

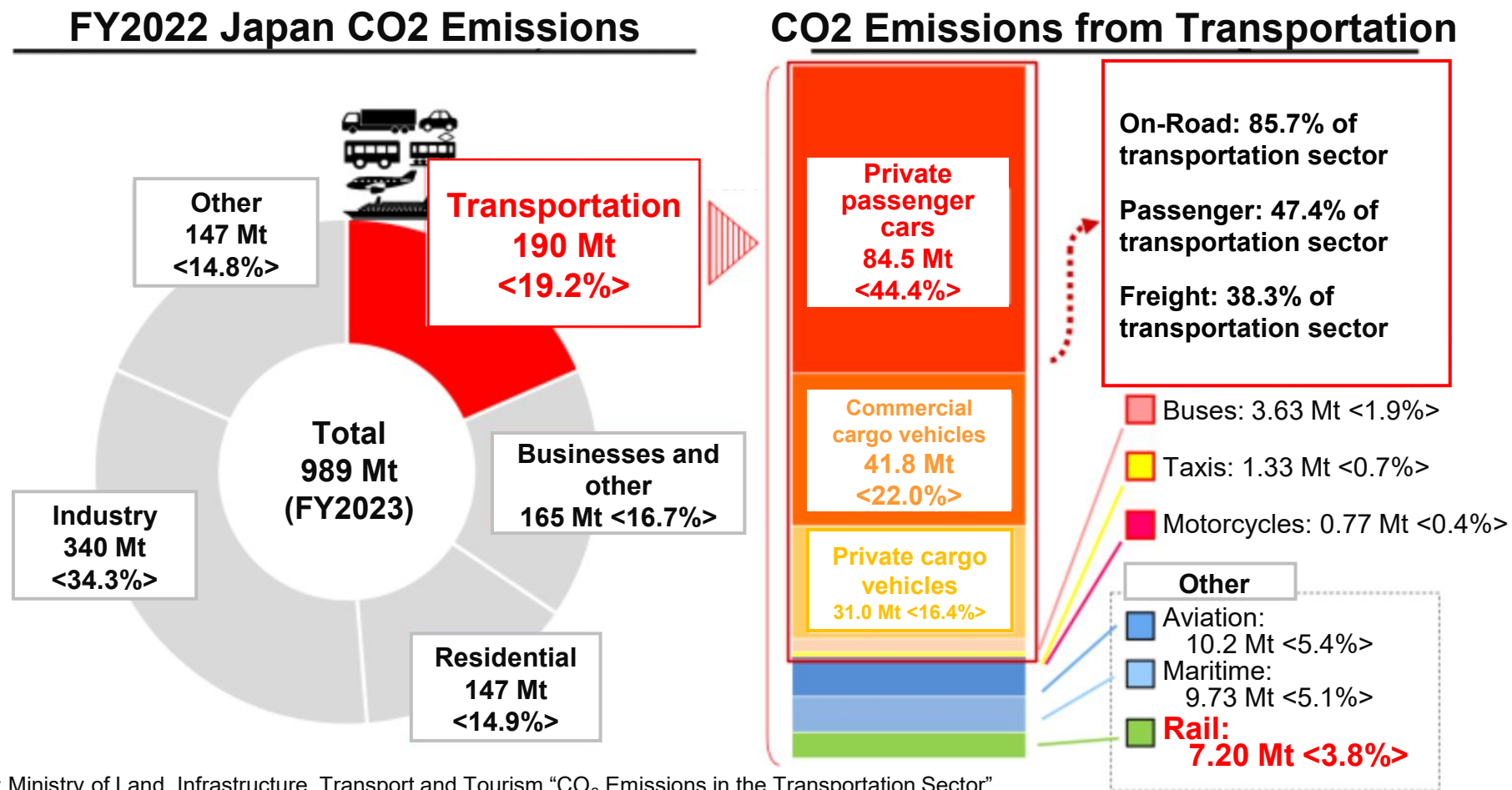
# The Use of Hydrogen in Japan's Rail Sector and the Hydrogen Supply Chain in Japan

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## Transportation sector is the second largest source of CO2 emissions in Japan.

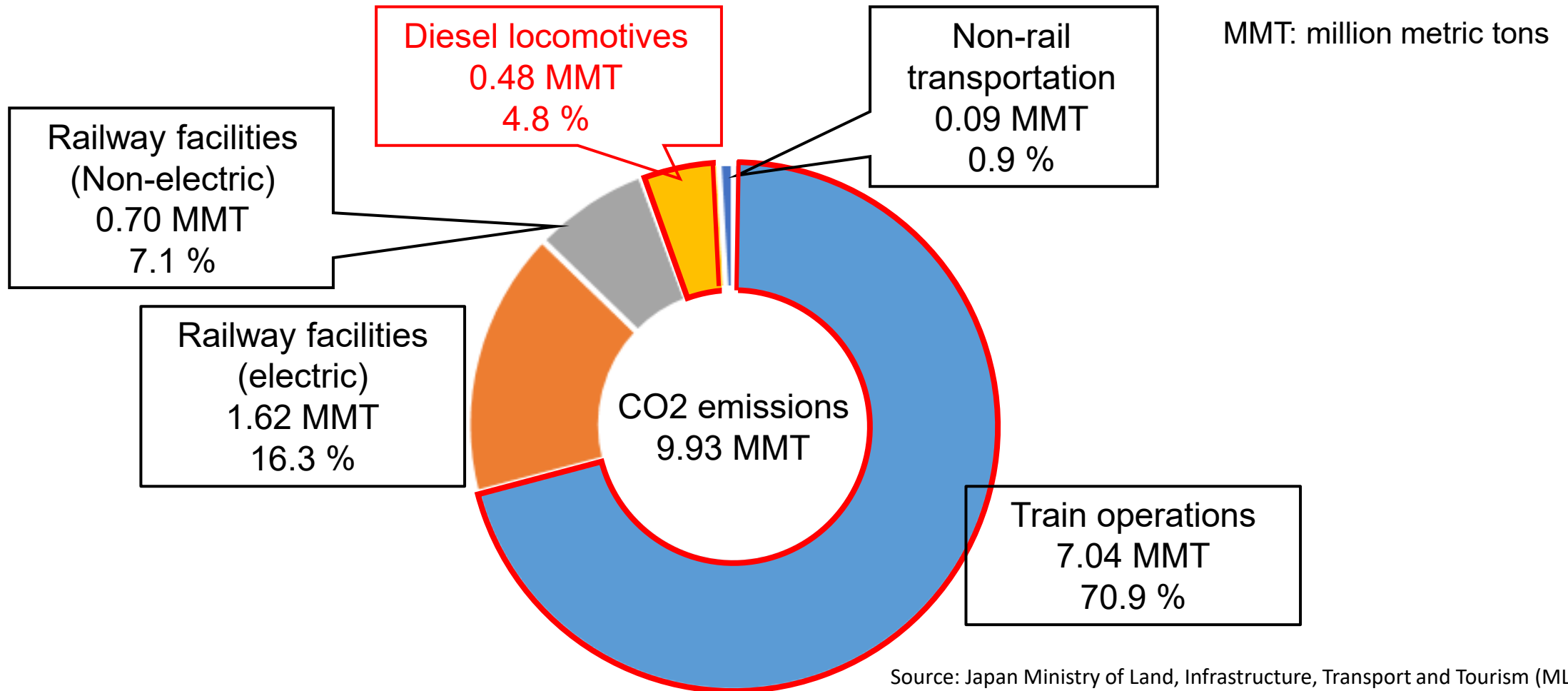
- Cause of poor air quality
- Main global petroleum demand driver



Source: Ministry of Land, Infrastructure, Transport and Tourism "CO<sub>2</sub> Emissions in the Transportation Sector"

- CO<sub>2</sub> emitted from railway vehicles accounts for about three-quarters (**approx. 76%**) of total emissions. Reduction in this area would be most effective toward achieving targets.

## Railway Operator CO<sub>2</sub> Emissions (FY2019)

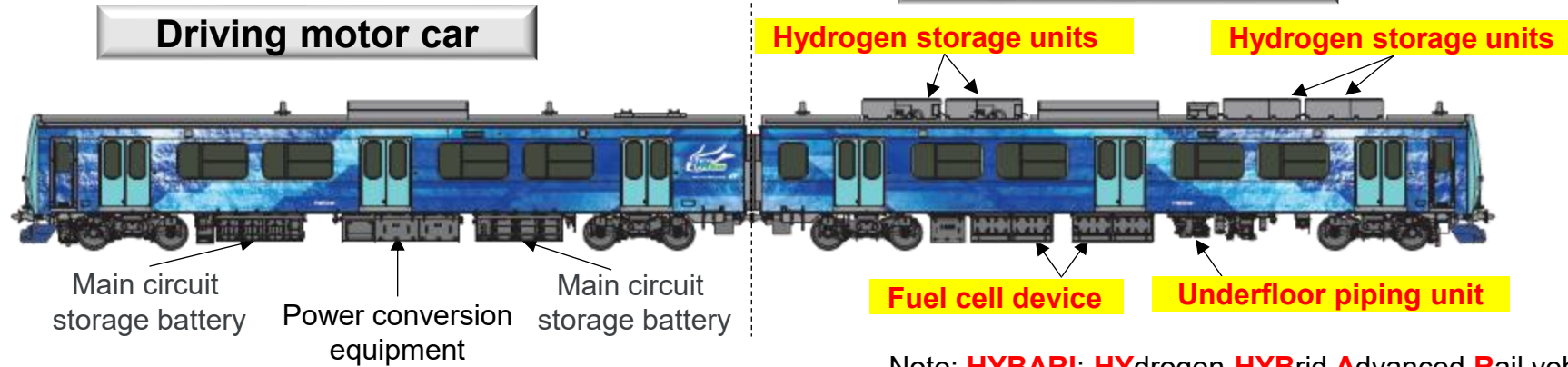


# Japan's First Runs of the Hydrogen-driven Train

## Overview of “HYBARI” developed by JR East



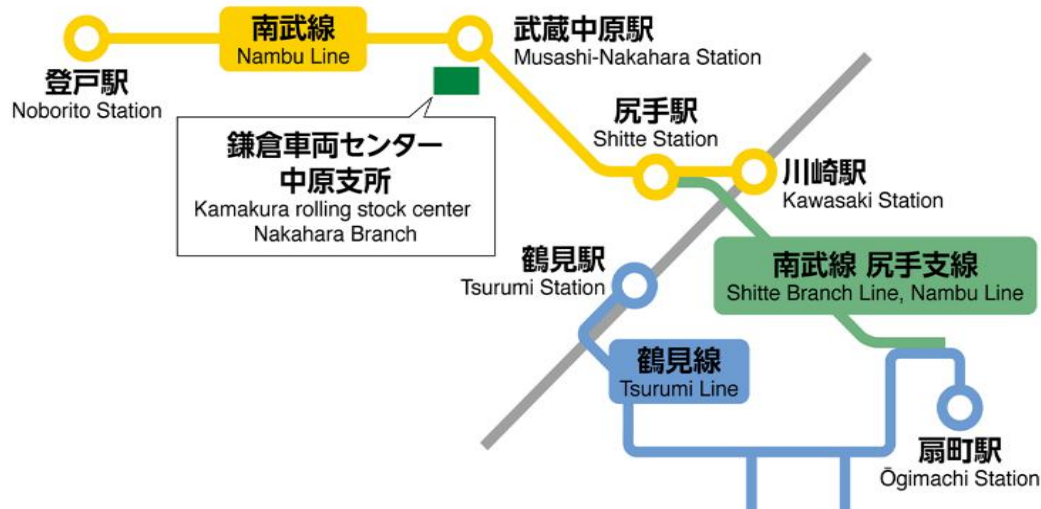
HYBARI



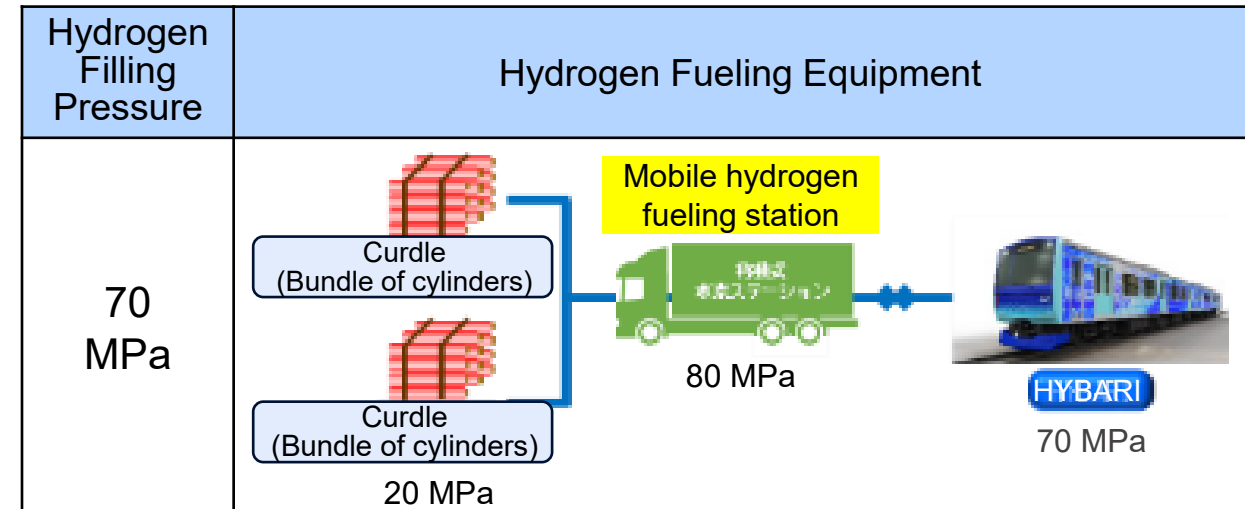
Note: **HYBARI**: **HY**drogen-**HYB**rid **A**dvanced **R**ail vehicle for **I**nnovation

## Sections of Trial Runs

Trial runs have been carried out from March 2022 to March 2025.



## Hydrogen Fueling for HYBARI



Source: Reconstructed by JTTRI, based on information disclosed by JR East

- As it will be difficult to electrify all track sections, it is essential that hydrogen trains be introduced to achieve railway decarbonization by 2050.

## Key Challenges

- Specifics still need to be considered, including development of a hydrogen supply chain and accompanying infrastructure as well as how these will be operated.
- The rail sector as the sole user does not create sufficient prospects for stable large-scale procurement. This makes it difficult to ensure the predictability necessary for investment to develop a large-scale commercial supply chain.



**Feasibility and predictability** need to be enhanced to develop cost-effective and efficient hydrogen supply infrastructure and usage environments by facilitating **cross-modal collaboration across the transportation sector.**

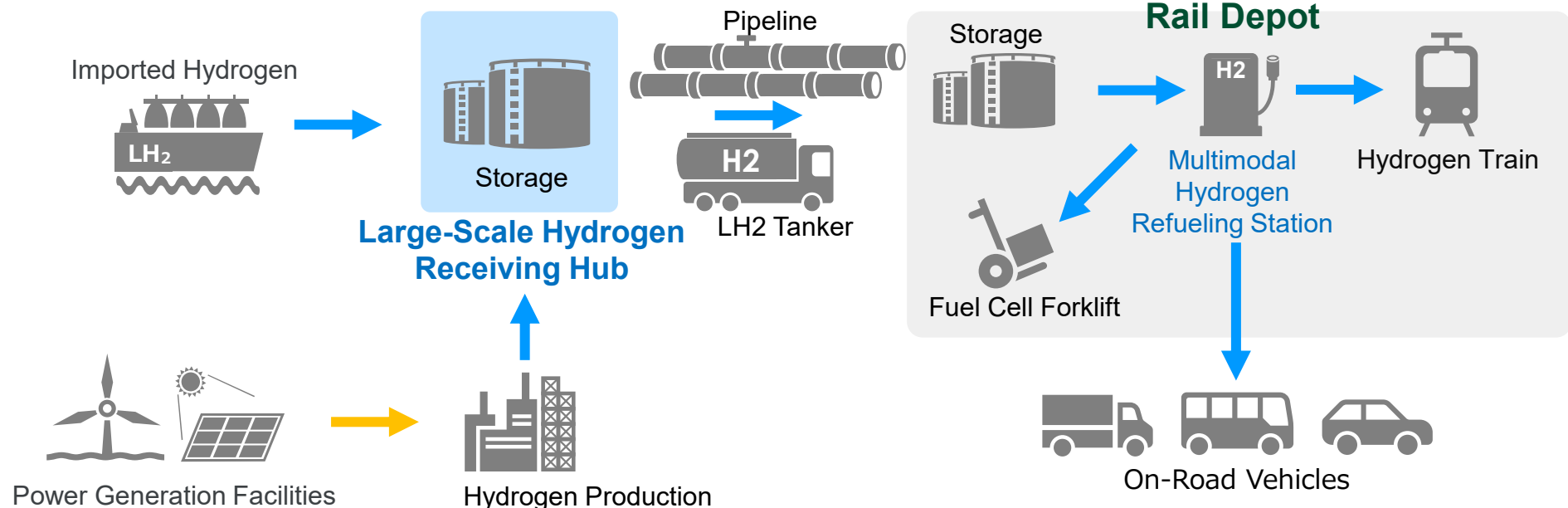
## Objective

- To accelerate the widespread adoption of hydrogen in Japan's transportation sector, a comprehensive assessment of its current use across the entire sector will be carried out. This assessment will also identify highly-feasible models that take into consideration development of a hydrogen supply chain.

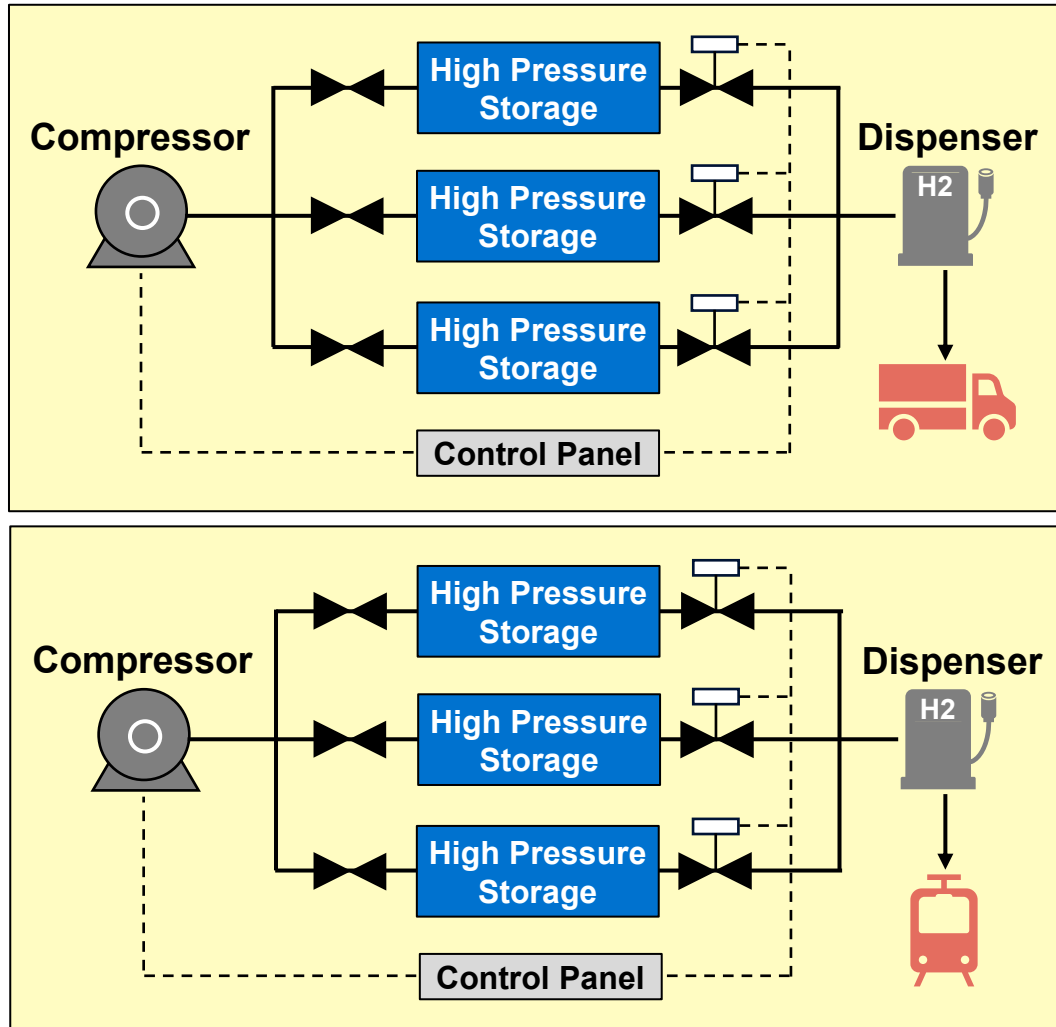
## Overview

- Present a feasible and predictable model for social implementation of hydrogen, taking into account the potential for efficiently maintaining and operating a hydrogen supply infrastructure through intermodal and cross-sector collaboration within the transportation sector.
- Consolidate issues to be addressed so as to realize a socially-implementable model and discuss how to solutions will be directed.

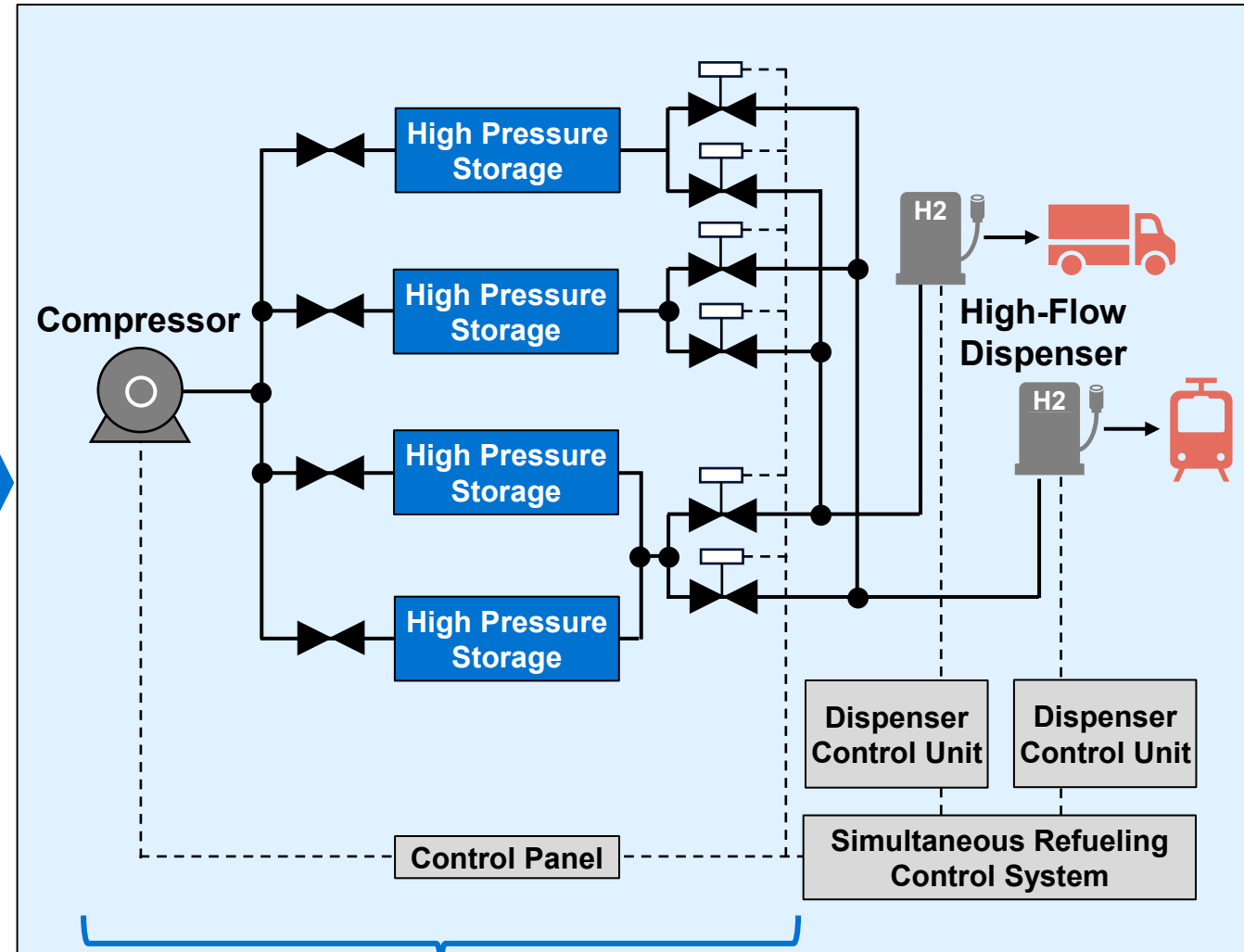
### Proposed model for rail + on-road linkage



## Two Identical Hydrogen Refueling Stations



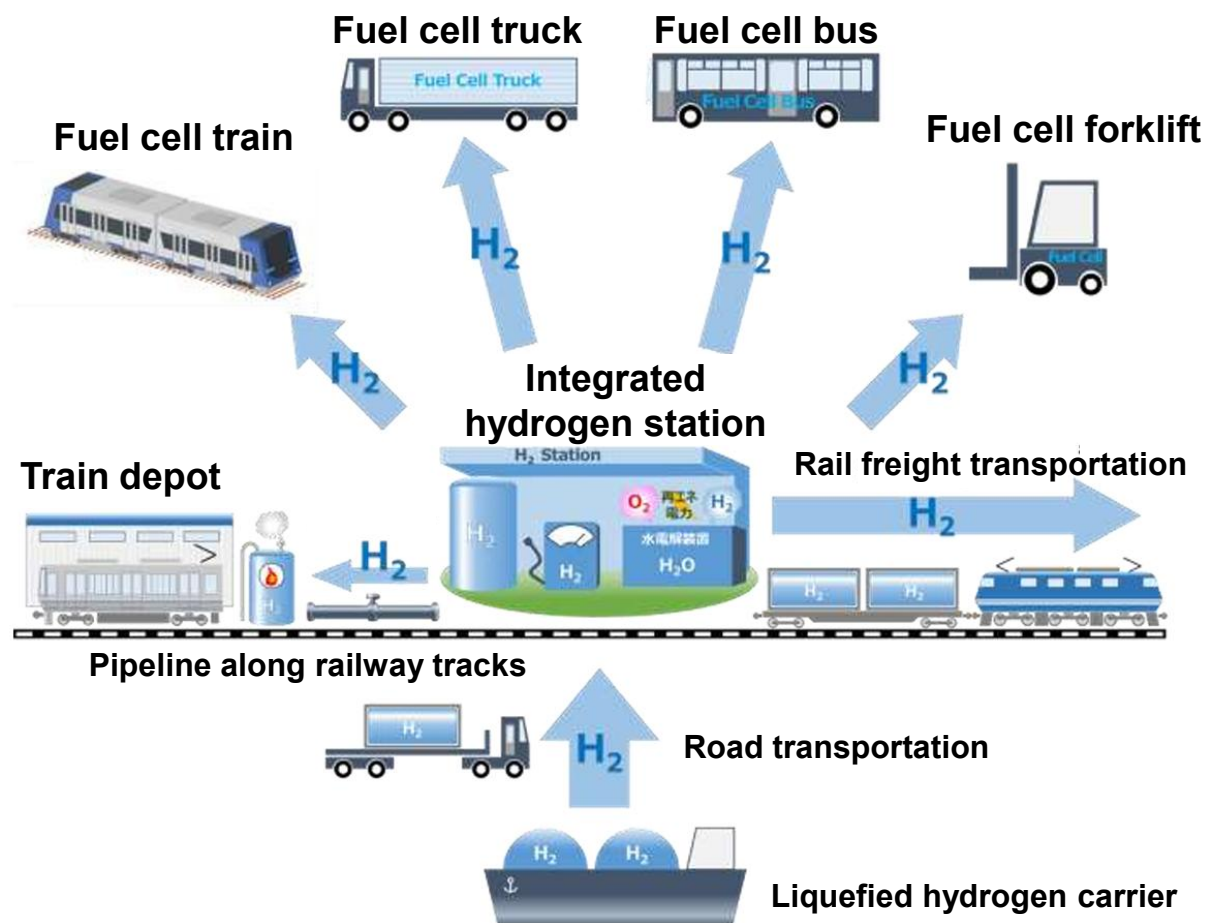
## Concept of Shared Infrastructure (Under Development and Consideration)



Sharing Equipment Reduces Costs



## Consideration of Integrated Hydrogen Station



In 2023, West Japan Railway Company started considering how best to set up an integrated hydrogen station that utilizes railway stations and other such assets.

Source: Created by JTTRI based on West Japan Railway Company website.

## Hydrogen Refueling Stations Constructed at Airport

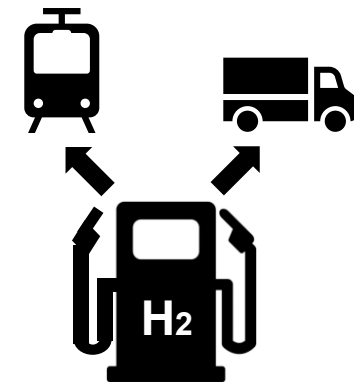


Source: Chubu Centrair International Airport Website

A hydrogen refueling station for industrial vehicles was opened in the cargo area at Chubu Centrair International Airport in November 2018, and another hydrogen station for passenger cars and buses in March 2019.



- Establishing a framework for promoting multimodal hydrogen utilization
- Advancing technological development of multimodal hydrogen refueling stations
- Streamlining and optimizing regulations and systems, and expanding support mechanisms
- Promoting initiatives in leading regions to stimulate hydrogen demand
- Supporting human resource development and retention, and creating mechanisms to encourage changes in behavior



**Thank you for your attention.**

ご清聴ありがとうございました。