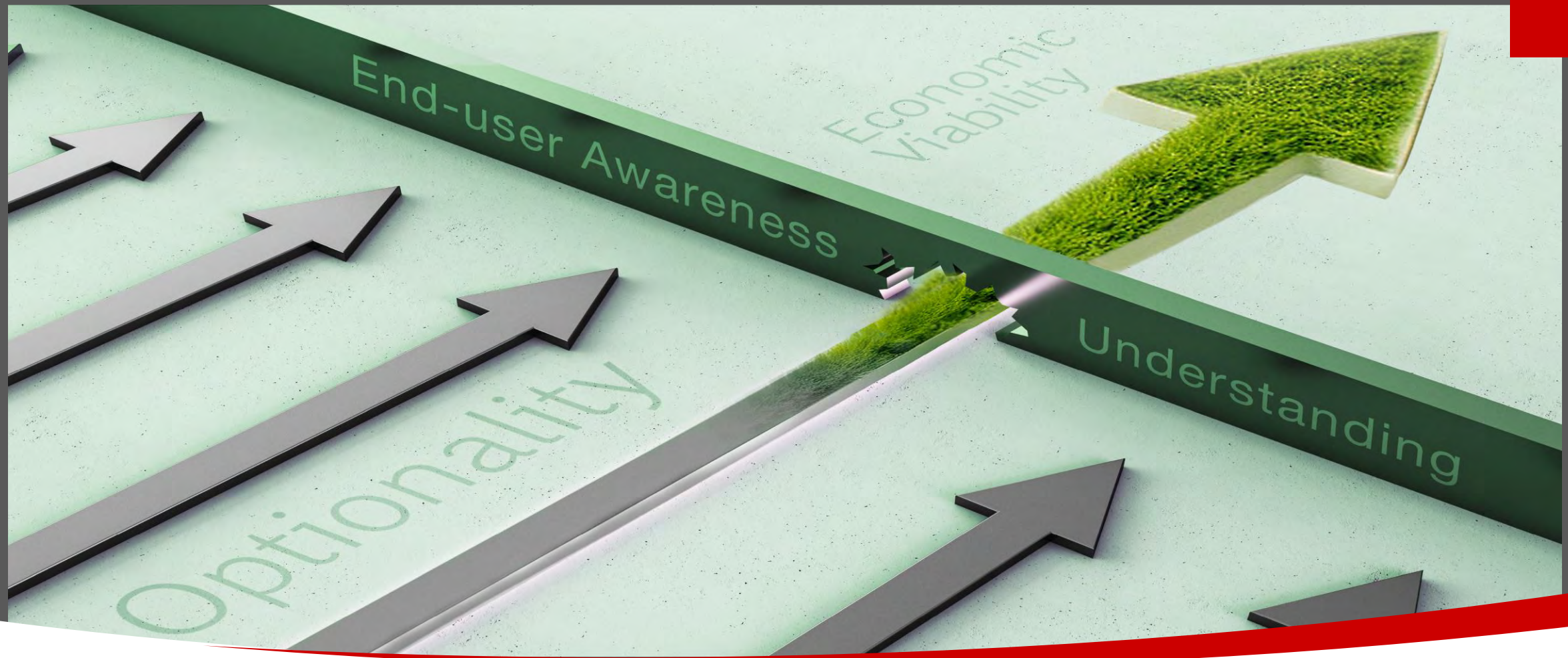
2024



For COP29

Navigating Sustainable Finance: How Satellite Data Guides Our Journey to the Future

November 2024

COP29 Baku Azerbaijan

Highlights of each whitepaper

Whitepaper 1.0 (2022)

"Difference" in regional characteristics

CN drivers across industries

Different path to carbon neutrality (CN) by country due to regional characteristics

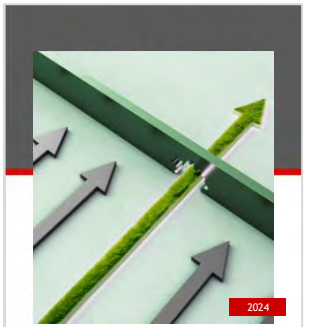
Whitepaper 2.0 (2023)

"Difference" in policy support approach

Electricity and heat
(list of positive technologies)

Different approaches and policy structures to CN promoted by each country

Whitepaper 3.0 (2024)



Transition Whitepaper 2024

Price pass-through/ global collaboration

Technology options expansion & assessment/ Ensuring the economic viability of technology

Common challenges in price pass-through of CN technologies, faced by Europe, the U.S. and Japan

Recap on the purpose of this Whitepaper

The purpose of this Whitepaper is to **start the discussions on some of the important agenda for the international financial community with some space for consideration** (rather than reaching to conclusions)

1. **How can the transition technologies be financially supported? (with wide options)**
2. **How can the business without economic viability be supported? (role of financial institutions for scaling)**
3. **Are the individual roles of policy support and private investment well understood by technology stages?**

In advancing these discussions, it is essential to objectively measure direct impact of decarbonization and to identify **new values**

Objective and neutral data with traceability

Objective and neutral traceable data

As technology advances, **space use / satellite technologies have led to value creation for many ground-based businesses**
(Space industry ≠ Space equipment industry (rocket/satellite manufacturing, etc.))

New value creation via visualization using **satellite technologies**

How much GHG is being

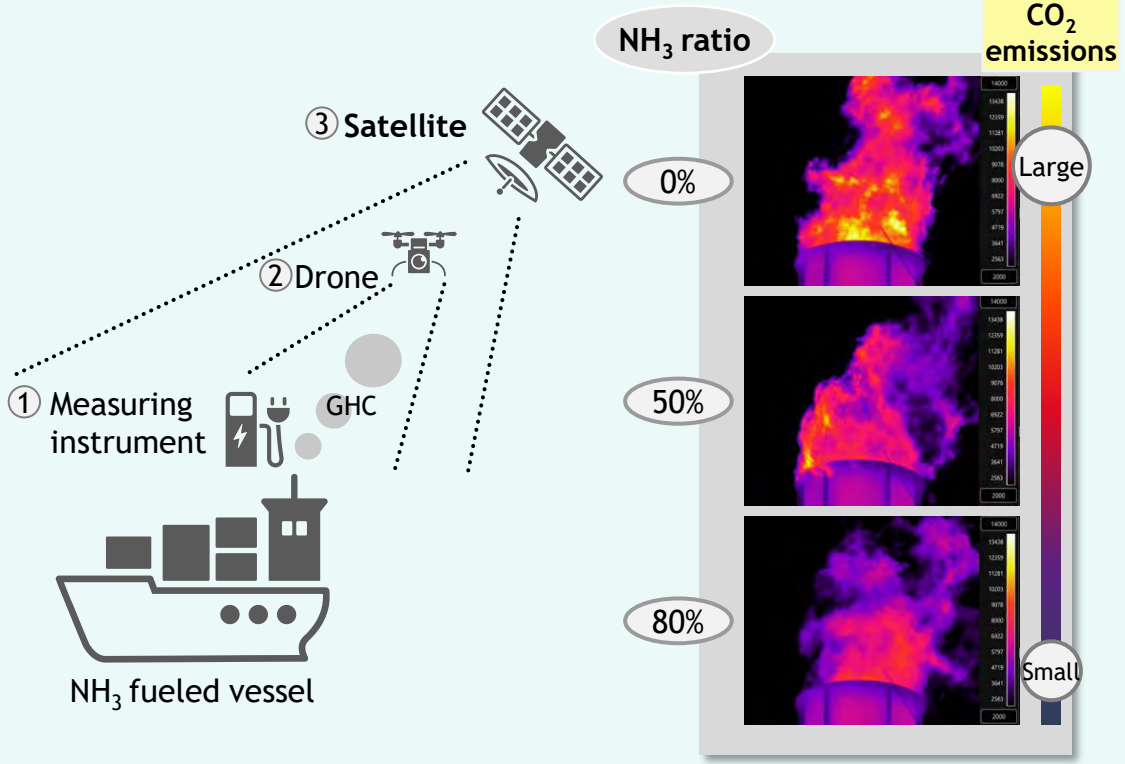
1. Reduced?
2. Emitted?
3. Absorbed?

Reduced?

1 Visualization of "Reduction"

Reduction of GHG emissions in the shipping industry (introduction of NH_3 vessels)

- **Transparently communicate** company's decarbonization initiatives to its stakeholders making full use of **objective observations**



Environment of the shipping industry

External factors

- **Europe introduces a charging system ahead of others** (EU-ETS surcharge)
- Shipping companies start **requesting price pass-through** to customers

EU-ETS[1] started to include shipping industry

EEXI regulation[3] in IMO[2], and CII system[4] introduced

Issues

- **GHG emissions** rely on **self-reported** fuel consumption from each shipping company, **leaving room for improvement in objectivity**

Shipping industry

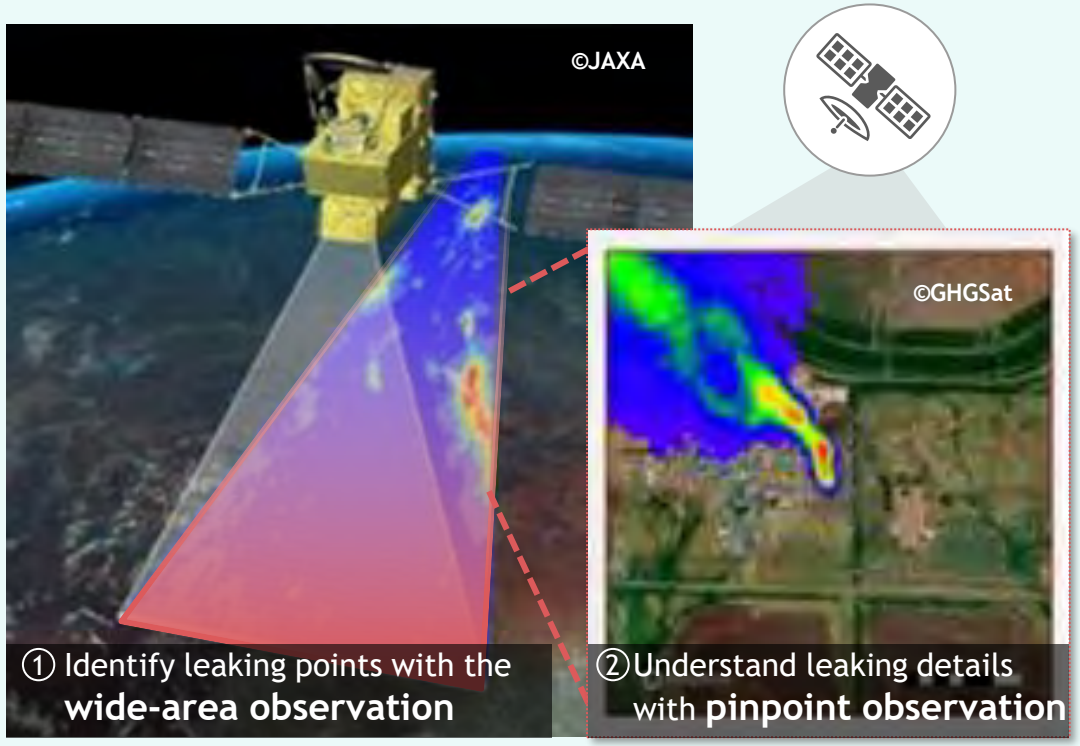
GHG emissions = Fuel consumption × Coefficient

1.European Union Emission Trading Scheme; 2. International Maritime Organization; 3. Energy Efficiency Existing Ship Index; 4. Carbon Intensity Indicator;
Source: Collaborative demonstration of Nippon Yusen, Nagoya Electric Works, Shimizu Corp., ArkEdge Space, Sunflame, and MUFG

② Visualization of "Emission"

GHG emission monitoring of LNG plants/pipelines

- Linking Japan's core large satellites with small commercial satellites from overseas to **① wide-area observation** and **② pinpoint observation**



Trends in methane emissions management

External factors

- **International discussions/initiatives underway to manage** methane emissions in LNG value chain

UN environment programme

MMRV[1] framework in OGMP[2] 2.0 etc.

JP-Korea collaboration in LNG value chain

Issues

- Earth Observation is attracting global attention including COP28 as one of the objective observation methods
- Need for **Japan to actively participate in building a mechanism** based on international collaboration

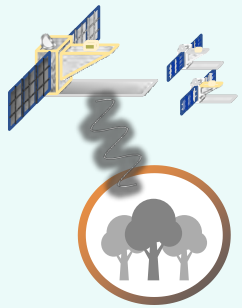
1. Measurement, Monitoring, Reporting and Verification; 2. Oil Gas Methane Partnership
Source: Collaborative demonstration of Mitsubishi Electric Corp., SDS, GHGSat, MOE, JAXA, and MUFG

3 Visualization of "Absorption"

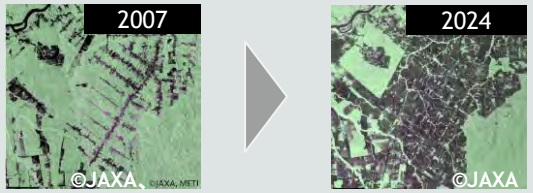
Observation of CO_2 absorption by forests

- Measure forest CO_2 sequestration using satellite data
- Result in generating highly reliable carbon credits

Step 1

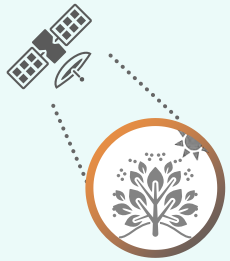


CO_2 absorption is estimated by the increase in tree volume (≒ tree trunk × height × coefficient)[1]

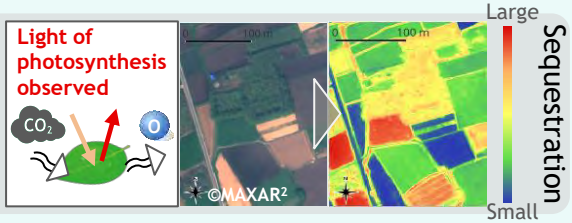


Green: forest, Black: bare land/water surface

Step 2



CO_2 absorbed is directly measured by observing the fluorescence resulting from photosynthesis



Generate carbon credits through a transparent process that combine Step 1 and 2

Incorporation of satellite data-based evaluation into the carbon crediting systems

External factors

- **Various crediting systems exist** around the world
- **Greenwashing risk** exists due to presence of various evaluation methods to identify the sequestration amount of CO_2

Verified Carbon Standard A VERRA STANDARD

J-クレジット制度

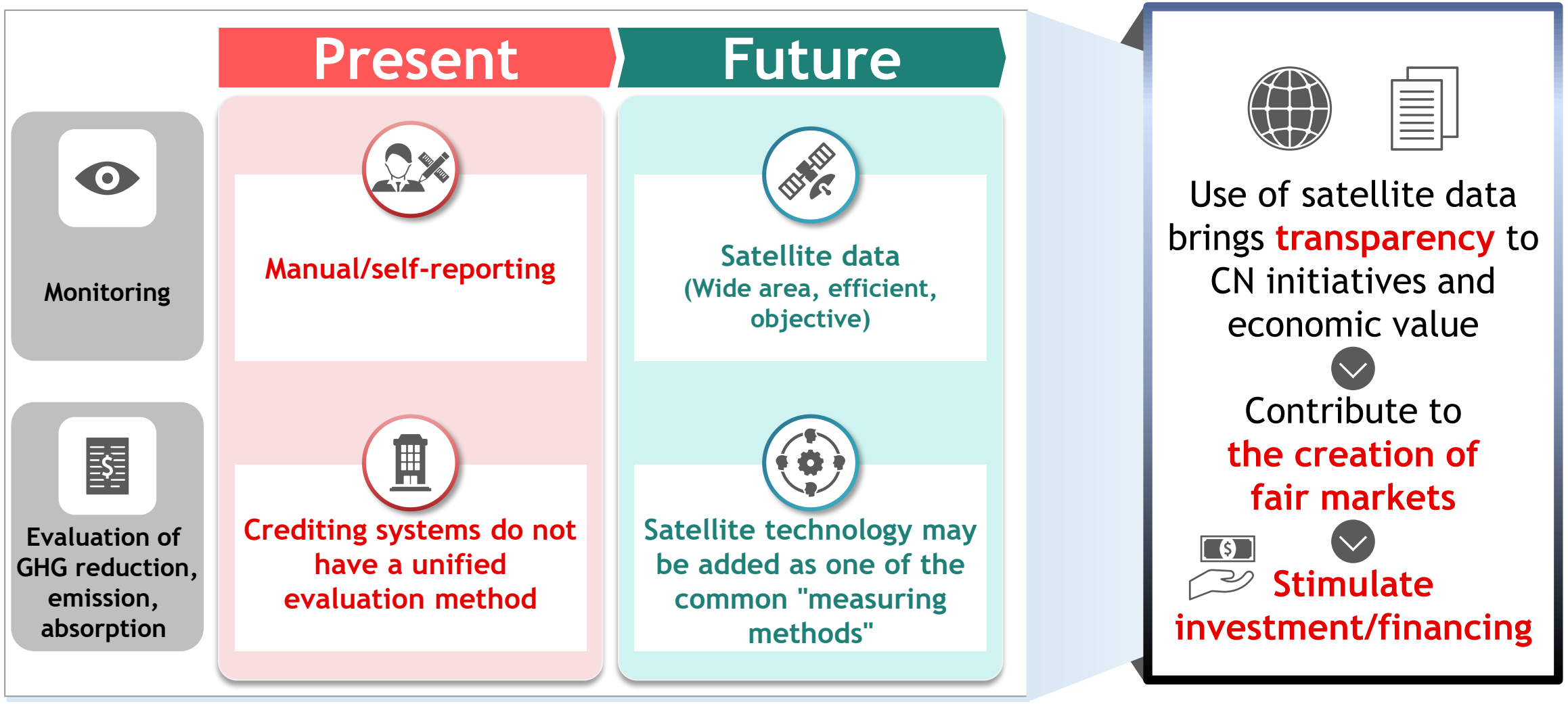
JCM THE JOINT CREDITING MECHANISM

Assumed solution

- Useful to **incorporate satellite data** based on objective observation **into the existing evaluation methods of the carbon crediting systems**

1. The underlined items were observed using satellite data. MUFG was commissioned by JAXA to conduct「Demonstration project on forest carbon credit calculation using satellite data (FY2024-2025) (Collaborative demonstration by SDS, Mitsubishi Electric, Archeda, Forest Value, and MUFG) 2. Prepared in cooperation with Mitsubishi Electric and SDS based on Maxar's satellite data

Outcomes from satellite use




Sustainability is the ultimate accountability

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