

エネルギーと環境を考える

JANUS

City-to-City Collaboration project for developing a Sustainable Eco-friendly Smart City between Toyama City and Male' City

TOYAMA CITY
JAPAN NUS CO LTD

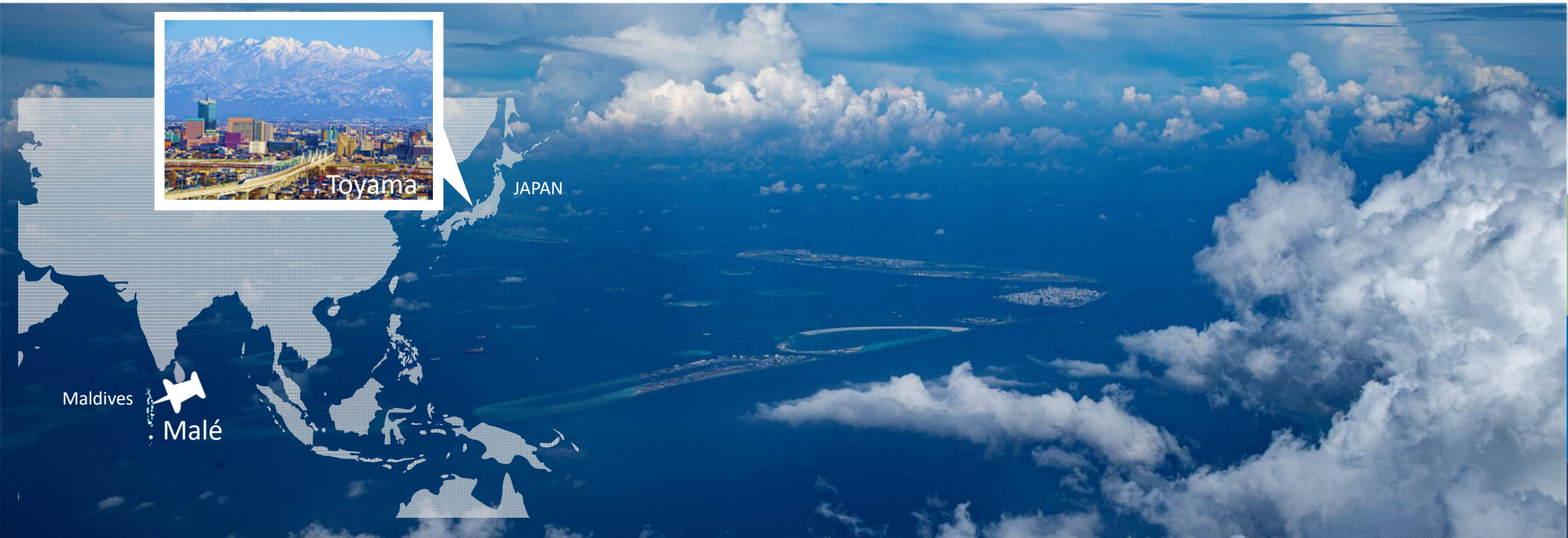


JAPAN

Maldives



Malé



City-to-city collaboration project

Ministry of the Environment Japan project
aiming to realize a carbon-free society through regional cooperation

Policy

Offering advice and sharing good practice of **decarbonization policy formulation, planning** and **carbon neutral declaration**



Technology

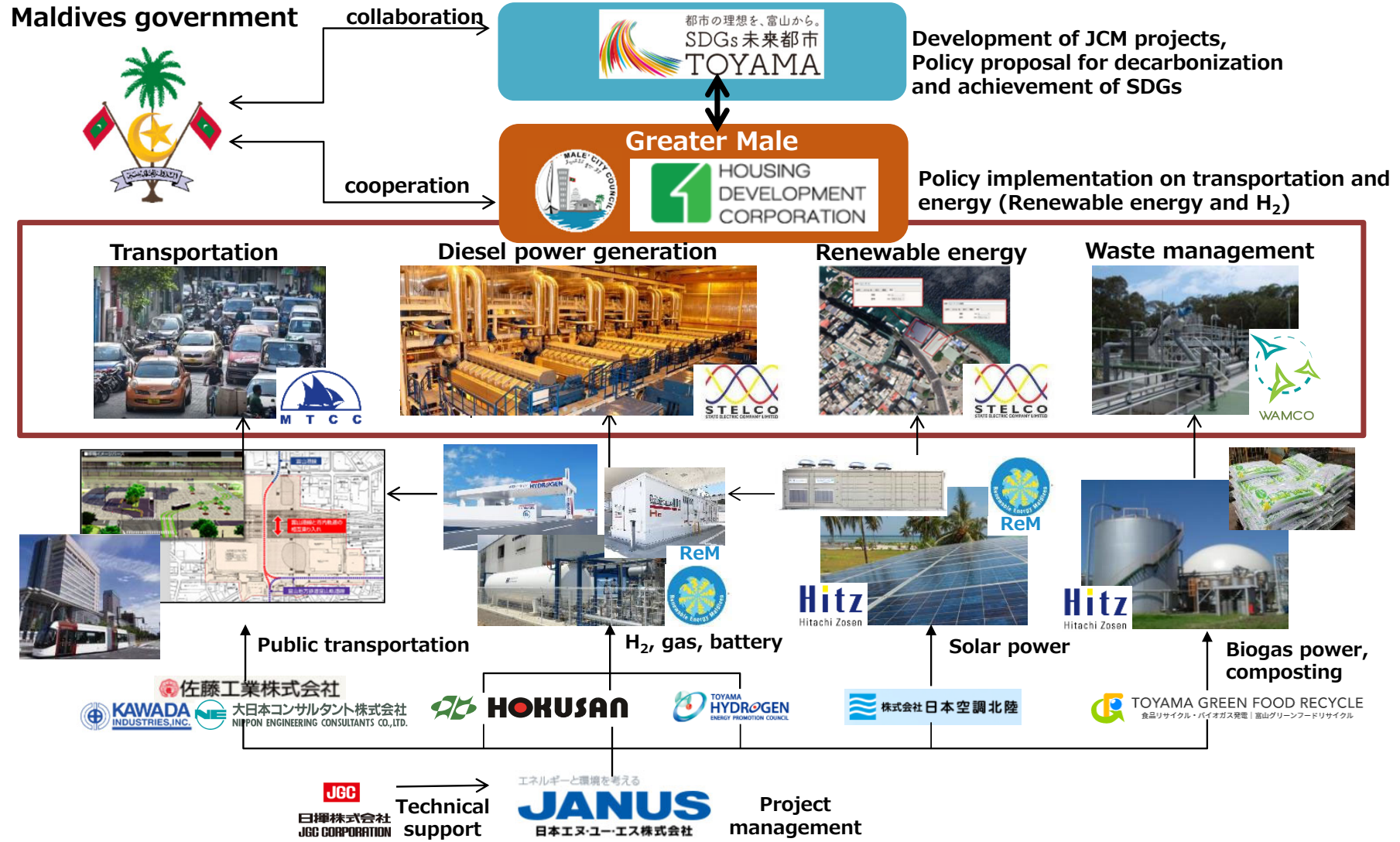
Formulation of **advanced and compatible technologies** and **introduction of plans** that contribute to low carbonization and decarbonization

Finance

Proposals for **utilizing JCM subsidies** and other support program to help introduce technologies

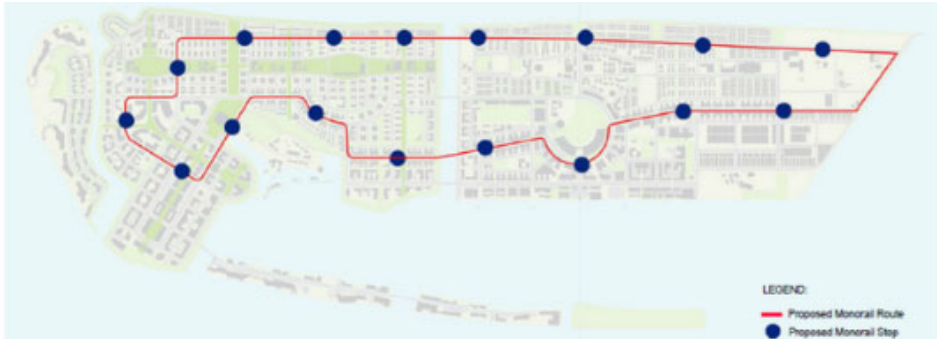


City-to-city collaboration structure for solving challenges

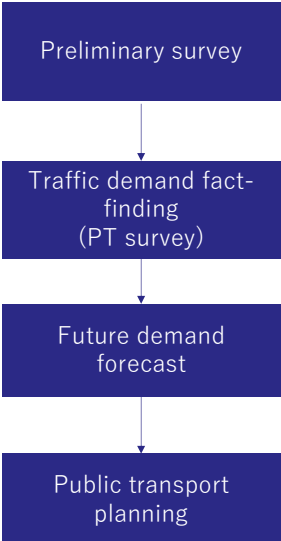


Transportation(1)

Recommendation for long-term measures:
Develop a Public Transportation Master Plan to select the best mode of transportation.



“Maldives Transportation Master Plan Study”



Toyama is conducting a survey using digital data for transportation policy

format	subway	monorail	LRT (elevated)	LRT (ground)	Bus (guideway)
Feature	Dedicated track by tunnel or viaduct Massive high-speed railway that runs	Orbital transportation that guided by a single rail	Light rail transit which runs on a dedicated track on the viaduct	Light rail transit which runs in orbit on the ground (road or open space)	A new transportation system that realizes semi-automatic driving that does not require steering operation by tracing this on a dedicated track equipped with a guide rail with a guide wheel. It can also be used as an ordinary bus on general roads
Example		Haneda	Yurikamome	Toyama	Nagoya
Advantages	Mass and high-speed transportation is possible	It is easy to elevate and only little space required. Little noise and vibration, and no gas emission.	Because it runs on a dedicated elevated track, there is no traffic congestion and accidents. The construction cost of the track structure can be saved by reducing the size and weight of the vehicle.	The ratio of dedicated tracks is high, and the operation is not easily affected by traffic. Larger transportation capacity than trams by forming several cargos	It will not be caught in traffic by separating it from other road. Barrier-free can be achieved by eliminating steps.
Disadvantages	High construction cost and long time required for construction work	Vehicles are more expensive and have less capacity compare with ordinary railways	Transportation volume is small and speed is slow for the construction cost	More expensive than trams	If will not reduce carbon emission unless switch it to electric or hydrogen buses.
Maximum transport capacity (person / hour / one way)	84,000	21,000	18,000	11,000	4,000
Construction cost	25-30 billion yen / km	6.5-14.5 billion yen / km	6.5 to 16.5 billion yen / km	Approximately 3.5 billion yen / km	Approximately 5 billion yen / km
Vehicle cost	Included	Included	Included	Approximately 300 million yen / both	Approximately 80 million yen / both
Operation cost				Approximately 610-840 million yen / 10km	Approximately 300-530 million yen / 10km

format	Bus (ground-only lane)	Bus Rapid Transit(BRT)	Share bike	SKYWAY
Feature	A transportation system that secures a dedicated driving lane and performs high-speed transportation	A system that can flexibly respond to road conditions by combining improvements such as driving routes, vehicles, stops, and fare collection based on fixed-route buses, and driving in general lanes.	Environmentally friendly, safe, active and efficient sustainable transportation. Actively used overseas as a complement to public transportation	The system of SkyWay, a Belarusian start-up company. High-speed driving (150km/h) is possible with a mechanism similar to a cable car.
Example	Jakarta	Tokyo BRT		Dubai
Advantages	It does not get caught in traffic by separating it from other road. Barrier-free can be achieved by eliminating steps.	By introducing IC card systems and road improvements, it achieves transportation capacity, functions and flexibility, same as trams.	It is environmentally friendly and the introduction cost is low.	Construction cost is low, about 1/10 of monorail
Disadvantages	Wide road space is required because it requires a dedicated lane on the general road.	Since it runs on general roads, it may cause traffic congestion.	It is just a complement. The maintenance of bicycle parking lots and the separation from pedestrians can be an issue.	Transportation capacity is small. The capacity is 7 to 189 people (when connected).
Maximum transport capacity (person / hour / one way)		3,120		
Profitability				
Construction cost		50-700 million yen / km		
Vehicle cost				
Operation cost				

Transportation(2)

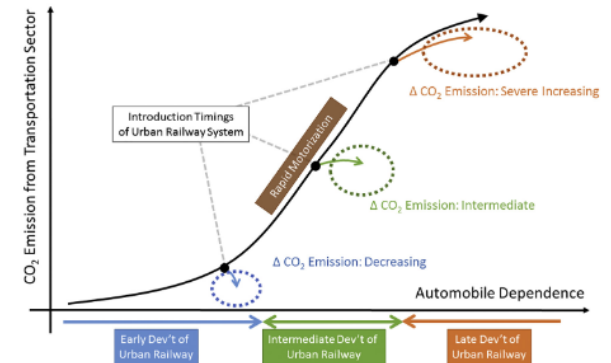
Recommendation for short-term measures: EV bus introduction

- Early improvement of convenience of public transportation is effective for decarbonization
- Promotion of EV conversion of MTCC public buses

Exchange of opinions with Ministry of Environment, Climate Change and Technology, Ministry of Transport and Civil Aviation and MTCC in November 2021:

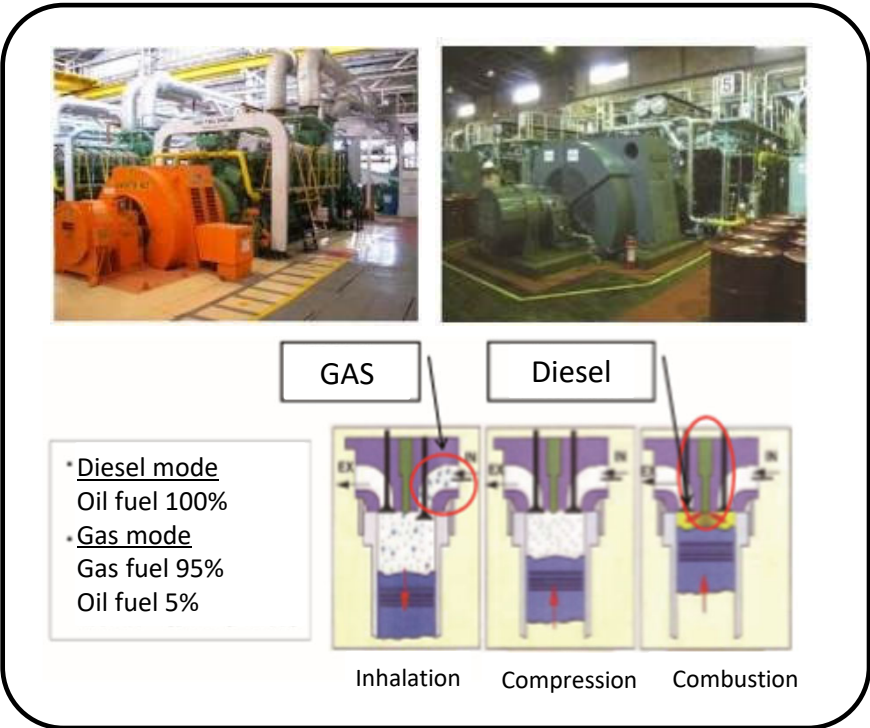
- Considering introduction of EV bus
- Plan of GEF(Global Environment Facility) project
- Consideration of JCM project formation

(A company in Toyama City is conducting a survey on the introduction of EV using renewable energy power.)



Diesel power generation and renewable energy (1)

Plan for LNG utilization has been formulated, and there is a 200 MW scale LNG thermal power construction plan in Thilafushi. Japan has excellent diesel and gas co-firing technology, which enables carbon reduction with gas co-firing for existing diesel power plants as well.



Gas hub to be developed in Sri Lanka; will supply fuel to Maldives



The Asian Development Bank (ADB) is funding a study on the feasibility of setting up a liquefied natural gas (LNG) terminal in Sri Lanka to supply fuel to the Maldives.

A Sri Lanka newspaper reported that ADB will spend US\$ 225,500 in the form of a grant aid on this project.

Citing ADB, the newspaper reported that according to the proposed feasibility study, a main gas hub will be established in Sri Lanka, and studies will be conducted to determine if a land-based LNG terminal or floating storage and regasification unit would be optimal to provide gas to the Maldives.

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News / Maldives Carbon Neutralization

Parliamentary Committee instructs amendment of LNG project to comply with carbon neutralisation tools

Tuesday's session held by the Parliamentary Committee on Environment and Climate Change. PHOTO: PARLIAMENT

The Parliamentary Committee on Environment and Climate Change, on Tuesday, decided to amend the project to establish a Liquefied Natural Gas (LNG) station in Maldives to align with government intentions to reach nationwide carbon neutrality.

Mariyam Halse
30 January 2024, MVT 04:15

Attended by representatives from the Ministry of Economic Development, the Ministry of Environment, State Electric Company (STELCO), Fensha Corporation Limited and other stakeholders, the meeting was intended to discuss the extent to which the LNG project was compatible with plans to achieve carbon neutralisation by the year 2030.

During his address at the United Nations Climate Ambition Summit in December 2020, President Ibrahim Solih declared that Maldives could achieve net-zero carbon emissions by 2030 with international support and assistance.

Speaking at the session, Environment Ministry Director Ahmed Ali stated that the LNG station project was included in the roadmap compiled by ADB and the environment ministry before the government announced intentions of setting a net zero carbon neutralisation goal.

Funded by the Asian Development Bank (ADB), the LNG station in Maldives is scheduled to receive supplies from the LNG station being developed in neighboring Sri Lanka with assistance from the bank.

He added that ADB's roadmap entailed a 50 percent emissions reduction, complying with the previous state aim to cut down emissions by 24 percent by 2030.

Although the incumbent has made various pledges to tackle imminent threats to the environment, local NGOs, movements and advocates have accused the government of failing to 'walk the talk' and live up to electoral pledges made with respect to sustainable development and halting environmental degradation.

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There is an LNG hub construction plan in Sri Lanka, supported by ADB. In this F / S (ongoing), the policy is to consider the supply to the Maldives. But the use of LNG is questioned by the Maldivian parliament because it is a fossil fuel. Careful consideration is required for decarbonization.

Diesel power generation and renewable energy(2)

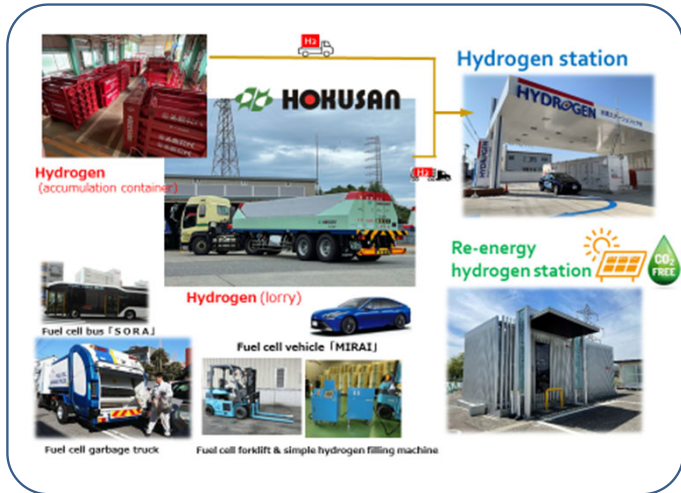
Utilization of hydrogen by renewable energy is also progressing in Toyama City
 Achievement of hydrogen station development and fuel cell waste trucks utilization

Potential of hydrogen in Maldives:

- Solving unstable PV power generation grid connection issues
 (Adjusting power → Store electricity with hydrogen)
- Potential of fuel utilization for mobility

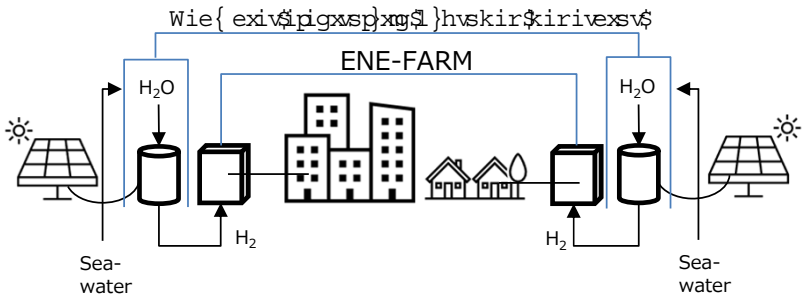


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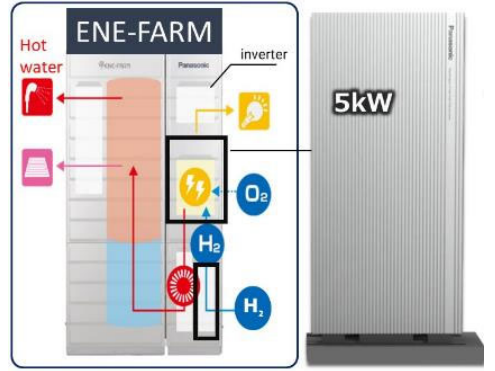


Hydrogen infrastructure in Toyama

Solution: Hydrogen utilization and decentralization by ENE-FARM & Simple fuel



ENE-FARM product by Panasonic



Waste Management

Waste management system

Current situation

- No segregation system
- Landfill on Thilafushi Island



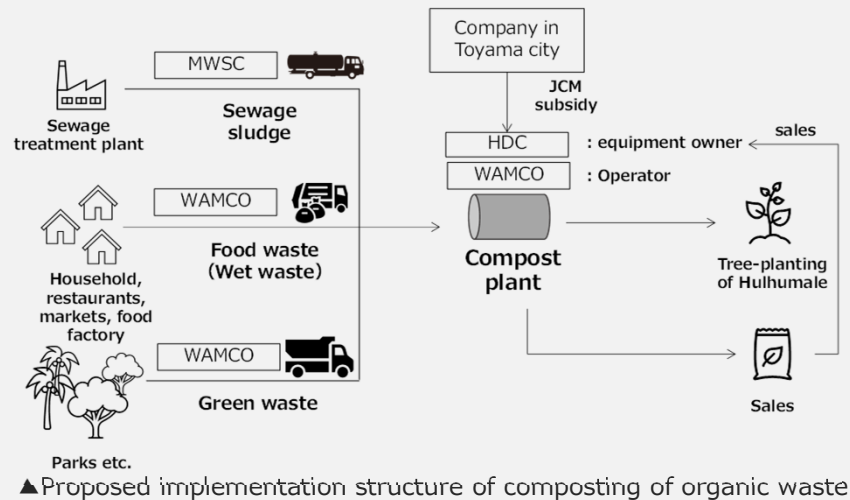
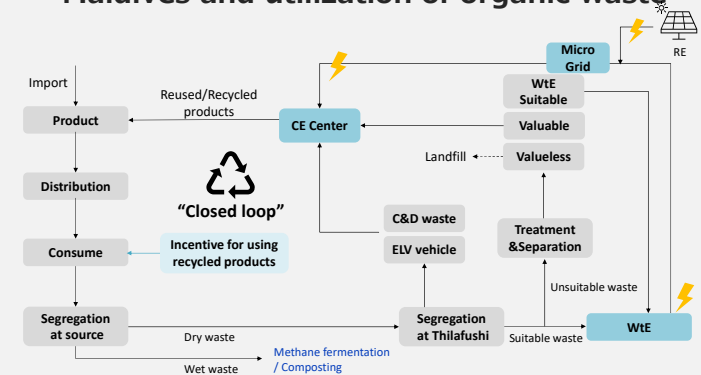
▲ Thilafushi Island

Waste management plan

- Segregation for Wet and Dry waste will be started in June, 2022
- Dry waste will be treated in WtE plant from 2025
- Treatment of wet waste has not been determined



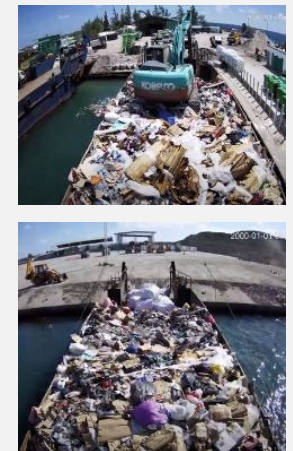
Proposal towards realization of circular economy in Maldives and utilization of organic waste



GHG emission reduction by composting

Assuming that the population in Hulhumale is 100,000

- Reference emission
GHG emissions from anaerobic digestion = 44,512 t-CO₂
- Project emission
GHG emission from composting = 27,152 t-CO₂
- GHG emission reduction
17,360 t-CO₂



HDC Climate Change Policy

HDC is at the start of its ESG journey and puts strong emphasis on establishing policies to meet international standards

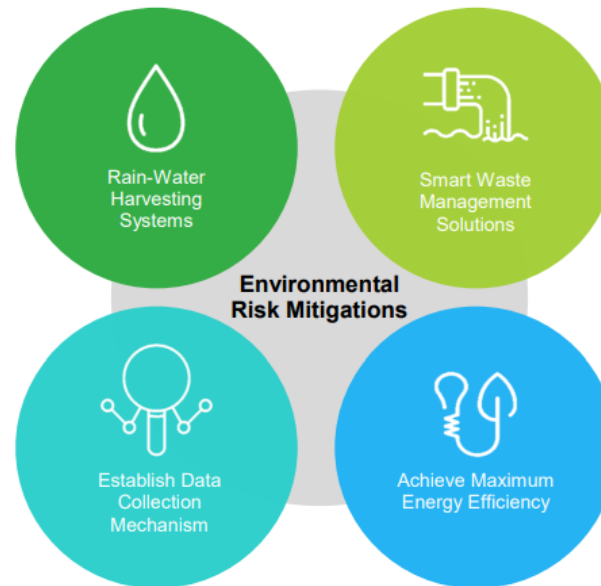


Compliance with environmental policies

- While there are no specific environmental regulations that apply to HDC, the company adheres to the guidelines provided by the Environmental Protection Agency (EPA)
- In 2017, HDC collaborated with BREEAM in UK, the world's leading sustainability assessment method for master planning projects, infrastructure and buildings. HDC is currently in the process of integrating the BREEAM standards and green components in planning and developmental guidelines

Environmental risks and climate resilience

- HDC takes environmental and climate considerations seriously, and sees threats such as global warming, pollution and depletion of resources to be of paramount importance to the sustainability of the region
- To deal with these issues, the government is implementing projects which include solar energy as well as waste management projects in collaboration with World Bank. A rain-water harvesting project is in the pipeline, as it is being assessed by World Bank on how it can be implemented. A study on potential public transport models for Maldives is also underway, which would aid the government in pushing for public transportation to reduce vehicle pollution
- Hulhumalé was specially reclaimed to be at least 2 metres above sea level⁽¹⁾ so that it would be less vulnerable to the increase in sea level. Hulhumalé has the highest above mean sea level in all of Maldives, as most islands are only 1-1.2 metres above sea level



Toyama team will make contribution in achieving ESG and decarbonization policies in Greater Male and Maldives with Japanese technology and experience under collaboration with HDC, Male city.

