANDLOG cloud server　ICT harvester


Smart forestry system

Assistance Provided for Agriculture

Assistance for Developing New Agricultural Methods which Use Our Strengths (Construction Equipment Technology)

Evolving construction equipment (Application of ICT and IoT)

ICT-intensive construction equipment
+
Attachments for agriculture

1) Development of new farming processes and optimal soil improvement
2) Revitalization and reuse of abandoned farmland
3) Long-term use of machines by taking advantage of their high durability (More than doubling durability compared to farm machines)

Contributing to improved productivity, lowered fuel consumption and increased earnings

Our construction equipment has proved they can do what farm machines have not been able to do. → Assistance for Agricultural Innovation by using construction equipment

【Examples of using construction equipment】

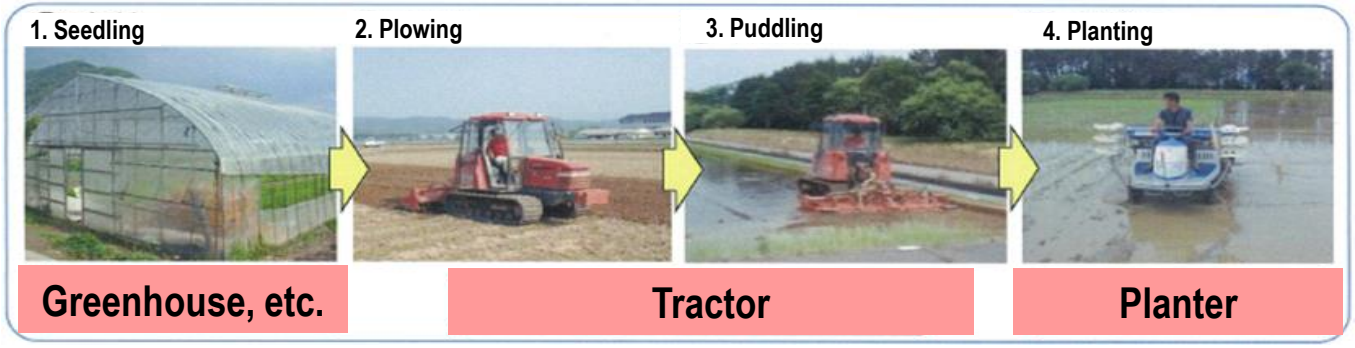
High-precision leveling of rice paddies by using multifunctional ICT-intensive dozer (Improved yield)

Direct seeding by multifunctional ICT-intensive dozer (Reduced man-hours and machine expenses)

Weeding and soil transportation by using multifunctional wheel loader (Regeneration of farmland and labor-saving)

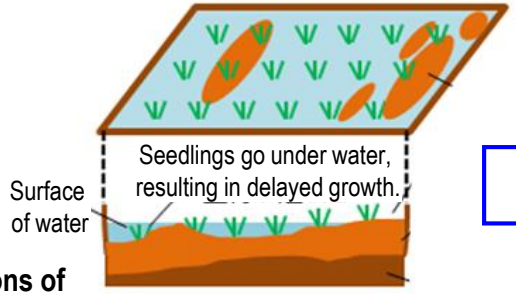
Assistance Provided for Developing Low-cost Direct Seeding Cultivation of Rice in Paddies by Using Multifunctional ICT-intensive Dozers

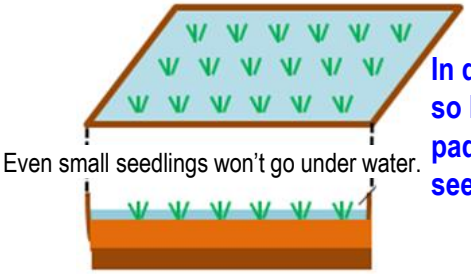
<Conventional rice cultivation in paddies>



Note: Horizontal level is important for rice paddies, because good level not only improves yield but also enables direct seeding.

Poor level results in bad conditions of rice paddies





Smooth paddy thanks to excellent leveling.

In direct seeding, sprouts are short, so high-precision leveling of the paddy surface is important for seedlings grow uniformly in water.

<Ishikawa-style: V-furrow direct seeding seeding in dry soil and growing in water-filled paddies by using multifunctional ICT-intensive dozer>

High-precision leveling (automatic)

Plowing

Puddling

V-furrow direct seeding

Change to direct seeding
1) No need for seedling and planting
→ Reduced man-hours
2) No need for greenhouse for seedling
3) No need for planters
→ Reduced expenses for facilities and machines

Benefits of Low-cost Direct Seeding Cultivation of Rice in Paddies by Using Multifunctional ICT-intensive Dozers

Ishikawa-style model for direct seeding cultivation of rice in paddies

1. Used only one multifunctional ICT-intensive dozer able to attach the rear-side work gear (By Komatsu: Reduced maintenance and machine costs)
2. Introduced V-furrow direct seeding (By Ishikawa Prefecture Agricultural Exp. Stn.: Reduced labor cost)
3. Developed and introduced a new variety of good-taste, high-quality, high-yielding rice. (By Ishikawa Prefecture Agricultural Exp. Stn.: Increased yield) → Challenging outstanding reduction of rice cultivation costs.

Model for V-furrow direct seeding in dry soil and growing in water-filled paddies by using multifunctional ICT-intensive dozer (Ishikawa Prefecture Agricultural Exp. Stn.)


Plowing & leveling


V-furrow direct seeding

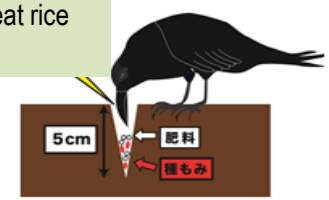
Germinating & growing

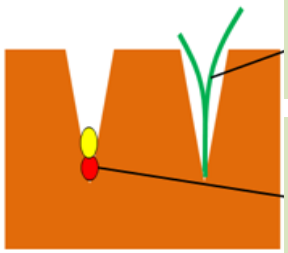

Water filling


Growing


Harvesting

Can't eat rice seeds.



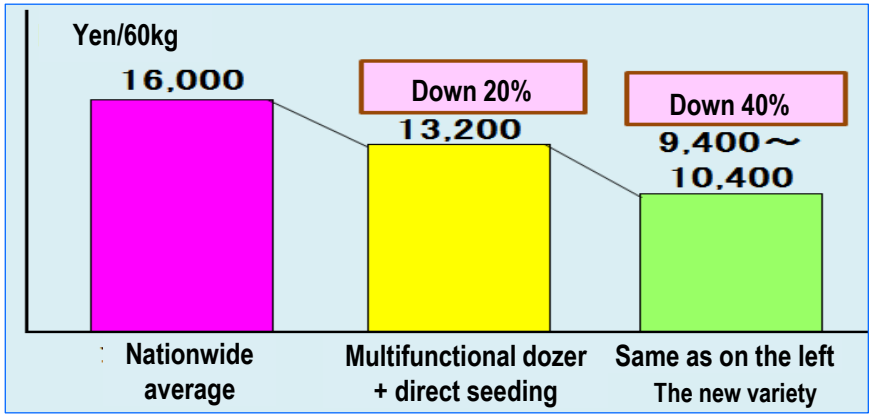


Good sprouting inside the V-furrow , rarely falling down

Minimal damage from wind or rain as protected by the V-furrow . No need for fertilizer after seeding.

Overcoming the weakness of direct seeding

Cost verified in Prefectural Government's tests



Assistance Provided for Forestry

Local Production for Local Consumption of Wood Chips for Use in Biomass Boilers by Ishikawa Prefectural Government, Forest Association and Komatsu

- **Neglected wood in the forest, such as thinnings, expands driftwood damages and kills wild animals.**
  → **Big risk for the local communities**
- **Agreed on effective use by biomass boilers of unused thinnings and neglected wood in local collaboration.**
  (Agreed by Ishikawa Prefectural Government, Kaga Forest Association and Komatsu in May 2014)

Prefectural Government

- Wants to promote improvement of forests
- Wants to curtail driftwood damage

Forest Association & forestry people

- Want to make earnings by effectively using unused thinnings, etc.
- Want to promote local use of wood.

Komatsu

- Wants to promote energy saving and reduce CO_2 emissions mainly by using biomass boilers for wood chips.
- Wants to assist local forestry.

Abandoned thinnings

Improving forests

Expected benefits from using the biomass boilers

- Reduced driftwood damage caused by abandoned thinnings, etc.
- Improved forests.
- Improved maintenance of Satoyama (domestic woodland)

Chips made of neglected wood becomes fuel.

- Increased earnings
- Increased youth employment
- Vitalized forestry thanks to improved conditions of thinnings

Biomass power generation & use of thermal energy

- Realized energy-saving plant
- Reduced CO_2 emissions
- Reduced energy expenses, etc.

Kaga Forest Association's New Business of Using Unused Wood

Began the chip-making business by collecting unused wood. ⇦ **Long-term procurement assured by Komatsu**

- **Improving forests because of long-term stable earnings of the chip-making business**
- **New employment of the youth should vitalize forestry.**

Collection of unused wood and neglected thinnings

Storage and drying yard (About 9,000 m^2)

Storage of about 5,000 tons on a regular basis

Chips

Chip storage yard (About 420 m^3)

Chip making facility (389 m^2)
Opened: January 2015

- Max daily production capacity: 50 – 70 tons
- Annual production volume: 5,000 – 7,000 tons

- Ishikawa Prefectural Government has offered financial assistance for facilities, etc.

Use of Biomass Boilers for Wood Chips at Komatsu's Awazu Plant

- **Introduced a system whose scale matches with the local volume of resource.**
- **Developed a high-thermal efficiency system. (an original system jointly by a local manufacturer and Komatsu)**

1. Biomass boiler system for wood chips to heat water (Operation began in April 2014.)

1) Application
- Supply of heated water to the employees welfare center, cafeteria, etc.

2) Output: 110 kW
Chip consumption volume: 40 kg/h
Heat utilization efficiency: About 80%

2. Power generation & thermal use system based on the biomass steam boiler system for wood chips (Installed in April 2015 and began full-scale operation in August 2015.)

Steam boilers (4 units)
- Generation of high-pressure steam by burning chips

Consumption of chips: 1,200 kg/h (5,000 tons annually)

High-pressure steam → Medium-pressure steam → Low –pressure steam

Output of compressed air by using high-pressure steam

Electric power generation by using medium-pressure steam.

Air conditioning by using low-pressure steam

Compared to conventional oil-fired boilers, this system features reduced running costs and easy ROI. → Realization of an energy-saving plant

- Power and heat used: About 3,200 kW (all in the plant)
- Heat utilization efficiency: About 70% (High efficiency)

(Efficiency of conventional biomass facilities: About 20%)

Outcomes and Benefits of Using Biomass Boilers at the Awazu Plant

- Realization of an energy-saving plant
- Reduced environmental impact by cutting down CO_2 emissions. (Coexisting with the local community)
- Use of local timber (In addition to using wood chips, the Plant also uses it for structures because it offers good energy saving effects.)

Energy-saving plant

・Awazu Plant: Coexisting with the local community with small environmental impact

Use of biomass steam boilers

Item	Unit	FY2018 (Projected)
Chips used	Ton/yr	About 4,300
Purchase electricity reduced	kWh/yr	About 700,000
Use of heavy oil reduced	Litter/yr	About 650,000
CO_2 emissions reduced	Ton/yr	About 2,000

New cafeteria

CLT building method

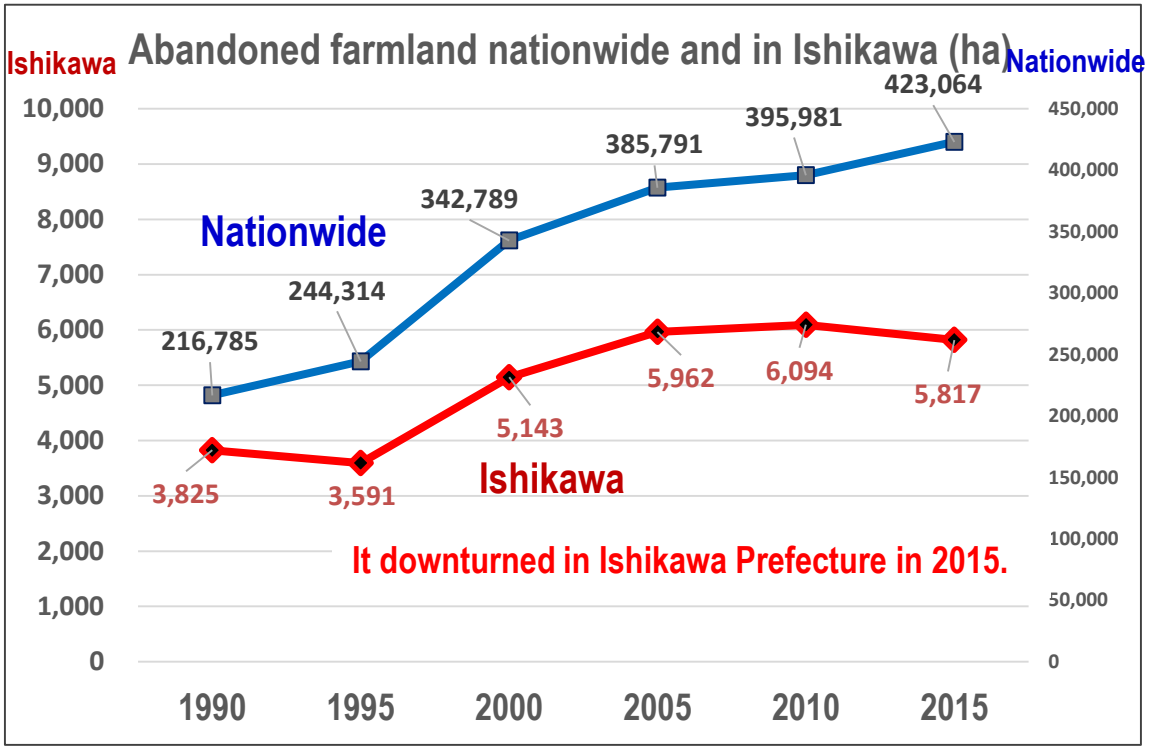
Building energy-saving facilities with local timber

To visitors from around Japan, we promote the use of biomass systems and timber produced in Ishikawa.

Ripple Effects of Assistance for Agriculture and Forestry

Ripple Effects of Assistance for Agriculture and Forestry: Examples

Agriculture



Source: Agriculture and forestry census by the Ministry of Agriculture, Forestry and Fisheries

New farmers in Ishikawa Prefecture

Fiscal year	2014	2015	2016	2017
New farmers	115	130	121	140

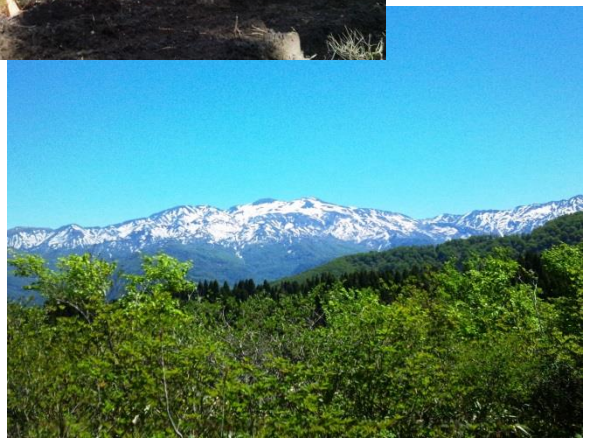
Average: 127 persons

Actual cases of recovering abandoned farmland in Noto

Agriculture:
In 2014, the number of people entering in agriculture increased and abandoned farmland decreased.

Forestry

Forestry:
Since 2015 when the Awazu Plant began using the biomass boilers, neglected wood in forest has disappeared in Kaga region, reducing driftwood damages, etc.



Thank you for your interest in Komatsu.
Norio Mitani