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Komatsu IR-DAY 2024

Forest Machine Business

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Contents

1. Social Issues and the Environment Surrounding Forest Machine Business

1. (1) Initiatives toward SDGs (Forestry) Contributing to Curbing Global Warming and Decarbonization

Forestry business contributes to ESG and carbon neutrality

・Forests absorb and store CO_2, and by using timber from these forests in buildings and other structures, carbon can be stored for long period of time.

・Energy-saving materials, such as wood and wood biomass, contribute to reducing CO_2 emissions.

・Sustainable forest management, which repeats the cycle of felling, using, planting and cultivating, contributes realizing decarbonized society by sustainably utilizing forest inventories.

➡ Komatsu contribute realizing sustainable forest management with customers through the forest machine business.

● Forest absorbs and stores CO_2

- Green Carbon
- Lowest cost method for absorbing CO_2 from atmosphere

↓ CO_2

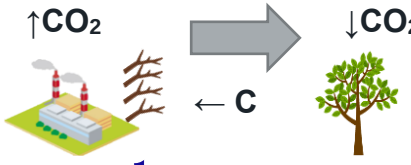
- Japan (Sugi) = 40$ / CO_2 ton
- Tropics(Fast growing trees)= 11$ / CO_2 ton
- Direct Air Capture = 300$ / CO_2 ton (Japan Science and Technology Agency)

● Wood products store CO_2 for a long time

- Carbon stock of wooden products, which take into account accumulation changes and attenuation functions, is 7.33 billion tons of carbon in 2016.
- 2.5-fold increase in the last 55 years(Tokyo University of Agriculture and Technology)
- Increase in large wooden buildings (Left picture: Komatsu Forest HQ)

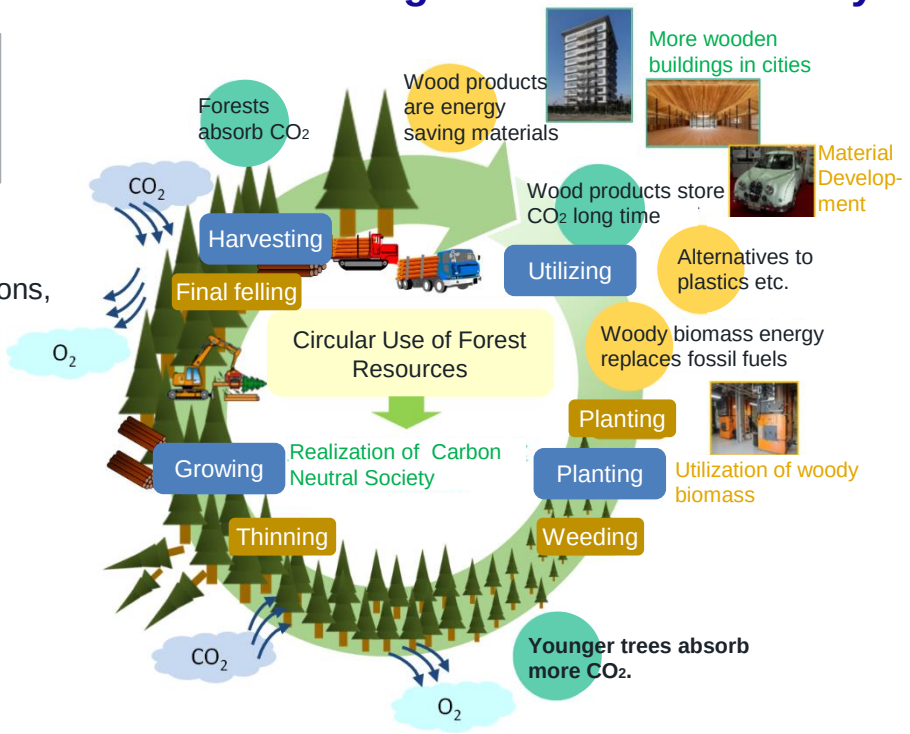
Source: The Wood Science Society Journal in Japan Vol.66

● Using wood material reduces CO_2 emissions compared to fossil fuels.



- Woody biomass fuel
- Development of woody biomass liquid fuel
- Alternatives to plastics

● Sustainable forest management contributes realizing decarbonized society



Source：Ministry of Agriculture, Forestry and Fisheries, Japan, Annual Report on Forest and Forestry in Japan Fiscal Year 2023

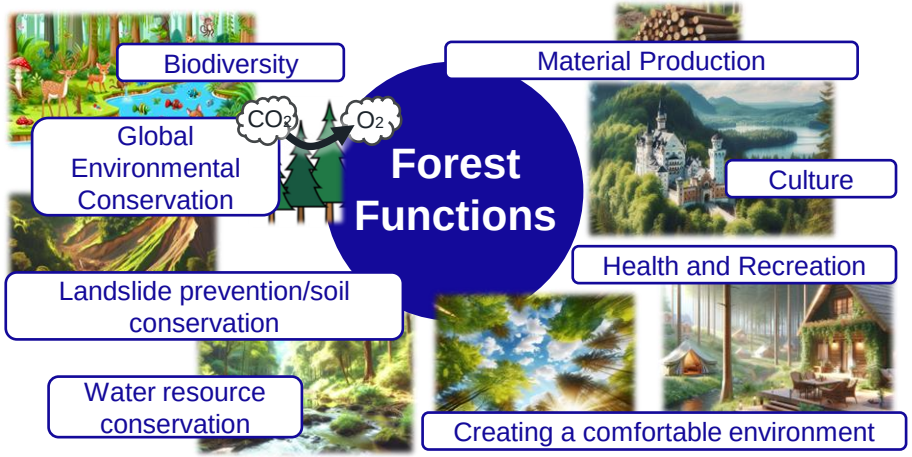
1. (2) Environmental Protection and Forest Management

Forests are being reevaluated, and society is demanding forestry operation that takes biodiversity, forest conservation, and soil condition into consideration.

- High-quality forest management through biodiversity, water resource management, and fire management
- Application of the new European regulation on deforestation and forest degradation (EUDR)
- Increased value of certified wood products (e.g. FSC, PEFC certification)

➡ **(Challenge) Appropriate forest management and solutions**

Forest functions as a basis for life



Water resource management / fire management

Forests store, nurture, and protect water resources, and have functions such as flood mitigation and water resource storage. Appropriate forest management, including afforestation and silviculture, is important.

In addition to human factors, wile fires are caused by global climate change. For forestry, this leads to significant resource losses, so fire management, including fire prevention, early detection, and prevention of fire spread, is also important.

Forest Environment Protection - New European Regulation, EUDR

EUDR was enacted to help EU citizens avoid consuming products that lead to deforestation and forest degradation within the EU and around the world. Companies bringing the following products onto the EU market must ensure that they are not produced on land subject to deforestation:
The restrictions apply to regulated commodities (beef, cocoa, coffee, palm oil, rubber, soybeans, timber) and related products traded on the EU market or exported from the EU.

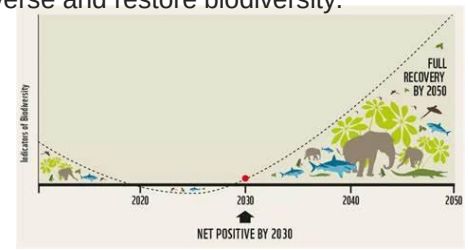
Biodiversity Forests - largest repository of biological species on land

The 15th Conference of the Parties to the Convention on Biological Diversity (COP15) Kunming-Montreal Biodiversity Framework

Goal: Nature Positive (Regeneration of Nature)

Halt biodiversity loss by 2030.

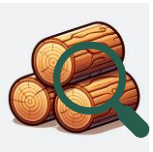
Reverse and restore biodiversity.



Certified wood - (e.g.) FSC、PEFC certification

It is occasionally regarded as an indicator for the achievement of Goal 15 among the 17 SDGs.

Forest Protection



Transparency

Source：Forestry Agency of Japan, Nature Positive Initiative

1.(3) Labor-intensive Forest Operation

The mechanization progress of forest operations differs from region to region, but securing labor and safety are common challenges.

- Labor-intensive operations and safety issues
- The challenges of securing labor
- Specific examples of demand for mechanization

➡ **Komatsu aims to develop safe, highly productive, smart and clean forestry workplace of the future**

Labor-intensive forest operation and safety issues (in case of Japan)

Source：Forestry Agency (photos)

Planting and nurturing

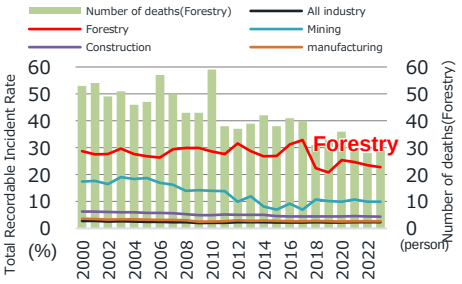
Clearing sites and preparing compacted forest land. → Planting seedlings. → Removing undergrowth to encourage saplings to grow.

Land preparation → Planting → Weeding

Logging and extracting

Examine the tree volume of standing trees and make a plan for management. → Trees are felled and cut to the appropriate size using a harvester. → The logs are transported to the mountain yard. → Transporting logs from the mountain yard to the market.

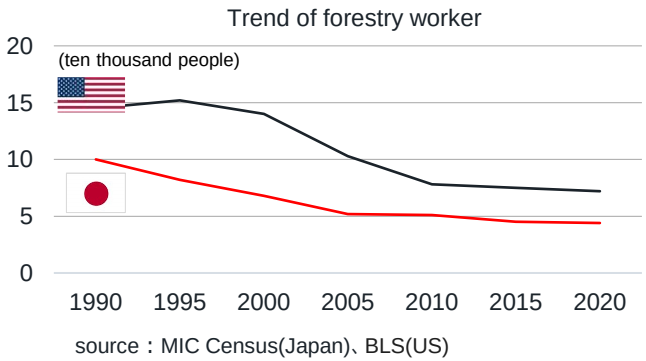
Survey → Felling・Gathering → Logging → Transporting



source：MHLW

The challenge of securing labor

Forestry workers is declining in Japan and US.



source：MIC Census(Japan)、BLS(US)

In Brazil and Indonesia, there are also issues with securing labor for forestry operations in areas far from urban area.

Specific examples of forest operations due to a labor shortage and mechanization

＜Felling by chainsaw＞ ＜Harvester＞

Source：Forestry Agency(pictures)

＜Manual Planting＞ ＜Planter＞

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2. Forest Machines and Market Trends

2.(1) Forest Machines (Summary)

● Purpose-built Felling / Extracting machine

(Komatsu Forest product)

Nordic style・・・Mainly for Cut To Length (CTL) method

(TimberPro product)

North American style・・・Mainly Full Tree Length (FTL) method

Harvester

At the forest felling site, each tree is cut to a specified length.

Forwarder

Timber cut to specified lengths and dimensions is transported from the forest to the forestry road.

Feller buncher

Cut the trees at the base, pile them up one after the other, and then take multiple trees and drop them to the ground.

Skidder

Lying trees are not cut up, but instead collected and dragged across the ground for transportation.

● Excavator-based forest machine

・・・Specially designed or customized for various purpose

Crawler harvester

Log loader

Swing yarder

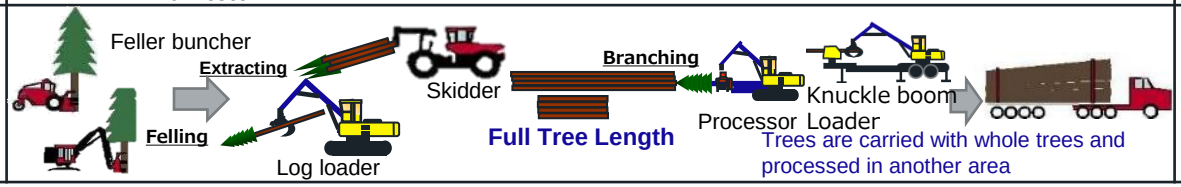
Grapple

● Others ・・・developed and spreading for mechanization

Planter

Subsoiler

(Ref.) Main harvesting and extracting methods in forestry

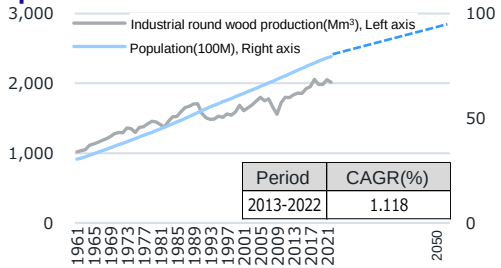
Method	Detail	Featrure
CTL Method		• Felling, bucking and processing by harvester head in forest • Extracting by forwarder • Popular method mainly in Nordic area.
FTL Method		• Felling by felling head • Extracting with whole trees by Skidder • North American style. Suitable for large scale logging in a short time.

2.(2) Forest Machine Business Market Trend

There is a correlation between population growth and timber production. Forestry mechanization is necessary. Forest machine demand is expected to grow at CAGR 2.3%.

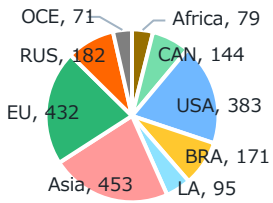
- Global roundwood production: 2.02 Bil m3 (’22), 2.04 Bil m3 (’24), 2.12 Bil m3 (’27) (CAGR +1.1%)
  - Saw log ;Increase in large wooden buildings. Increased housing starts in emerging countries
  - Pulp related ;Plastic Alternatives. Increase of sanitary goods in emerging countries
  - Fuel ;Expanding the use of biomass fuel(wood pellet, wood liquid fuel)
- Global forest equipment demand: $7.5Bil (’21), $8.3Bil (’24), $8.4Bil (’27) (Estimation by Freedonia)
- Afforestation area expanding. 50% of wood production comes from planted forest, estimated to grow to 70-85% by ’30. (Estimation by Tottori Enviro Univ.)
- Afforestation area is expected to expand for the purpose of decarbonization and preservation of natural environment (ADL)
- Mechanization of harvesting is expected to grow in Asia and South America.

●Global population & timber production



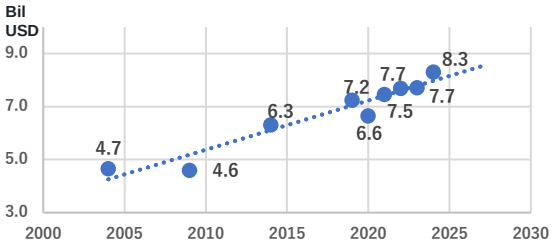
Period	CAGR(%)
2013-2022	1.118

●Industrial roundwood production by region (2,016 Mm³、2022)

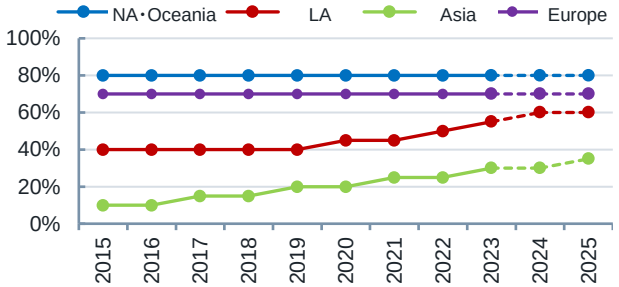


Demand for paper and wood increases steadily at a constant level due to the growth of the world population, especially the middle class.

●Global forest machine demand

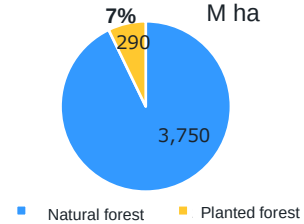


●Mechanization ratio by region

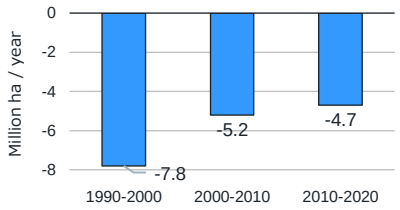


Demand for forest machine will increase. Increasing mechanization rates, particularly in emerging economies such as Asia and Latin America, will be a tailwind.

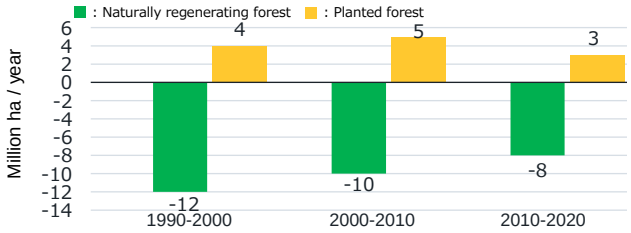
●Natural forest and planted forest



●Global deforestation



●Yearly change of natural and planted forest



(Ref； Land area of Japan is 37.8 M ha)

The area of plantations has been increased due to decarbonization and environment purposes as well as for harvesting purposes. Shortage of manpower could contribute to mechanized planting.

source: FAO(Industrial round wood production and forest area)、Freedonia (forest machine demand)

3. Forest Machine Business Overview and Sales

3. (1) Forest Machine Business Overview

Komatsu has been contributing to the realization of a decarbonization society through sustainable forestry management by forest machine business

- Contribute to safety and efficiency through forest machine technology and know-how. In particular, the mechanization of logging and extracting is continuously expanding the business.
- Promote mechanization/labor saving of planting & cultivating to contribute realizing sustainable forest management for future forest machine business.
- Provide forest and forestry solutions that support sustainable forest management including visualization of forest.

Source：Forestry Agency(pictures)

Forestry cycle

Planting and Tending

Land preparation → Planting → Weeding

Logging and extracting

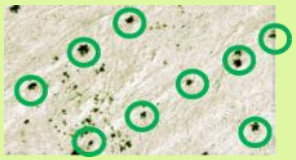
Survey → Thinning → Felling/ Processing → Extracting/ transport

Decarbonization contribution

Contributing to decarbonization through reforestation

Contributing to decarbonization through improving forest management

Komatsu assets & history in forestry business



Monitor seedlings & visualize survivors

Subsoiler　Planter　Weeding machine

Realize sustainable forest management cycle through mechanization of land preparation, tree planting and weeding

Visualize forest inventory

Visualize Logging process

Visualize forestry operation

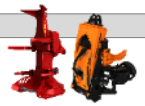
Harvester　Feller buncher　Forwarder

Keep people off the ground to reduce work accidents

2004 Valmet Komatsu Forest

2012 Log Max

2018 QUADCO GROUP SOUTHSTAR equipment ltd



2018 ORYX SIMULATIONS

2019 TimberPro

2022 Bracke FOREST

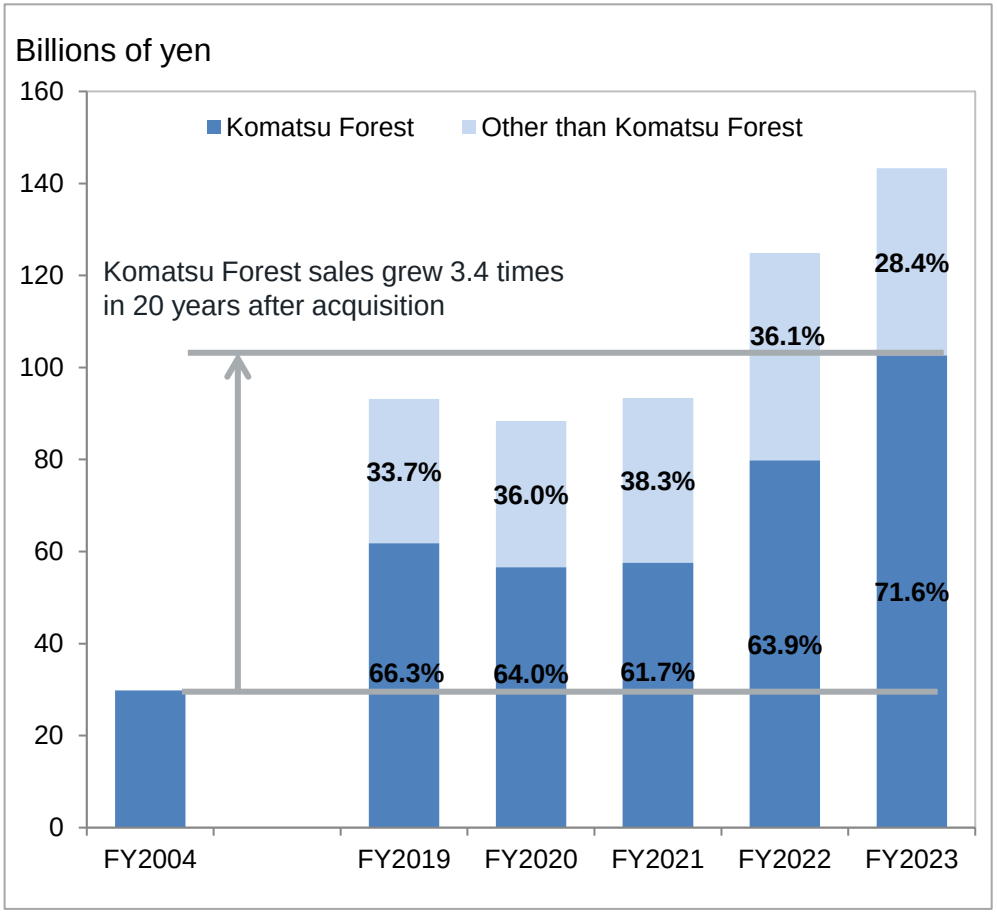
3. (2) Sales of Komatsu Forest Machines

Acquired Partek Forest* in 2004 and started full-scale forest machine business with wheeled purpose-built forest machines

* Currently Komatsu Forest

- Komatsu Forest achieved record sales since FY2021, accounting for 60-70% of Komatsu's forest machine sales. Komatsu Forest has been securing a stable market share of over 20% of global market and plays a key role in Komatsu's forest machine business
- In 2019, acquired TimberPro, a crawler feller buncher manufacturer and enter into FTL forest machine business.
- In addition to existing products that are accepted in the market, expand product lineup to grow our business.

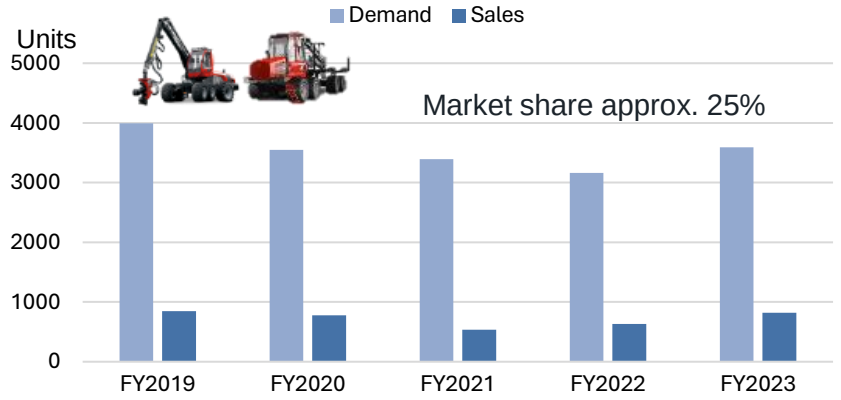
Sales of Forest Machines



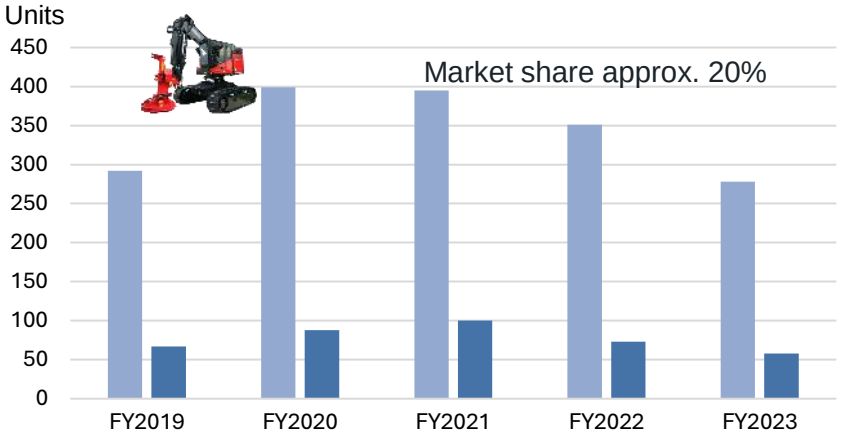
Market and Market share

(Komatsu estimate)

Wheeled purpose-built machine (Komatsu Forest)



Crawler feller buncher (North America market)



4. Forest Machine Business Growth Strategy: Key Activities

4. (1) Key Activities for Business Growth (Product①)

Strengthening production capacity, sales promotion and product development for Nordic style CTL forest machine business growth.

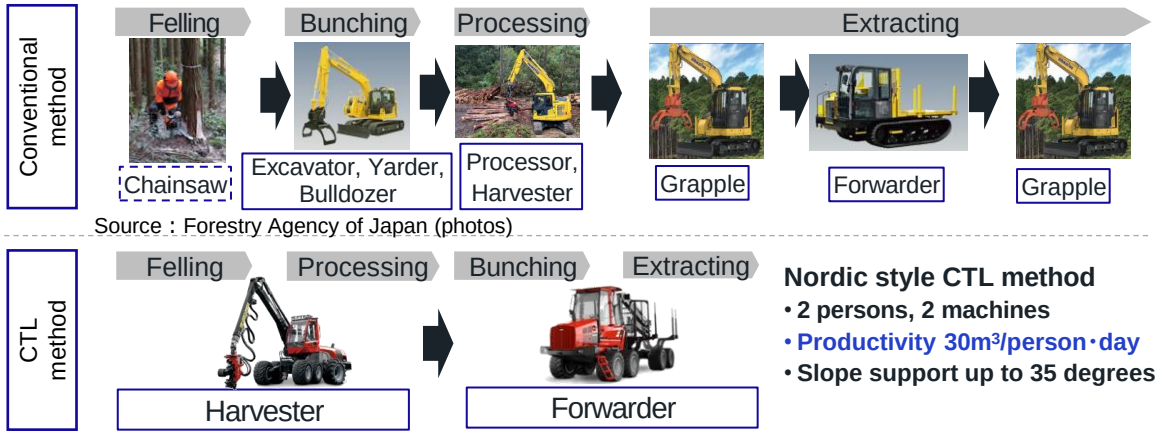
- Develop expand new market for CTL machine.
- Develop new soil friendly forwarder(Centipede/concept machine)
- Expand After Market sales.

Production capacity expansion of New Umeå Plant (Sweden)

- Start production from Aug. 2021. 25 units/week production in this year
- Europe's first carbon-neutral plant

Develop and expand new market: Asia, South America, Japan, etc.

Method comparison **(e.g.) Japan**



Source：Forestry Agency of Japan (photos)

Nordic style CTL method

- **2 persons, 2 machines**
- **Productivity 30m³/person・day**
- **Slope support up to 35 degrees**

Dropbox

- Unmanned containers (Dropbox) are placed near the worksite, and the parts ordered by the user are delivered to the specified drop box.
- There are about 110 in Sweden and about 30 in Finland.

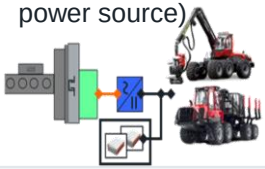
In addition, provide remote service and training for customer support.

Soil-friendly CTL machine crawler-type forwarder (Centipede/Concept machine)

- Due to global warming, the period of frozen soil is decreasing, and the period of soft ground is becoming longer.
- For sustainable forestry, KFAB is taking the lead in developing a **low ground pressure crawler-type forwarder** together with 8 Swedish forestry companies
- Low ground pressure has the feature of not damaging tree roots under the soil

Concept of Electrification and Automation

- Hybrid Electric (Generated by internal combustion engine)
- Battery Electric (same to hybrid electric excl. power source)



In addition, develop concept for automation such as extracting machine.

4. (2) Key Activities for Business Growth (Product②)

Strengthening production capacity, sales promotion and product development to grow whole forest machine business including NA style FTL machine

- Introduce new FTL machine to NA market and continuous production lineup expansion
- Introduce new hydraulic excavator-based harvester and sales expansion
- Develop silviculture machines to contribute realizing sustainable forest management

- **Production capacity expansion of TimberPro's Shawano Plant (US)**

  Expanded plant in FY23, increasing production capacity



- **Market introduction of TimberPro Brand FTL machines**

D-SERIES


- **Market introduction of new hydraulic excavator-based harvester**

PC230F-11 (NA)

PC135F-10M0 (Indonesia)

Forestry spec machines based on hydraulic excavator are developed and launched to meet the regional demand.

- **Product and sales expansion of silviculture machine**

Planter


Mulcher


4. (3) Key Activities for Business Growth (Solution)

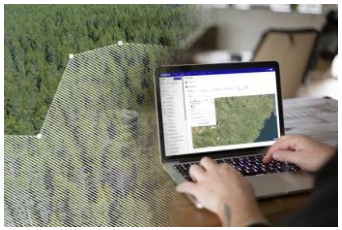
Solve customer's pain points in each process of forestry cycle by machine and solution

- Monitor forest inventory, logging progress, growth of seedlings with remote sensing technologies
- Provide information of forest fire, forest pests, biodiversity for sustainable forest management
- Aim for realizing forest DX and forest digital twin such as visualizing forest for sustainable forest management
- Build telecommunication network in the forest where is no signal for providing connected services.

Smart Forestry connected service

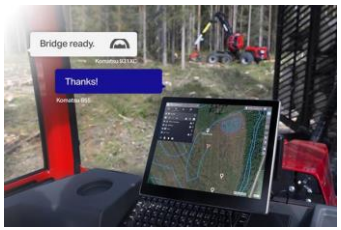
Fleet monitoring

- All machine information gathered in one place
- Visualize Machine operation / health / location and production (felling, processing, extracting etc.)



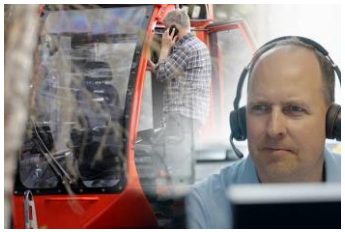
Logging plan/work order

- Pre-register production plan (logging area/spot, Geo information etc.)
- Shae information on in-vehicle monitors for improving productivity and avoid incorrect operation/.



Production management

- Operate as instructed on the monitor
- Share site info. and communicate between machines/operators for improving site safety and productivity.



Remote support

- Remotely monitor machine health and conditions.
- Remote trouble shooting by connecting machine management system remotely.
- Reduce service and support cost

5. Forest Machine Business Growth Strategy: Sales Outlook

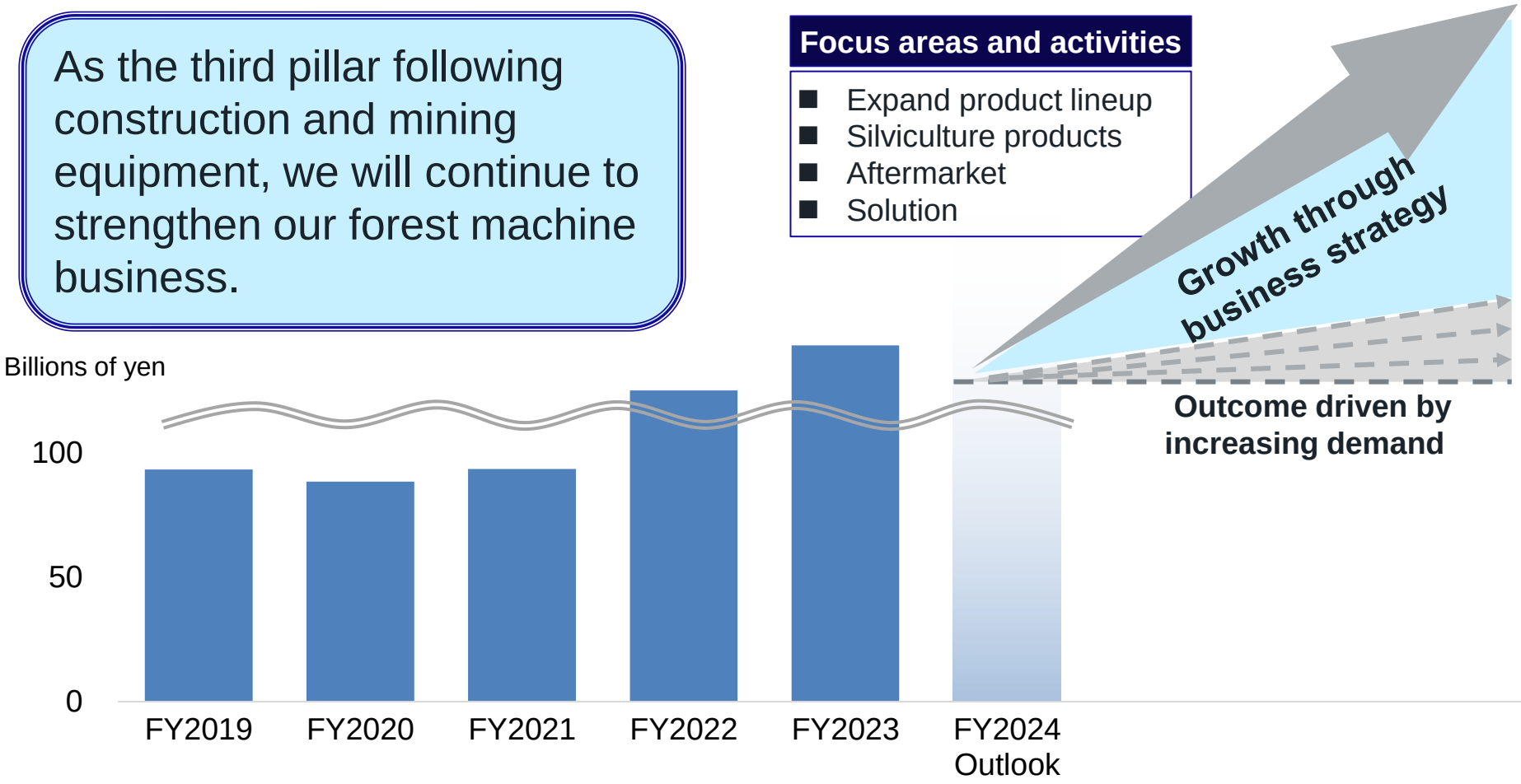
5. Outlook of Forest Machine Business

Forest machine sales in FY2024 are expected to be 1.5 times compared to FY2021.
We aim to achieve further growth by expanding aftermarket sales and strengthening key areas of activity such as silviculture and solution business

As the third pillar following construction and mining equipment, we will continue to strengthen our forest machine business.

Focus areas and activities

- Expand product lineup
- Silviculture products
- Aftermarket
- Solution



【Photo】Soil-friendly crawler-type forwarder, Centipede (Concept machine)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Creating value together