Transport Operation Management System Using Joint Crediting Mechanism (JCM) between Abu Dhabi, UAE and Japan

Project to reduce GHG emissions in the UAE (Abu Dhabi) by introducing low-carbon emission vehicles for public transportation and by introducing a SMOC system for monitoring and improving the efficiency of operations

Zenmov Inc.

JCM Webinar
5 March, 2024

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Zenmov Inc.

We develop IT solutions that power the public transportation and the shared mobility.

Zenmov Inc.

- Developing IT Service for Smart Transportation
- Headquartered in Tokyo

100%

Subsidiary

Zenmov Philippines Inc.

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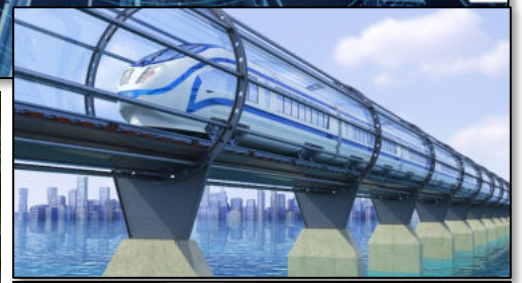
Our Mission

Realizing a world without the stress of travel



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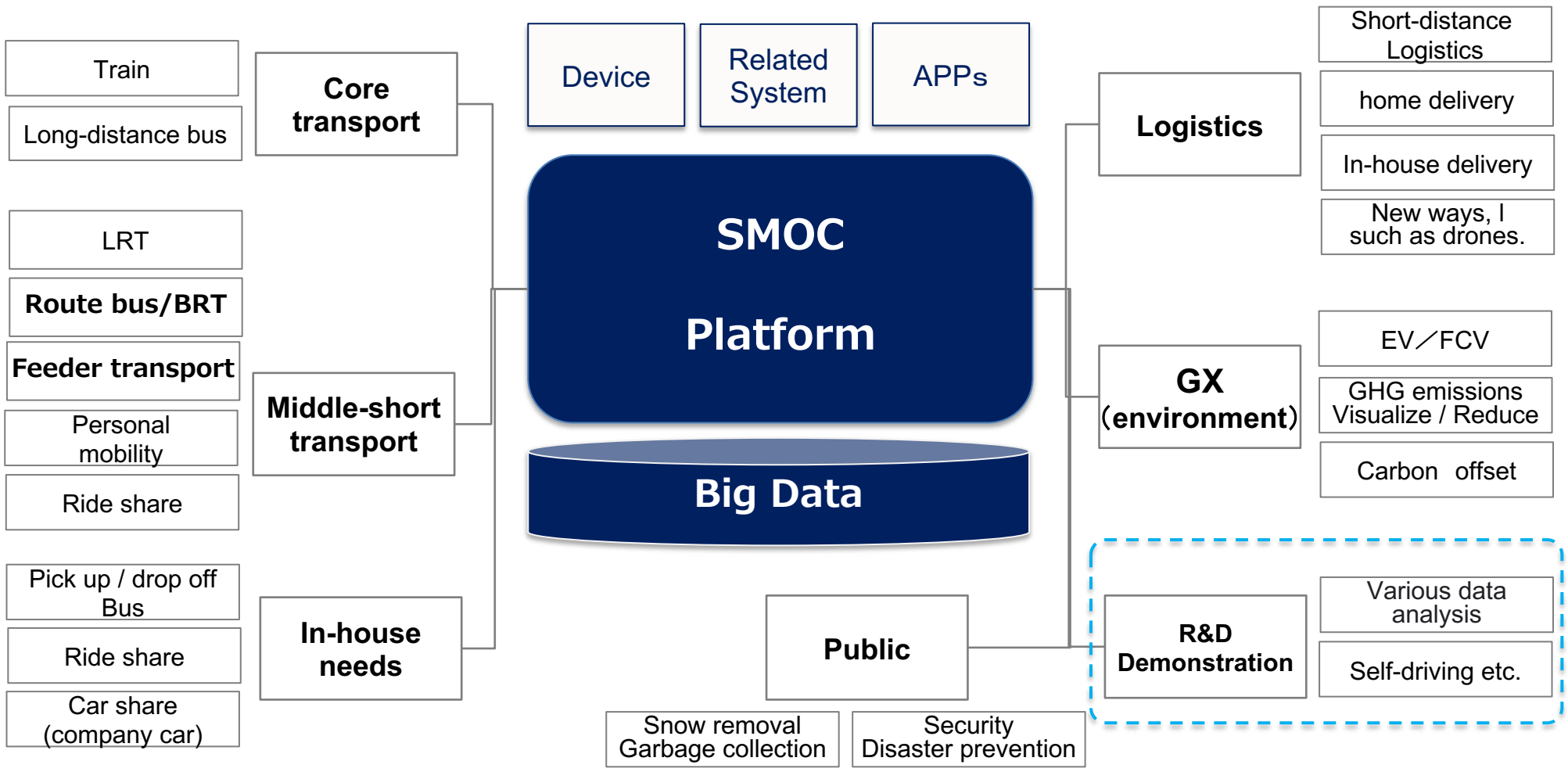
Benefits of SMOC

One software platform for multiple applications in mobility area



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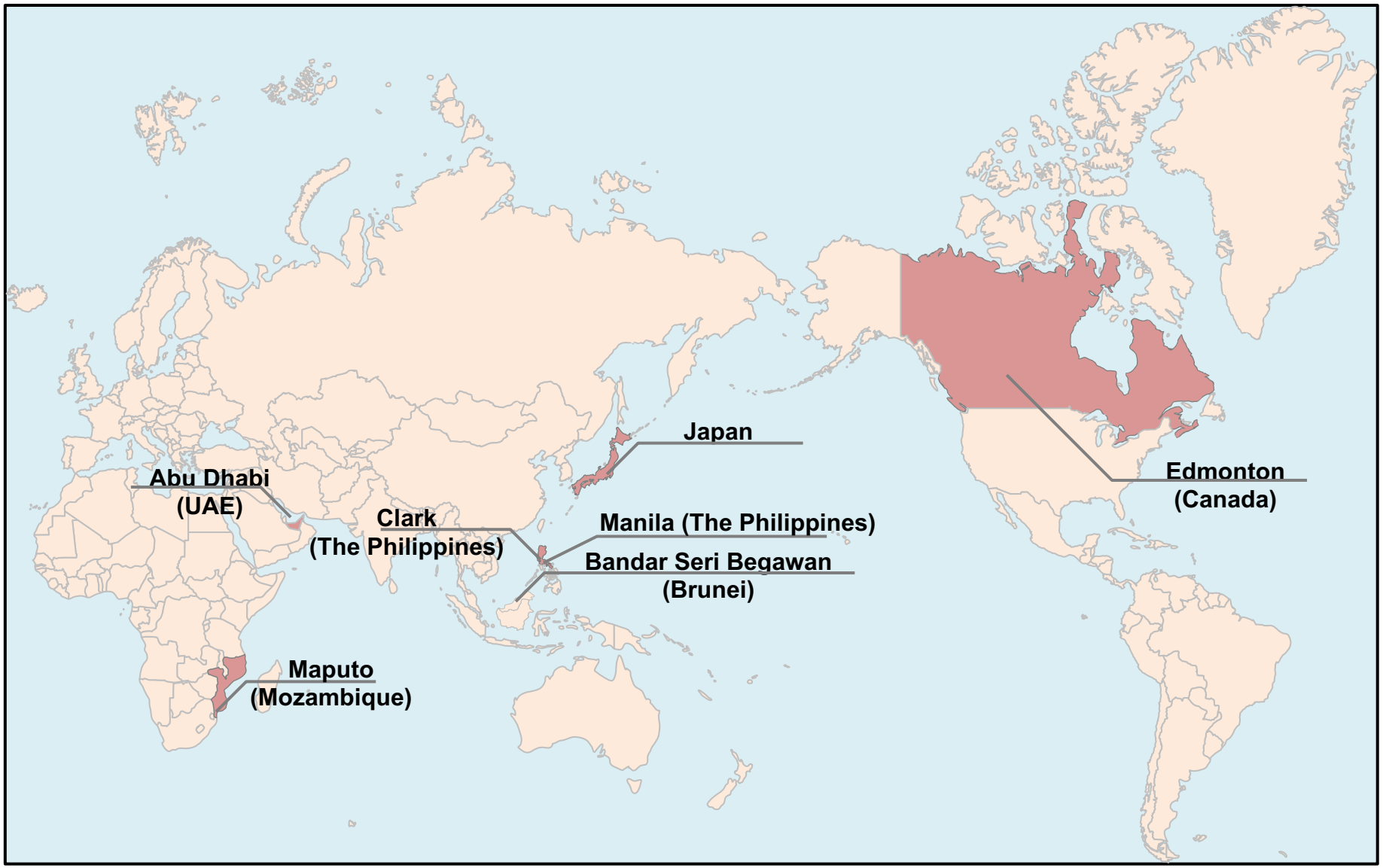
Current Areas of our Projects



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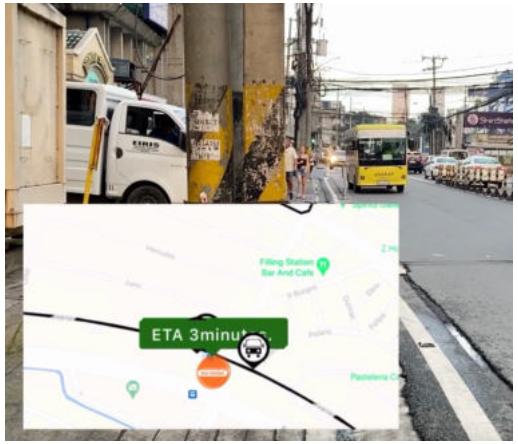
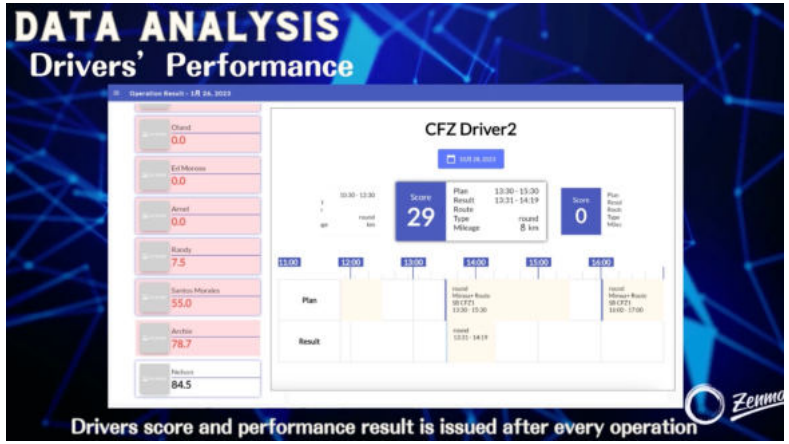
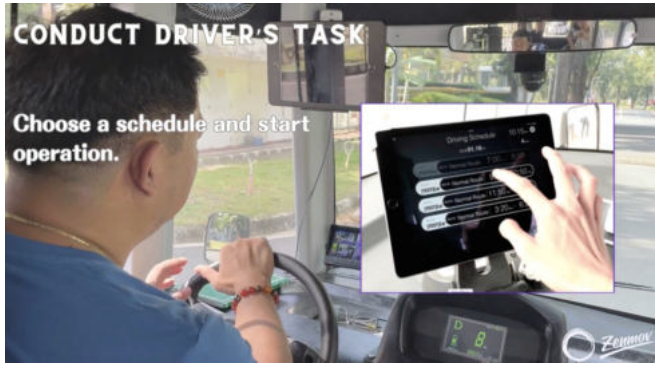
Operation examples in cities







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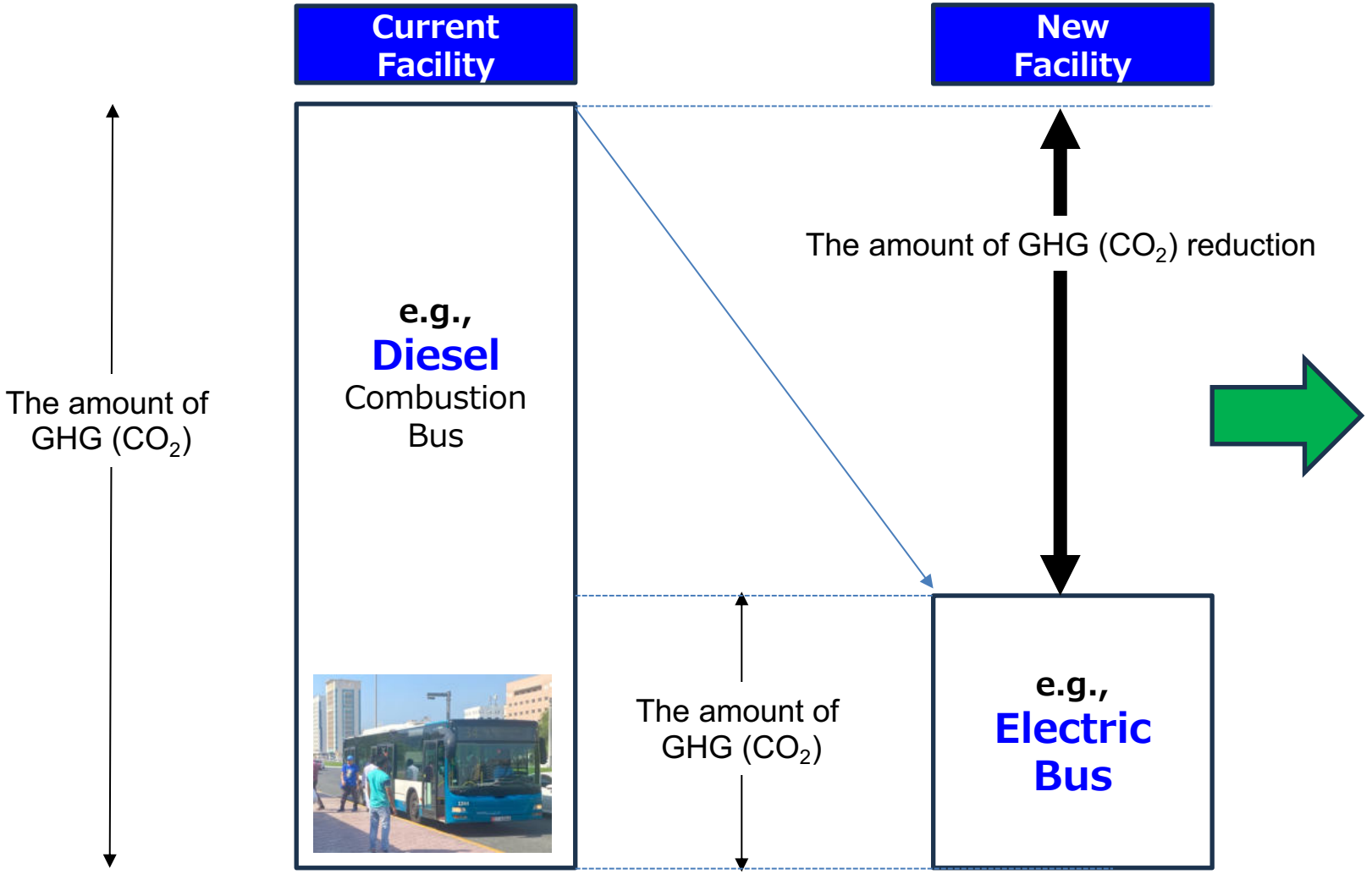
Application of JCM to the transportation sector

Generation of credits through EV conversion and operational efficiency



JCM Credit

- **Carbon Market** Pricing and Trading with UAE and JAPAN
- For **exchanging with monetary value**
- For **meeting GHG reduction target** on each country

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Feasibility Study for JCM in Abu Dhabi

Project Period : October 2023 – February 2024

Project Objective :

1. To make a **Methodology** for generating JCM credits in UAE
2. To make a **Plan** of **how to implement the methodology** in real operation
3. To **make scenarios for next steps** after the FS

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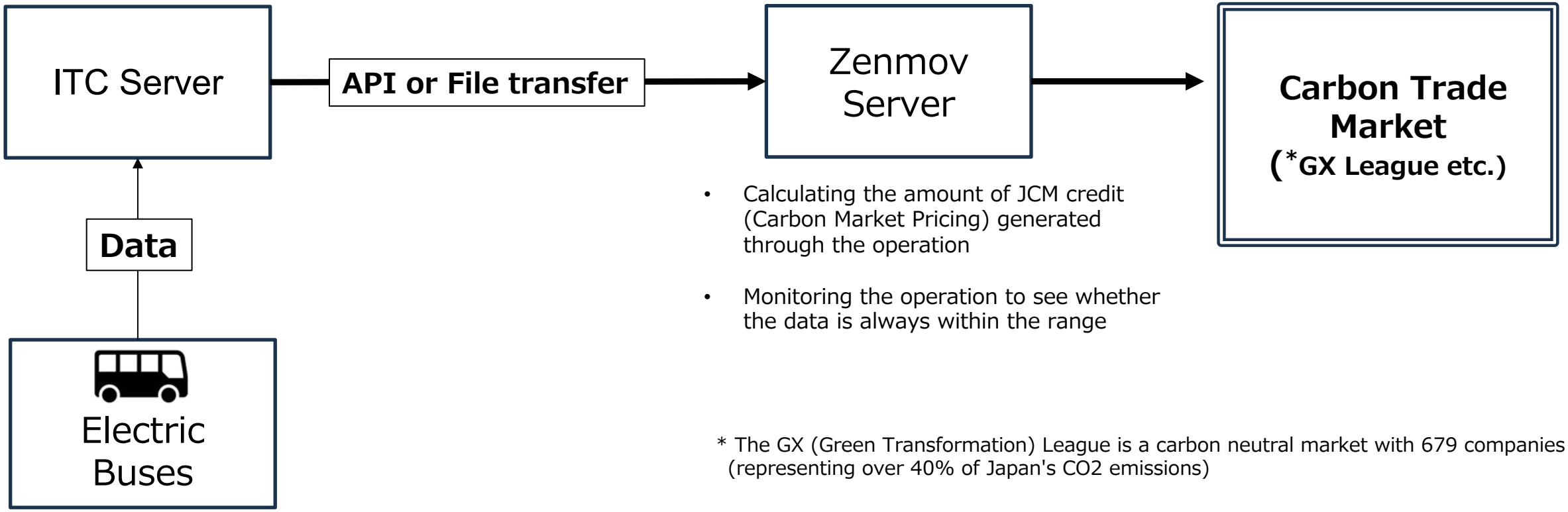
Systems for JCM

<Requirement>

- **Calculation of GHG (CO_2) reductions**
- **Output Carbon Price to GX League (Carbon Market Trading)**
- **Monitor Operation Patterns**

ITC has all necessary data for the system.

(e.g.)



- Calculating the amount of JCM credit (Carbon Market Pricing) generated through the operation
- Monitoring the operation to see whether the data is always within the range

* The GX (Green Transformation) League is a carbon neutral market with 679 companies (representing over 40% of Japan's CO2 emissions)

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Benefits for ITC, Abu Dhabi and UAE

Three main benefits for Abu Dhabi and UAE to proceed with this JCM project

1. It will **showcase Abu Dhabi** as a **pioneer** in carbon neutrality to the world.

2. Possibilities for acquiring **additional revenues** through selling JCM credits (Carbon Market Pricing and Trading)

3. **Know-how and experience** demonstrated in Abu Dhabi could be **exported** to other surrounding regions

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Effects of EV Conversion for GHG Reduction - Definition of the Calculations -

The calculation of GHG emission reductions (Erp) is obtained from the difference between reference and project emissions.

■ **ERp = REp - PEelec,p**

Option1: In case of converting 270 diesel buses to electric ones based on 2030 target ITC conversion plan

Option2: In case of converting 815 diesel buses to electric ones based on the value of ITC owned vehicles

- **REp = Reference Emissions (Before conversion) (tCO2)**

  Reference emissions are the GHG emissions from diesel buses traveling on a specific bus route.

  (The data for 'Fuel consumption (liters) of diesel buses', 'Distance of diesel buses operating on specified bus routes (km)' was provided by ITC)

- **PEelec,p = Project Emissions (After conversion) (tCO2)**

  Project Emissions are the GHG emissions derived from **the supply of grid electricity** to the electric buses that are the subject of the project.

  (The data for 'CO2 emission factor for grid electricity' was provided by EAD (Projected 'CO2 intensity attributed to electricity production' 0.264 [KgCO2/kWh] for 2026, 'CO2 emissions per vehicle' are derived from the default values of IPCC (Intergovernmental Panel on Climate Change, UN body)

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Effects of EV Conversion for GHG Reduction
- Estimated results for Option1 and 2

GHG reductions were estimated for the conversion of ITC's fleet of diesel buses to electric buses.

	Option1 EV conversion **based on the 2030 target ITC current plan** **[270 vehicles]**	**Option2** EV Conversion **for ITC-owned vehicles** **[815 vehicles]**
(1) Reference Emissions (tons CO2/year)	32,696	98,819
(2) Project Emissions (tons CO2/year)	6,905	20,844
(3) **CO_2 Reduction (tons CO2/year)** [(1)-(2)] (will be split between UAE and Japan by JCM project)	**25,791**	**77,975**
(4) CO_2 Reduction rate (%) [(3)/(1)*100]	78.9	78.9

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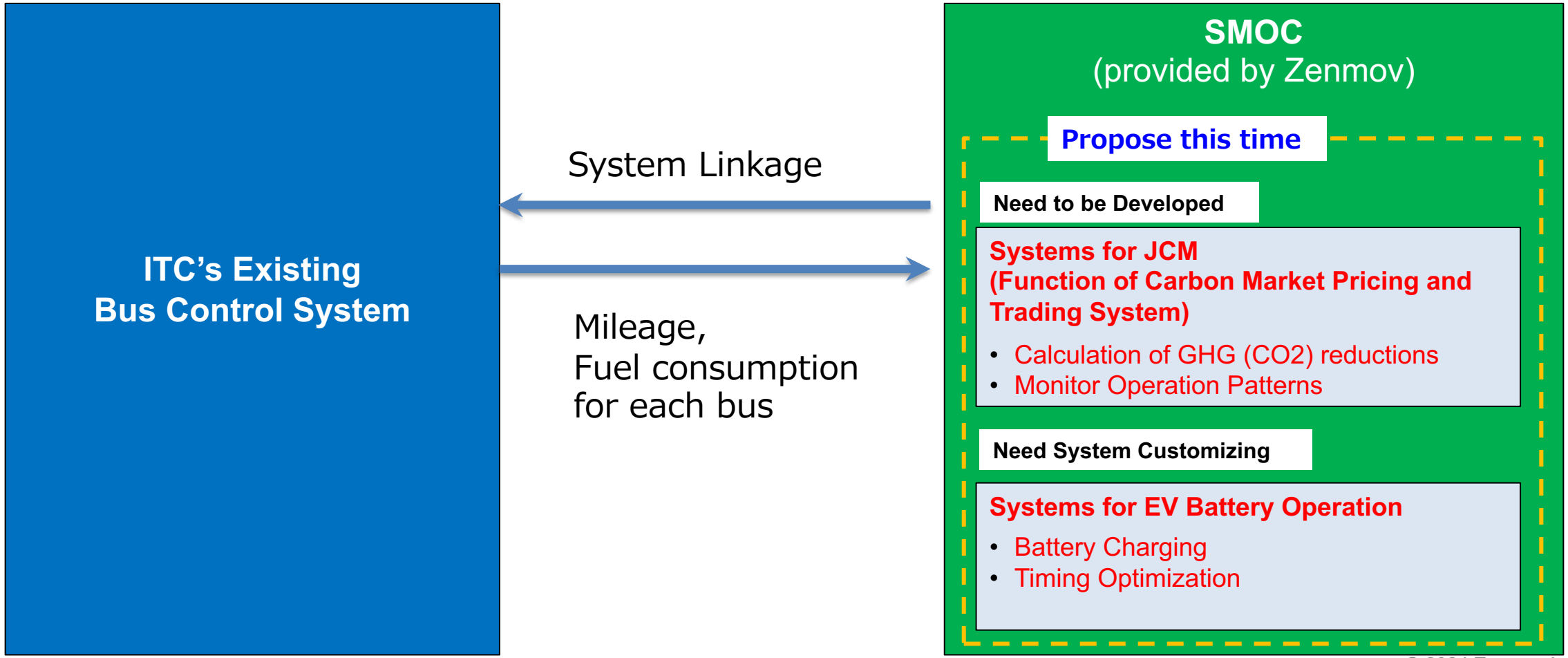
Zenmov's Contributions and Involvements

Provide the System for
JCM (Carbon Market Pricing and Trading System) and **EV Battery Operation**
by linking the SMOC system with ITC's Bus Control System.



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Difference between fuel buses and EV buses

Generally, EV requires charging time during the operation, which is an issue in terms of productivity.

Fuel Buses

Operation Start → Operation End

XX km/day
YYY passengers/day

Refueling Gas

EV Buses

Operation Start → Charging Battery → Charging Battery → Operation End

Output becomes lower than fuel buses

Mileage = Less than fuel buses
Passengers = Less than fuel buses

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Difference between fuel buses and EV buses

A buses with a large battery capacity can be utilized. However, there are some issues.

Fuel Buses

Operation Start → Operation End

Refueling Gas

XX km/day
YYY passengers/day

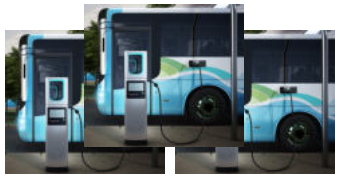
EV Buses

With a large battery capacity

- Lots of charging facilities are necessary.
- Low utilization rate of larging facilities.
- Congestions for charging

Operation Start → Operation End

Charging Battery



Mileage = Less than fuel buses
Passengers = Less than fuel buses

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Difference between fuel buses and EV buses

Optimization of charging timing is necessary from the perspective of effective use of facilities and maximizing the workload of transporting passengers.

Fuel Buses

Operation Start → Operation End

Refueling Gas

XX km/day
YYY passengers/day

EV Buses

With a large battery capacity

Charging at the best timing

Operation Start → Operation End

Charging Battery



Mileage = Less than fuel buses
Passengers = Less than fuel buses

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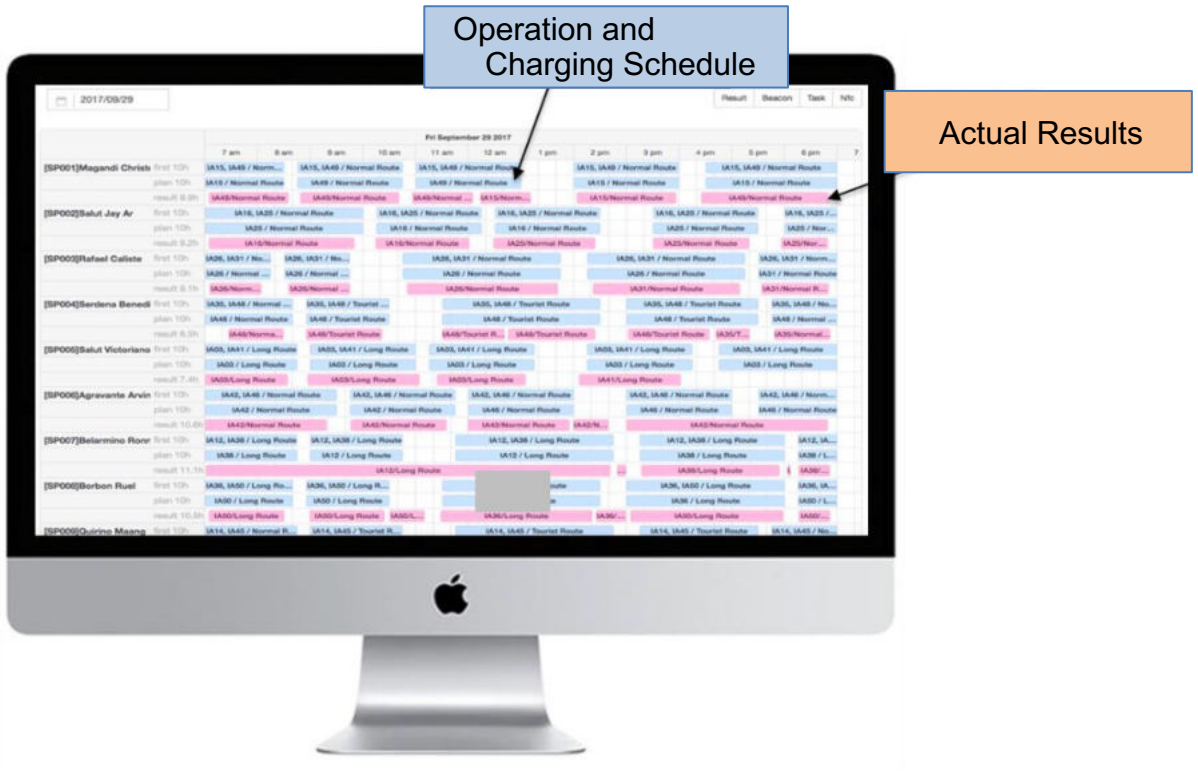
Optimized Scheduling of EV Charging



- Generating the **best schedule for EV buses**, taking into account the **charging time.**
- Charging times are planned to avoid peak travel times.
- Actual operation results can be reviewed.
- The schedules are updated based on the actual operation results.
- Accuracy of schedule gets better, the more data are accumulated.

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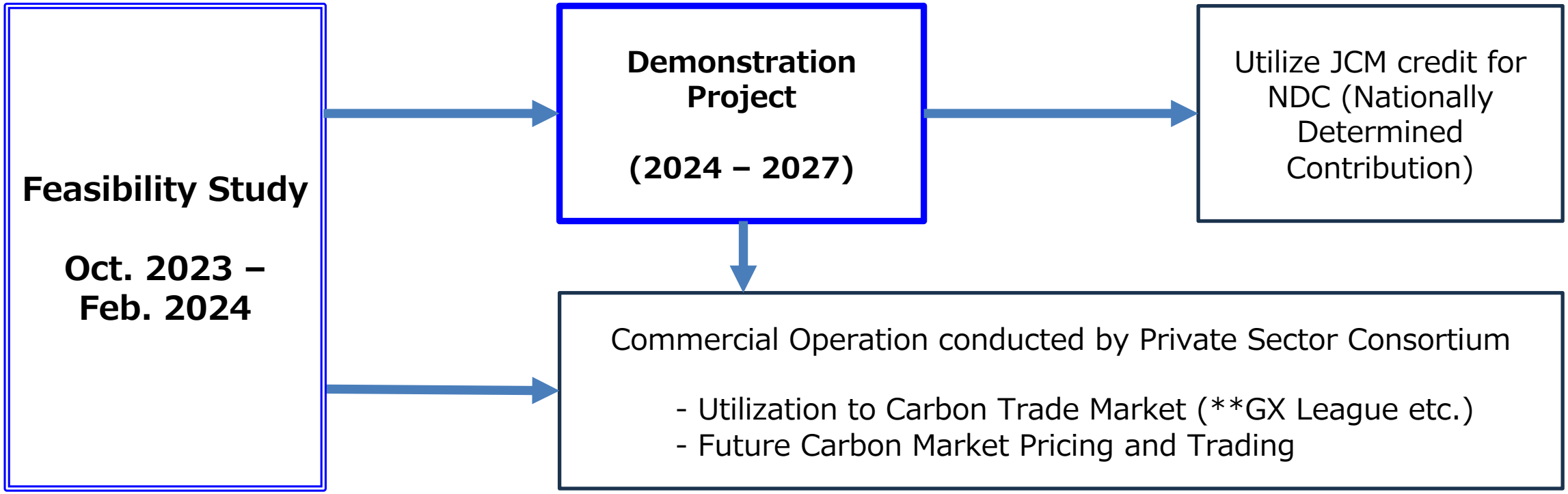
Scenarios for next steps

Next step is a demonstration phase before commercial operations.



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