



Komatsu IR-Day 2021

**Construction Business,
Electrification**

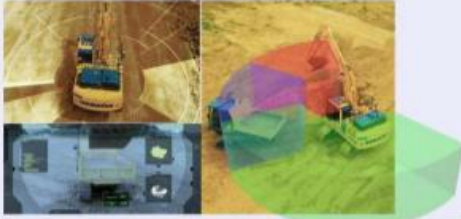
Seiichi Fuchita

**Senior Executive Officer
President, Development Division**

Mid-Term Management Plan

We will achieve sustainable growth in the face of changing external environment and challenges by focusing efforts on the following three pillars of growth strategies.

Value creation by means of innovation



- ◆ Optimization platform and solutions business strategies
 - * SMARTCONSTRUCTION, Autonomous Haulage System (AHS), and platforms (LANDLOG and IntelliMine)
- ◆ Automation, autonomous operation, electrification and remote controlling of construction, mining and utility equipment
- ◆ Smart forestry and agriculture

Growth strategies based on business reforms



- ◆ KMC integration synergies and business reinforcement
- ◆ Value chain reforms and redefinition of the aftermarket business
 - * Preventive maintenance by applying IoT and AI, and Lifecycle support under serial number-based management
 - * Logistics reforms * Next-generation key components
- ◆ Next-generation KOMTRAX
- ◆ Stronger focus on aggregate & cement, forestry, agriculture and other segments
- ◆ Efforts for “DANTOTSU NO. 1 in Asia” and in the growing markets of India and Africa
- ◆ Reforms of the industrial machinery business (Expansion of synergy with the construction equipment business and growth by capitalizing on core technologies)

Structural reforms for growth



- ◆ Business reforms by means of ICT and IoT
- ◆ Structural reforms of development operation
 - * Model base development
 - * Open innovation
- ◆ Connected plants with Zero impact on environment and workers
- ◆ Global human resource development

World Trend for Carbon Neutrality

CO2 reduction target

Country·Region	Due to	from	Reduction ratio	C/N Target
Japan	2030	2013	▲46%	2050
USA	2030	2005	▲50-52%	2050
Canada	2030	2005	▲40-45%	2050
EU	2030	1990	▲55%	2050
UK	2035	1990	▲78%	2050
Russia	2030	1990	▲30%	2060
China	2030	-	Decreasing	2060
India	2030	2005	Renewable energy ratio 50%	2070
Australia	2030	2005	▲26-28%	2050

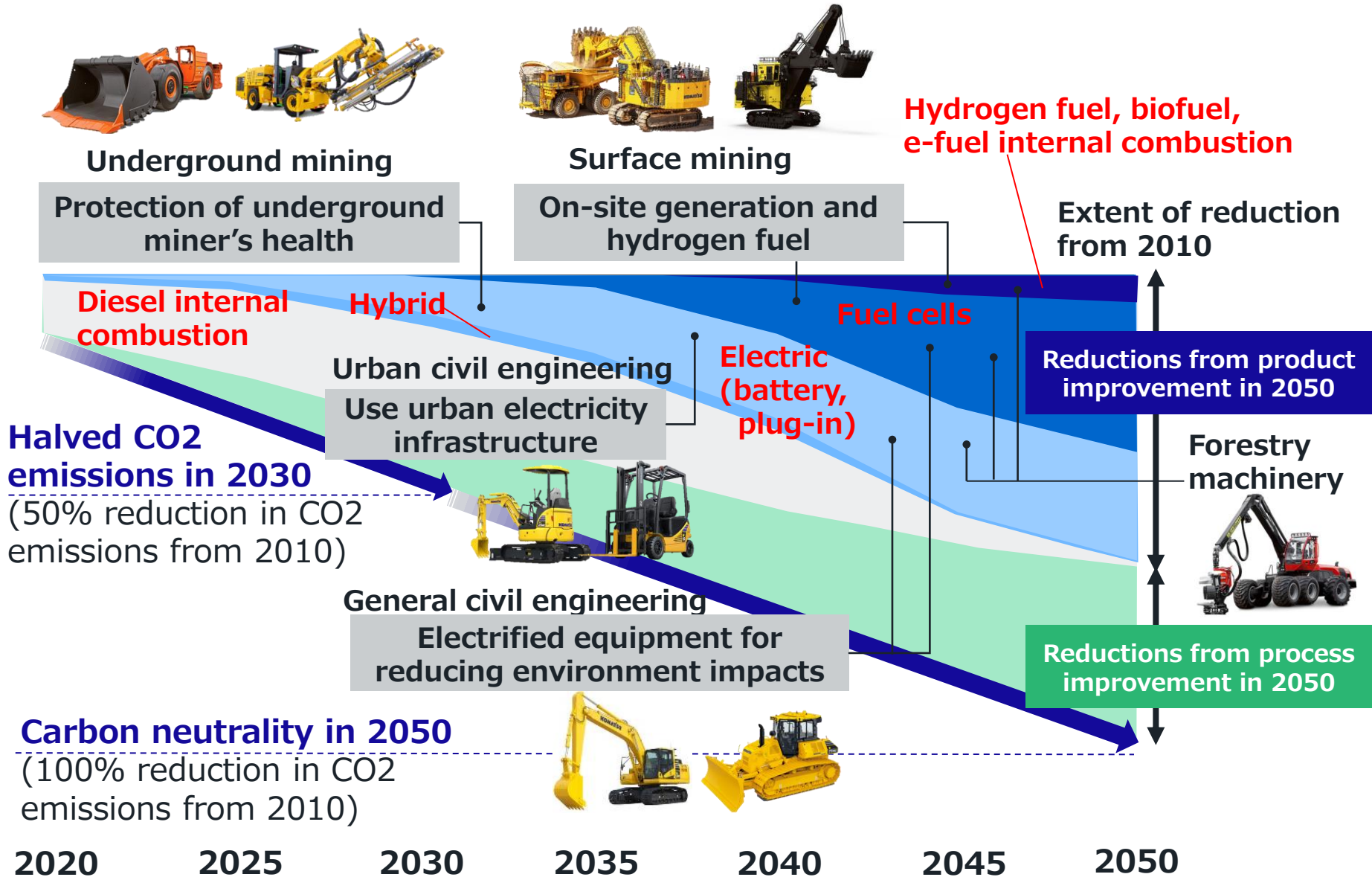
COP26 Agreement

- ✓ Global average temperature rise: Pursue effort to limit to 1.5 degrees Celsius
- ✓ Coal-fired power generation (has not taken measures to reduce emissions): Accelerate to efforts to phasedown
- ✓ Emission reduction target due to 2030: Review and strengthen by end of '22
- ✓ Support for developing countries: Steadily maintain annual contribution of 100 billion dollars promised by developed countries until 2025
- ✓ Carbon credit trading framework: Approval

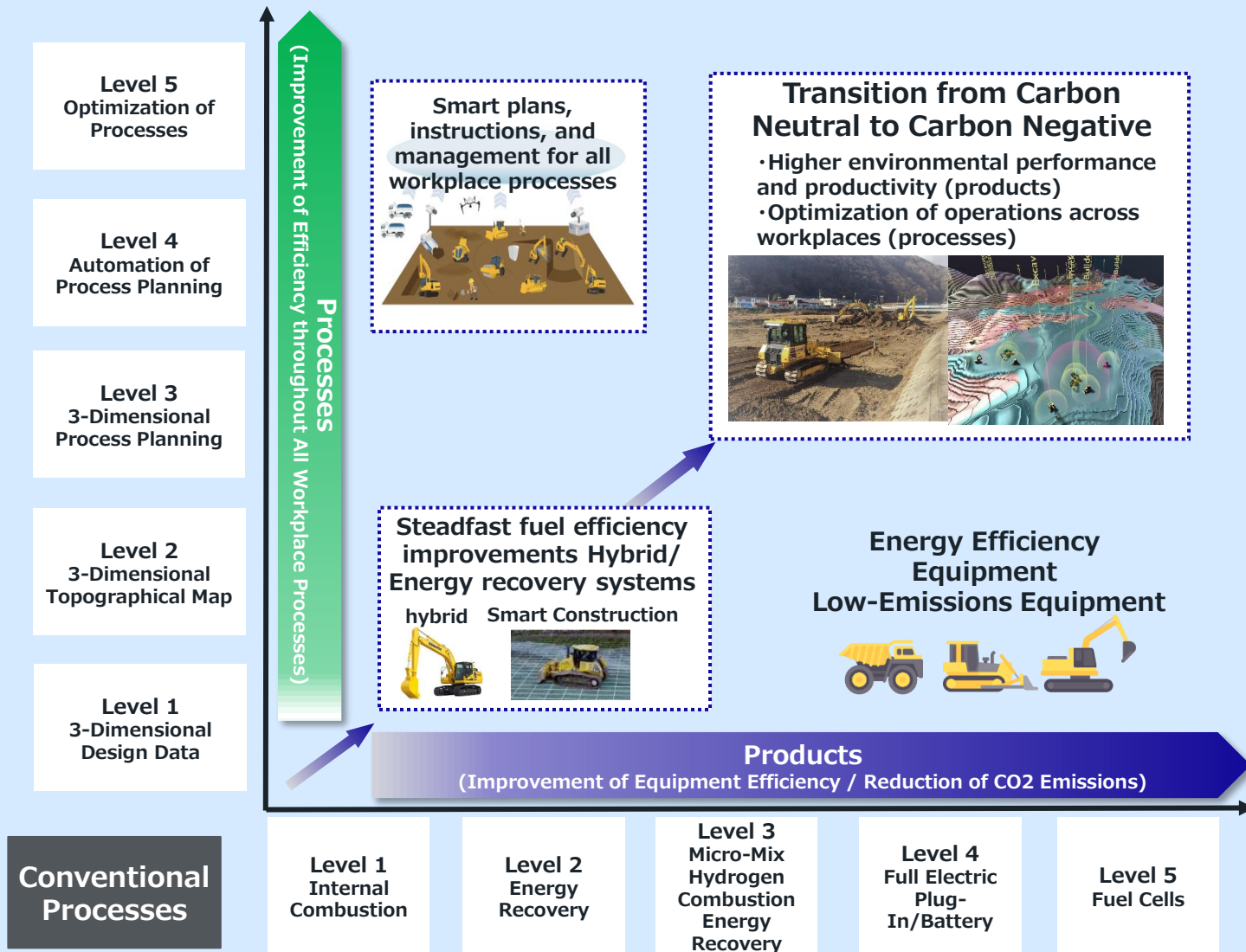
Others

- ✓ Vow to end and restore forest destruction by 2030 (by leaders from more than 100 countries)
- ✓ Announce global cooperation framework to reduce methane emissions due to 2030
- ✓ USA-China cooperation: Keep temperature rise to 1.5 degrees during this century

Roadmap for Carbon Neutrality



Two-Pronged Approach of Improvements in Products and Processes to reduce CO2 emissions



Challenges and Countermeasures for Electrification

Construction and mining equipment operate under harsh vibration, dust, harsh temperature conditions, etc.

Performance

- Countermeasures to decrease energy density
- Extension of discharge and charge cycle (output power and endurance)

Durability

- Durability under harsh vibration



10G



1G

Bigger room for new power source!!

4 Challenges to Overcome for New Power Sources

Environment

- Quick supply energy
- Reliability and durability under harsh condition

Cost

- Price optimization
- Development of battery circulation infrastructure



Snow condition



Dust condition



Current Situation for Carbon Neutrality (1)

Electrified vehicles in market

Small & Middle excavator

Electric Drive with cable



Hybrid



Mini excavator

Battery



Forklift

Battery



Surface mining

Diesel Electric



Electric Drive with cable



Underground mining

Hybrid



Battery



Current Situation for Carbon Neutrality (2)

Construction

2020 April: Mini excavator PC30E
in Japan market (Rental)



Proceed with next development based on opinions of customers who used PC30E-5.

Honda and Komatsu announce joint development of micro electric excavators powered by "Honda Mobile Power Pack Batteries"



Promote development to introduce in market around 2021

Joint PoC verification tests to start for electrification of small and middle excavators: collaboration with Proterra (USA)



PoC's vehicle is moving at customer's workplace now. And try to introduce in market as soon as possible.

Mining

Major mining companies  Komatsu

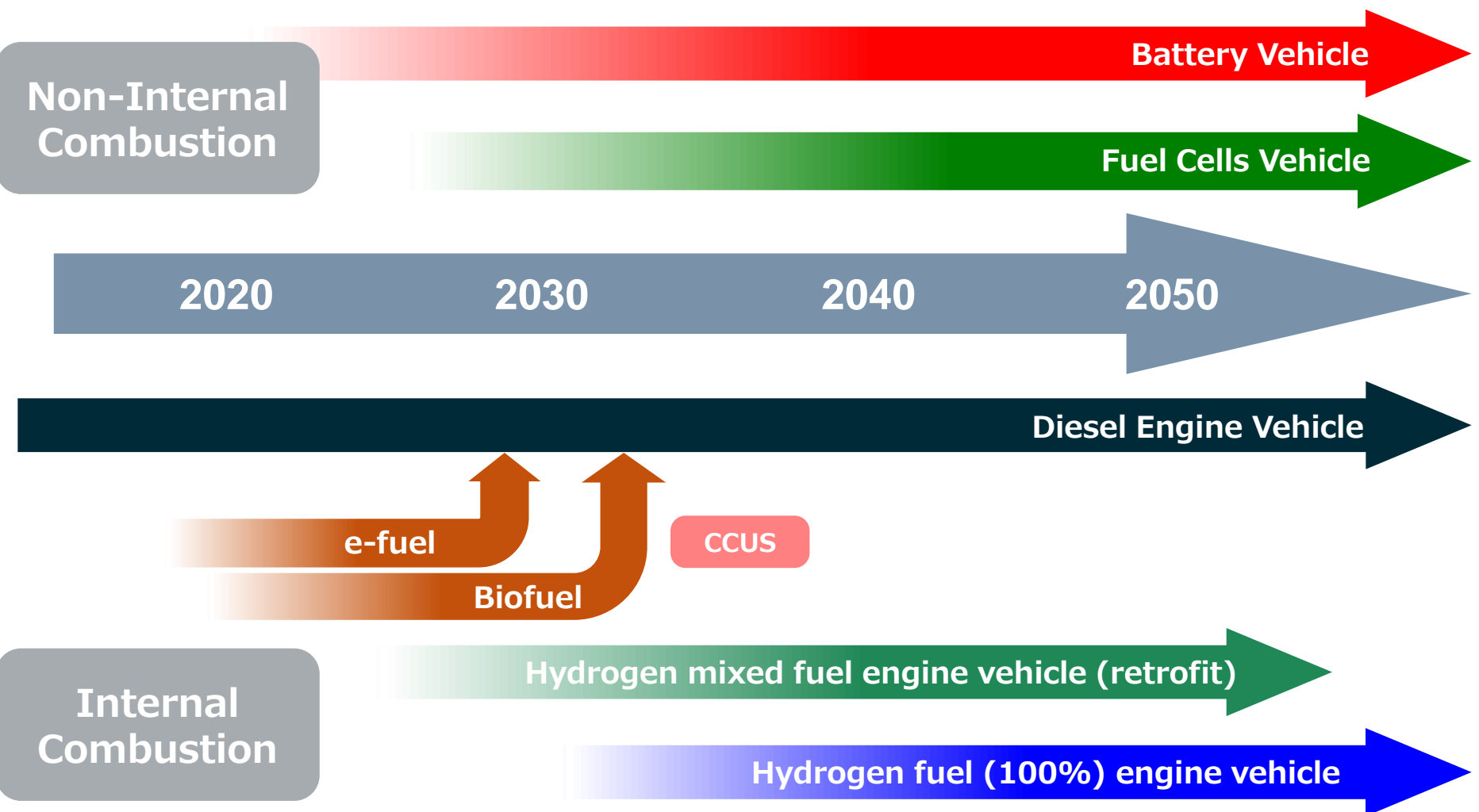
Komatsu GHG Alliance

Accelerate development of mining dump truck to reduce GHG

MINExpo2021
(9 /13-15@Las Vegas)



Direction of Electrified Equipment Development



Charging for Battery Construction Vehicles

Automobile

Easy to charge by yourself !

Use charging station in the city
(Gas station, shopping center, etc.)



Not easy to charge by yourself !

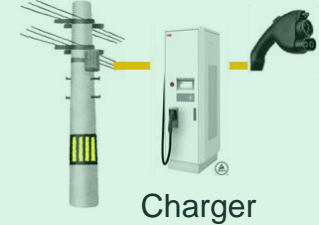
Vehicle for charging

Utilization of electricity infrastructure



Charge from generator or battery

or



Charging infrastructure (sample)

Excavator of 1 ton or less

Mini excavator

Small & middle excavator

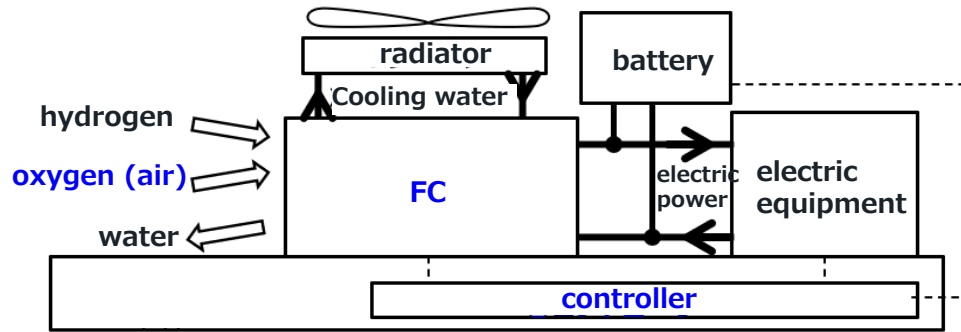


Image of a broad-ranging battery-sharing system established through utilization of MPP



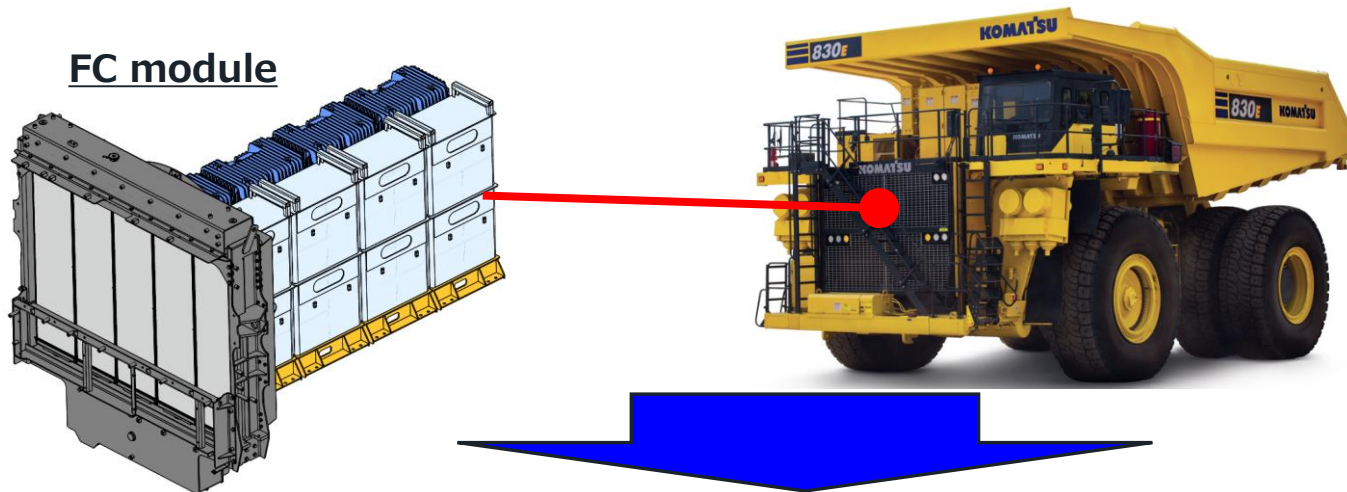
Research and Development of Fuel Cells

FC bench test : for control and simulation technology



FC bench test (Megawatt class): verification with real component

Test on prototype machine

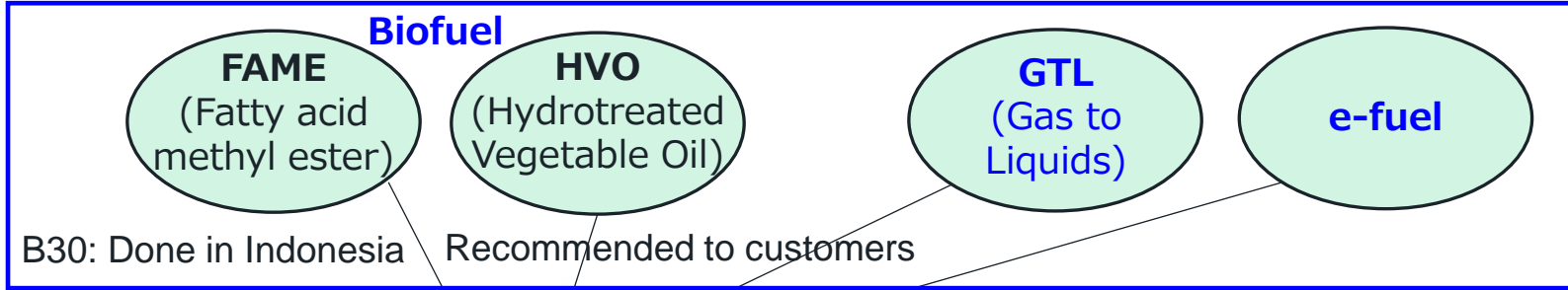


Try to introduce in market around 2030

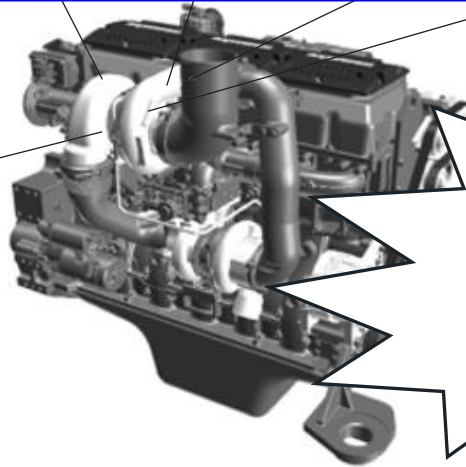
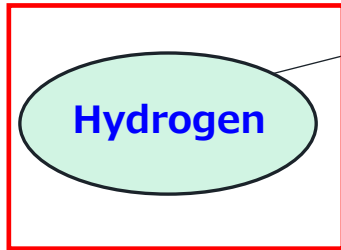
Utilization of Internal Combustion Engine for Carbon Neutrality

Proceed with measures while considering forecasts of each new fuel price (differences by region), infrastructure development timing, etc.

Immediate response under market conditions



Promote research and development



Promote research and development with advantage under strengths of in-house development and production of engines.

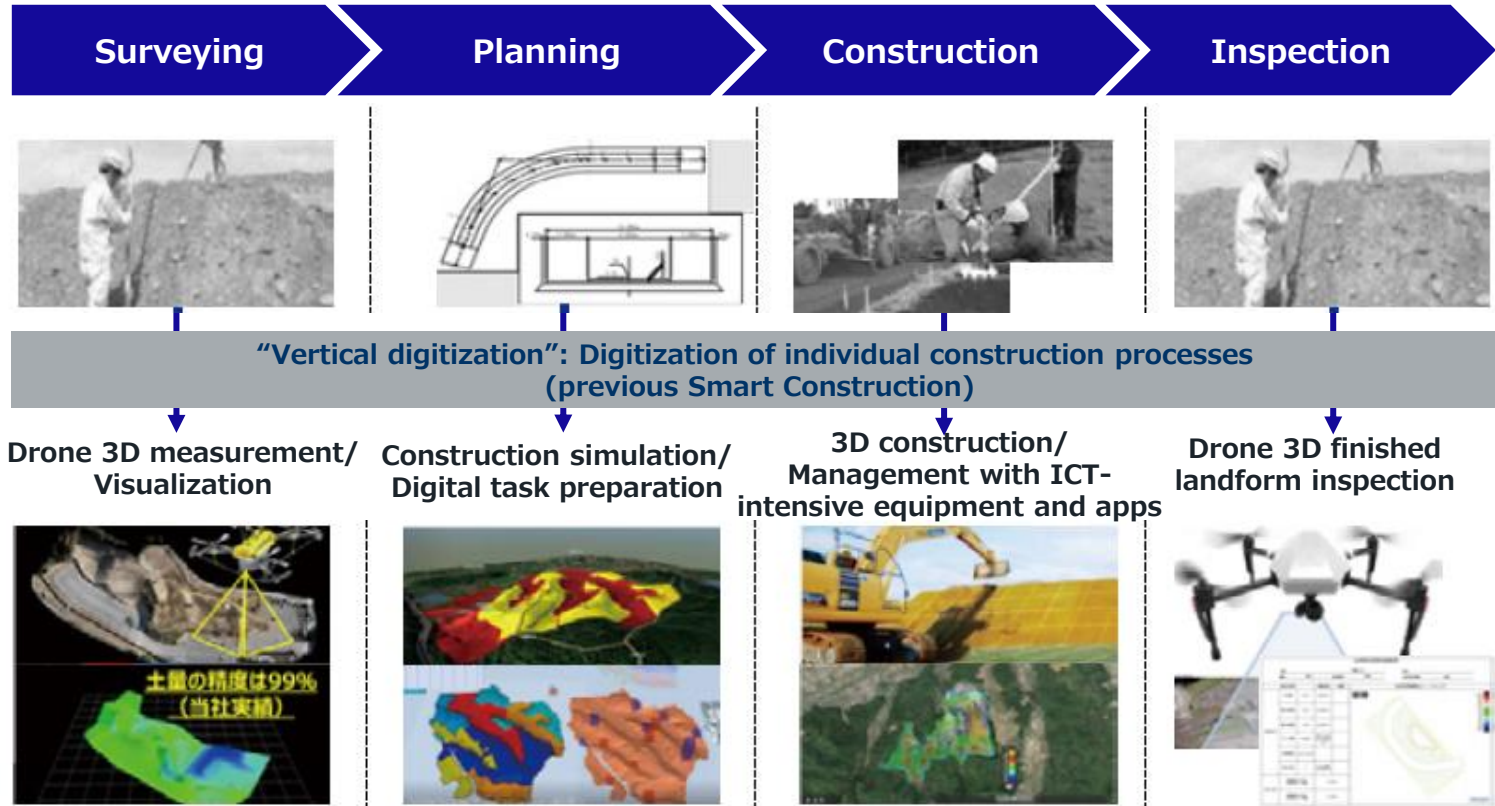
Roadmap of development for hydrogen engine

Development will be promoted assuming the following timing, but the introduction timing will be decided based on the situation including infrastructure.



Reduction of CO2 Emissions by Processes (1)

Smart Construction Digital Transformation



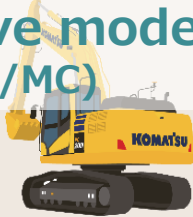
"Horizontal digitization": Digitization and connection of all processes to optimize entire construction process – the "digital transformation of construction" ("Smart Construction Digital Transformation")

Reduction of CO2 Emissions by Processes (2)

Construction sites

ICT-intensive models
(3D-MG/MC)

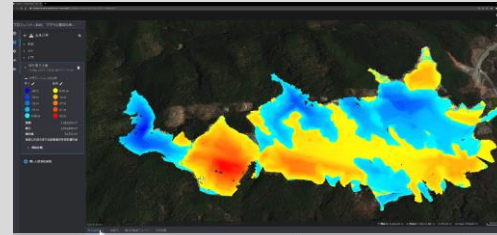
SC Drone
/Edge



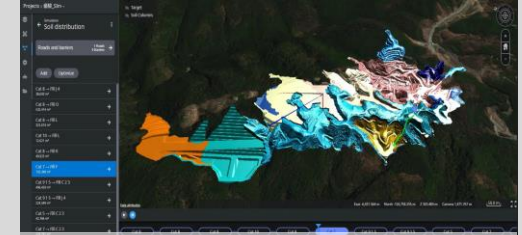
As-built digital data

Digital tasks under plan

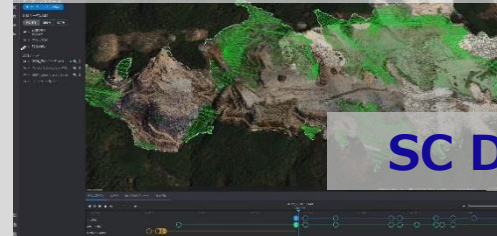
Digital Twin



SC Dashboard



SC Simulation



SC Design



Real-time visualization
of construction sites
(Machines, materials,
workers, and landscape)

Generation/reassessme
nt of construction plans
Generation of tasks of
machines, workers and



SC Insight



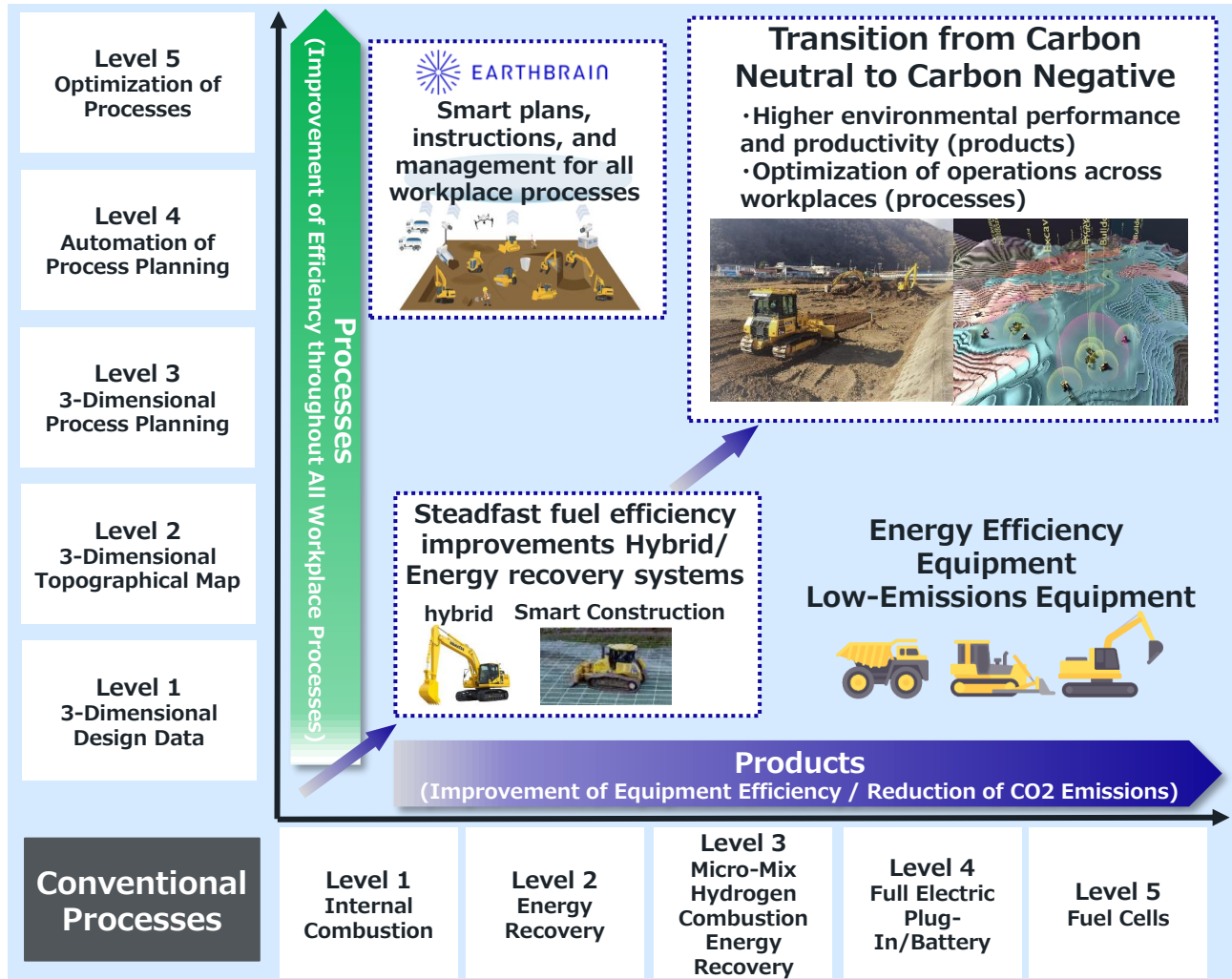
SC Remote

Visualization for top
management

Remote support for
ICT-intensive models

Contribution of Carbon Neutrality by “Products” and “Processes”

Komatsu seeks to contribute to carbon neutrality, at both construction and mining workplaces, through a combination of efforts to reduce CO2 emissions by means of highly efficient equipment and measures for improving workplace efficiency via smart plans, instructions, and management.



Thank you for your attention



【Picture】 Fully electric mini excavator (Concept machine)

Appendix

DANTOTSU Value and open innovation

Customer Value ↑

DANTOTSU Value

Workplaces of the future: Safe, highly productive, smart and clean

DANTOTSU Solution

DANTOTSU Service

DANTOTSU Product

Open innovation

External technology

Incorporating and utilizing State of the art technology

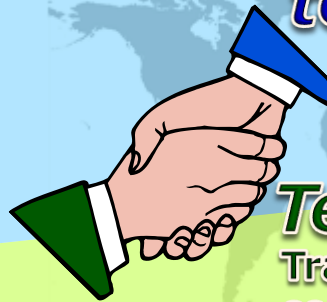
Own Technology

Product development leveraging Komatsu's strengths

Tradition and improvement of core components and core technologies



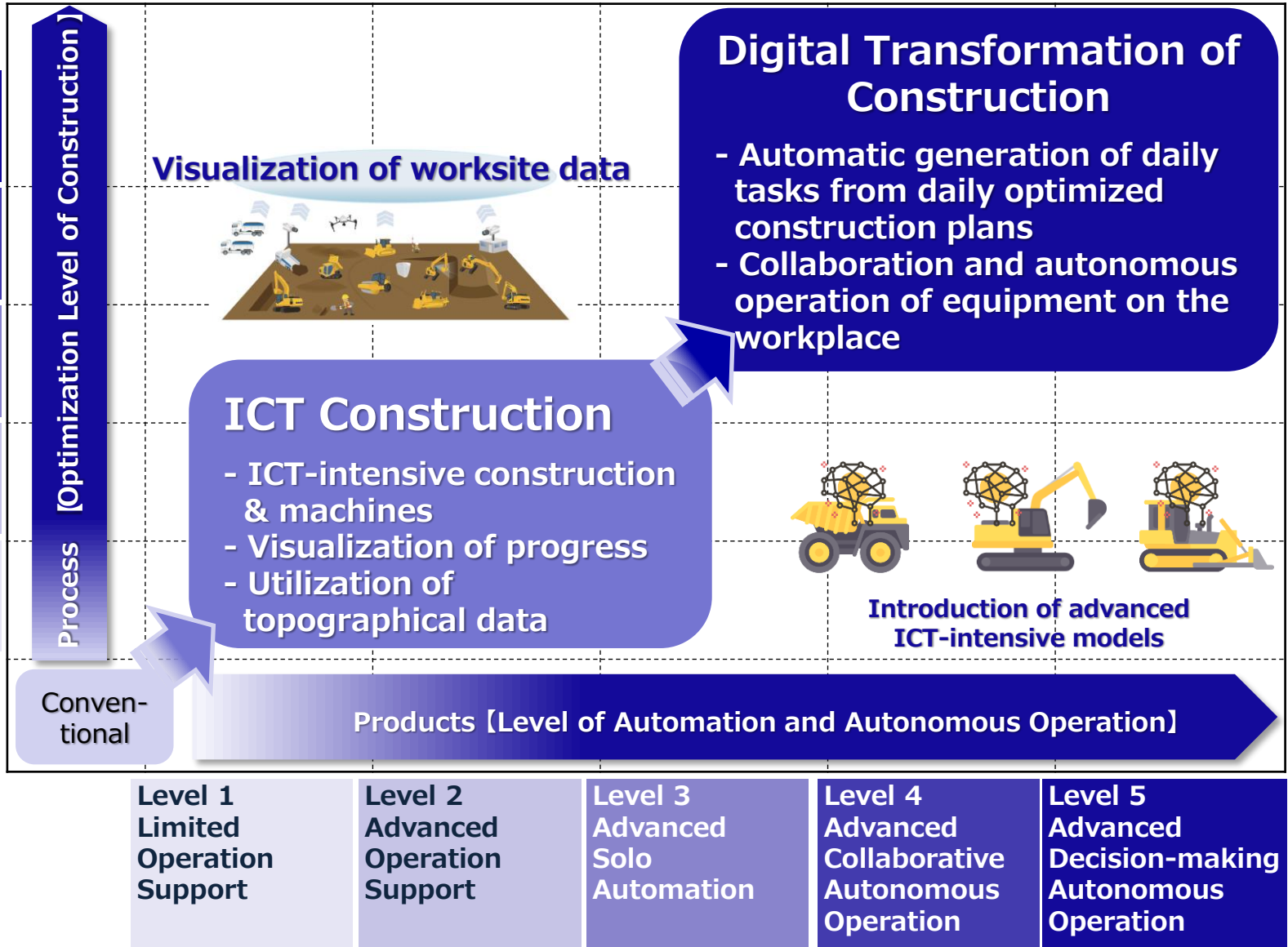
AHS: Autonomous Haulage System



Engine	Powertrain	Hydraulic Equipment	Electronic Device	Power Electronics

Create Future Construction Workplaces by promoting Digital transformation (DX)

Workplaces of the future: Safe, highly productive, smart and clean



Cautionary Statement

The announcement set forth herein contains forward-looking statements which reflect management's current views with respect to certain future events, including expected financial position, operating results, and business strategies. These statements can be identified by the use of terms such as "will," "believes," "should," "projects" and similar terms and expressions that identify future events or expectations. Actual results may differ materially from those projected, and the events and results of such forward-looking assumptions cannot be assured.

Factors that may cause actual results to differ materially from those predicted by such forward-looking statements include, but are not limited to, unanticipated changes in demand for the Company's principal products, owing to changes in the economic conditions in the Company's principal markets; changes in exchange rates or the impact of increased competition; unanticipated cost or delays encountered in achieving the Company's objectives with respect to globalized product sourcing and new Information Technology tools; uncertainties as to the results of the Company's research and development efforts and its ability to access and protect certain intellectual property rights; and, the impact of regulatory changes and accounting principles and practices.