# 添付資料

添付 1 第 1 回テーマ別ミーティング・現地ワークショップ資料

添付 2 第 2 回テーマ別ミーティング資料

# 添付 1　第 1 回テーマ別ミーティング・現地ワークショップ資料

# Solutions, Policies and Action for Carbon neutral goal under vision to 2050 in Ba Ria – Vung Tau Province

**Presenter: Mr. Trần Thượng Thọ**
**Head of Environmental Management Division, Ba Ria – Vung Tau Province Department of Natural Resources and Environment**

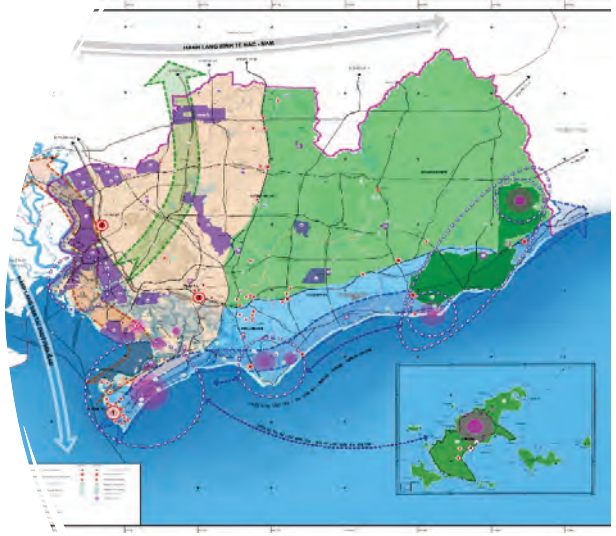
Vung Tau City, July 25, 2024

UBND TỈNH BÀ RỊA - VŨNG TÀU
SỞ TÀI NGUYÊN VÀ MÔI TRƯỜNG

TỈNH BÀ RỊA - VŨNG TÀU

# Presentation Contents

- **The relevant Vietnamese legal regulations and laws**
- **Provincial development perspectives and goals**
- **Provincial solutions and actions**
- **Reviews and Evaluations**

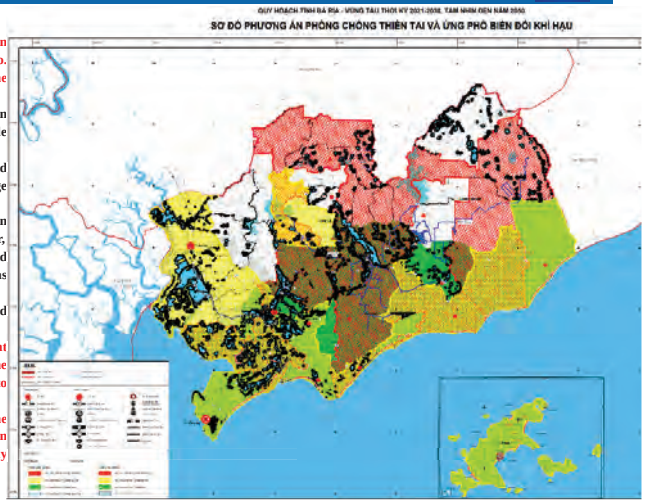


UBND TỈNH BÀ RỊA - VŨNG TÀU
SỞ TÀI NGUYÊN VÀ MÔI TRƯỜNG

## 1. Relevant Vietnamese legal egulations and laws

TỈNH BÀ RỊA - VŨNG TÀU

- **Law on Environmental Protection 2020,**
- **Decree No. 06/2022/ND-CP regulates greenhouse gas emission mitigation and protection of the Ozone layer, and Decree No. 08/2022/ND-CP detailing the implementation of several articles of the Law on Environmental Protection 2020**
- **Decree No. 08/2022/ND-CP detailing several articles of the Law on Environmental Protection 2020, specified from Clauses 4 to 9 in Article 152.**
- **Decision No. 888/QD-TTg in 2022 approving the Scheme on tasks and solutions to implement the results of the COP 26th on Climate change issued by the Prime Minister,**
- **Decision No. 896/QD-TTg of 2022 approving the National Strategy on Climate Change for the period up to 2050 issued by the Prime Minister,**
- **Decision No. 01/2022/QD-TTg promulgating a list of sectors and facilities emitting greenhouse gases that must conduct greenhouse gas inventories.**
- **Decision No. 148/QD-TTg promulgating the national monitoring and evaluation system for climate change adaptation activities**
- **The Minister of the Ministry of Natural Resources and Environment has issued Circular No. 01/2022/TT-BTNMT detailing the implementation of the Law on Environmental Protection in response to climate change.**
- **Document No. 9992/UBND-VP dated July 19, 2024 on the implementation of Directive 13/CT-TTG of the Prime Minister on strengthening carbon credit management to implement the nationally determined contribution (NDC)**




UBND TỈNH BÀ RỊA - VŨNG TÀU
SỞ TÀI NGUYÊN VÀ MÔI TRƯỜNG



## 2. Provincial development perspectives and goals

TỈNH BÀ RỊA - VŨNG TÀU

According to Decision 1629/QD-TTg dated December 16, 2023 of the Prime Minister approving the BRVT Provincial Planning for the period 2021-2030, vision to 2050

**II. DEVELOPMENT PERSPECTIVES, GOALS, AND BREAKTHROUGH**

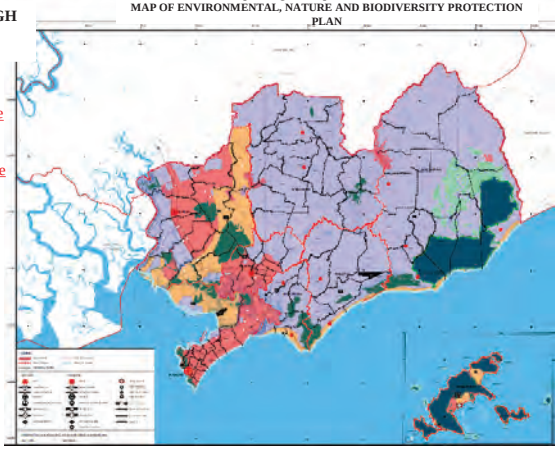
**1. Development perspectives**

d) Economic development associated with achieving progress, social justice and improving the quality of cultural, spiritual and material life for the People; ensure harmony of economic, social and environmental benefits throughout the development process; Protect the environment, balance ecology, do not trade off the environment with economic benefits in the development process. Proactively respond to climate change and develop sustainably according to the green transformation trend based on the development of circular economy, green economy, and low carbon economy, contributing to realizing the goals that Vietnam has set. Committed at COP26 to achieve net-zero emissions by 2050.

**3. Vision to 2050**

Ba Ria-Vung Tau is the national marine economic center; maritime service center of Southeast Asia; an international high-quality tourist center; one of the major industrial centers of the Southeast Region; with a modern and complete infrastructure system; safe, clean and high-quality living environment; society develops in harmony with nature, the economy develops effectively in the direction of circular economy, green economy, low carbon economy and achieves the goal of achieving net zero emissions.

**BRVT Provincial planning for the period of 2021 – 2030, vision to 2050**
**MAP OF ENVIRONMENTAL, NATURE AND BIODIVERSITY PROTECTION PLAN**



UBND TỈNH BÀ RỊA - VŨNG TÀU
SỞ TÀI NGUYÊN VÀ MÔI TRƯỜNG

***Results of BRVT DONRE in Implementing Document No. 16994/UBND-VP dated December 4, 2023 on Implementing the Green Growth Strategy for the Period 2021-2030, with a Vision to 2050, and Decision No. 882/QD-TTg dated July 22, 2022***

- On August 22, 2023, the BRVT PPC issued Decision No. 2066/QD-UBND approving the Project on Solid Waste Management and Sorting of Domestic Solid Waste at Source in BRVT Province until 2025, with an orientation to 2030. On December 26, 2023, BRVT PPC issued Plan No. 267/KH-UBND on implementing the tasks under Decision No. 2066/QD-UBND.
- On May 27, 2024, BRVT PPC issued Decision No. 17/2024/QD-UBND on promulgating regulations on waste management in BRVT Province.
- On July 18, 2024, BRVT PPC issued Decision No. 1866/QD-UBND approving the Provincial Plan for Air Quality Management in BRVT Province for 2025.

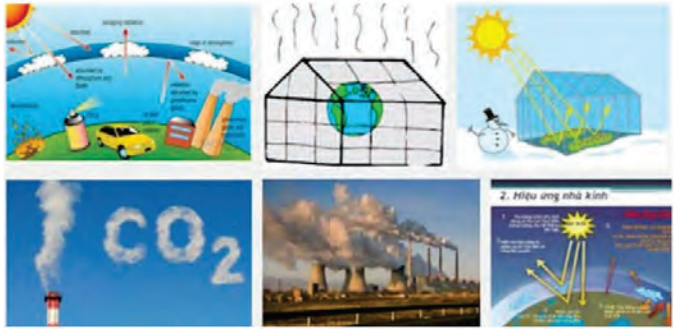





***Document No. 666/BC-UBND dated November 14, 2023, reported to the Ministry of Natural Resources and Environment on the results of the review of emission sources (facilities) required to conduct greenhouse gas inventories in 2022 (BRVT DONRE as a counsultative unit).***

The review results evaluated the facilities in BRVT Province and identified 108 emission facilities required to conduct greenhouse gas inventories (including 62 facilities that have been identified under Decision No. 01/2022/QD-TTg dated January 18, 2022, and 46 newly reviewed and supplemented one). In which:

- Industry and Trade sector: 98 facilities (including 55 facilities identified under Decision No. 01/2022/QD-TTg dated January 18, 2022, and 43 newly reviewed and supplemented ones).
- Transportation sector: 06 facilities (identified under Decision No. 01/2022/QD-TTg dated January 18, 2022).
- Construction sector: 01 facilities (identified under Decision No. 01/2022/QD-TTg dated January 18, 2022).
- Natural Resources and Environment sector: 03 facilities (newly supplemented).







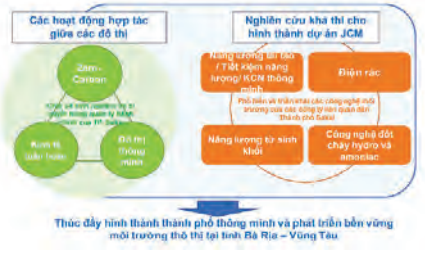

***Results of Implementing Decision No. 2066/QD-UBND dated August 22, 2023, approving the Project on Solid Waste Management and Sorting of Domestic Solid Waste at Source in BRVT Province for the period until 2025, with an orientation to 2030, and Plan No. 267/KH-UBND dated December 26, 2023, on implementing the tasks under Decision No. 2066/QD-UBND dated August 22, 2023 (DONRE as a consulative unit): A total of 96 tasks and solutions.***

- Issued Decision No. 17/2024/QD-UBND on May 27, 2024, on the promulgation of regulations on waste management in Bà Rịa – Vũng Tàu Province.
- Districts, towns, and cities are developing service pricing plans for collecting and transporting domestic solid waste.
- Completed legal documentation in accordance with investment laws, bidding laws, and provincial planning to select investors for the project of a waste-to-energy plant in the centralized waste treatment area of Tóc Tiên (capacity of 1,000 tons/day) and the waste incineration plant project in Côn Đảo district.





- Regarding policy mechanisms, the Government of Vietnam is continuously updating and amending regulations on greenhouse gas emission reduction and climate change response (amending Decree No. 06/2022/ND-CP and Circular No. 01/2022/TT-BTNMT). Efforts to strengthen carbon credit management to implement Nationally Determined Contributions (NDCs) are ongoing.
- Ba Ria – Vung Tau Province has enhanced carbon credit management efforts to implement the NDCs within the province. The issuance of regulations on waste management in Ba Ria – Vung Tau Province serves as an important legal foundation for the convenient implementation of activities related to the sorting, collection, transportation, and treatment of domestic solid waste in the near future.
- These results will further facilitate the implementation of the Collaboration Action Plan between Ba Ria—Vung Tau Province and Sakai City in 2024 and the coming years, contributing positively to the achievement of the province's carbon neutrality goal by 2050.

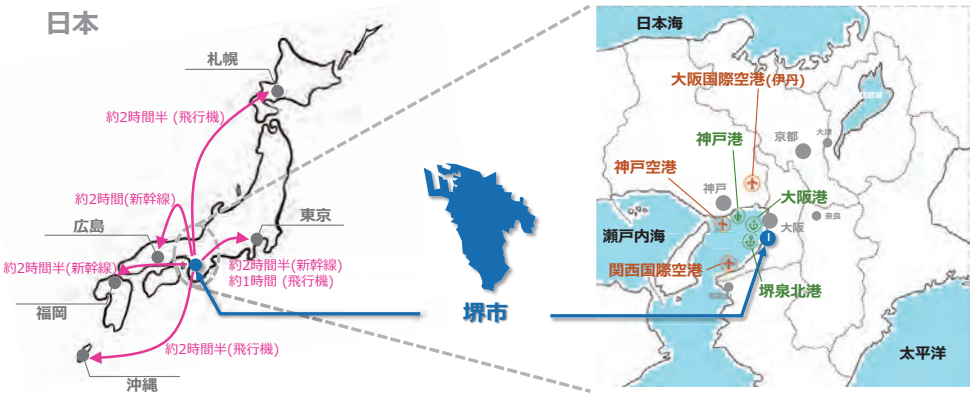


# 堺市における
# 再生可能エネルギー・次世代エネルギー
# 及び省エネルギーに係る施策

**バリアブンタウ省-堺市　都市間協議**
**2024年7月25日**

## ロケーション

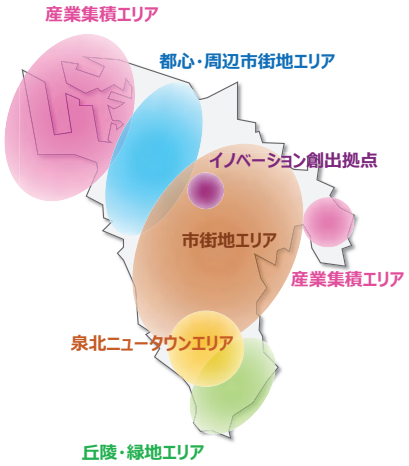
○ 大阪府で2番目の人口・面積を有する都市です。大阪市に隣接し、近くには京都市・神戸市等の大きな都市が位置しています。
○ 幹線道路が非常に発展しており、国際空港や港に近いため、国内の主要都市（東京・札幌・福岡等）や海外に容易にアクセスできます。



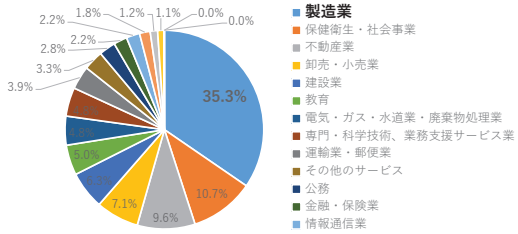



# 1.堺市の紹介

## 社会・経済の概要




■人口 808,371人（2024年6月1日現在）
■面積：149.83 km²（2024年6月1日現在）
■姉妹・友好都市: バークレー市（アメリカ合衆国）
連雲港市（中華人民共和国）
ウェリントン市（ニュージーランド）
ダナン市（ベトナム社会主義共和国）
■市内総生産：3兆4807億円（名目）（2020年度）
3兆3819億円（実質）（2020年度）




市内総生産(名目、2020年)産業別構成比

## 日本有数の産業都市

○ 堺市は日本有数の産業都市であり、先進的な環境・脱炭素技術を有する企業が多数立地しています。
○ 臨海部は複数の製油所、火力発電所、ガス製造所、水素製造所等の一大拠点となっており、関西地方で消費されるエネルギーの約70%を生産しています。

堺市の臨海部



# 2.堺市の環境に関するビジョンと現状

## 堺市の長期的な環境ビジョン「堺環境戦略」

○ 2050年に向けた長期的な環境ビジョンである「堺環境戦略」を策定しています。
○ 4つの"C"をキーワードに、世界をリードする環境先進都市をめざしています。

**①革新的イノベーションを結集した脱炭素都市**
**Carbon Neutral**

**②環境と経済とが調和する循環都市**
**Circular**

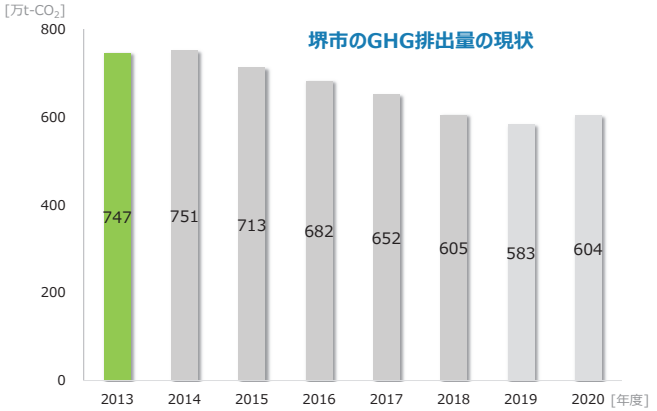
**③自然と共生した安全・安心で魅力ある快適都市**
**Comfortable**

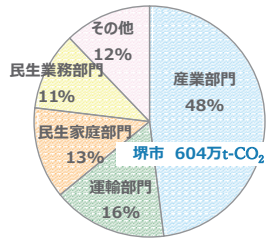
**④イノベーションを生み出し展開する貢献・協働都市**
**Cooperation**



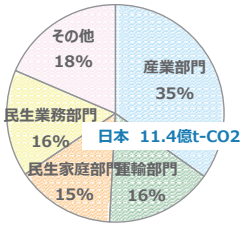
## 温室効果ガス（GHG）の現状

○市域からの温室効果ガス排出量は年々減少傾向です。
○ 2020年の温室効果ガス排出量の約48%を産業部門が占めており、全国平均と比べて高くなっています。



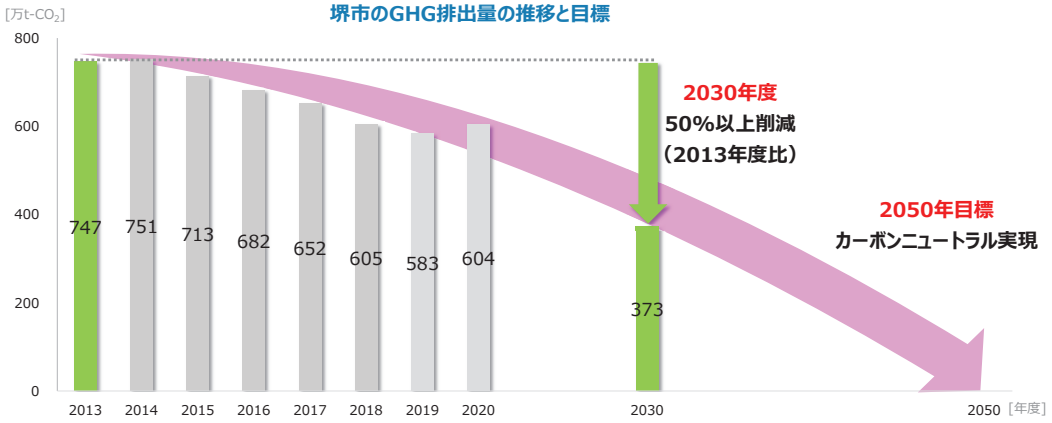

堺市の部門別GHG排出量（2020年度）




日本の部門別GHG排出量（2020年度）

## GHG排出量削減目標

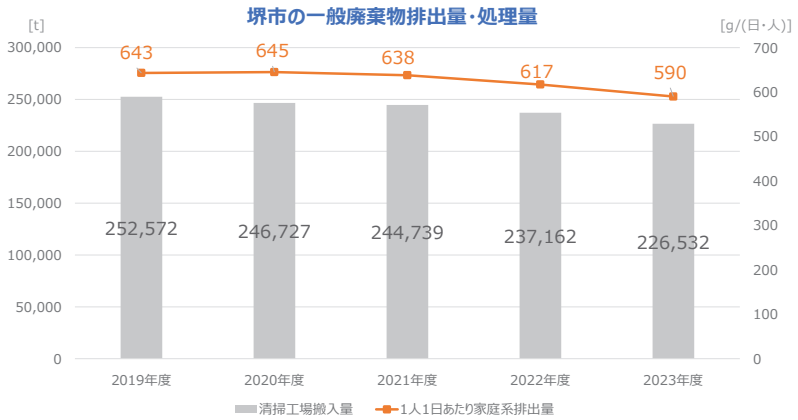
○ 2050年カーボンニュートラル実現に向けて、2030年にGHG排出量を2013年度比で50%以上削減することをめざしています。






## 一般廃棄物の排出量と処理量

○ 一般廃棄物排出量及び処理量は、それぞれ年々減少傾向です。






# 3.堺市の再生可能エネルギー導入・次世代エネルギーに係る取組

## 太陽光発電（取組の一例）

○ 市は、先導的な役割として、市の公共施設（市立小学校や下水処理場など）への太陽光発電の導入を積極的に推進しています。

**（2023年度末現在）**

| 分類 | 施設数 | 発電容量 |
|---|---|---|
| 市が設置 | 100施設 | 1,313.0kW |
| 屋根貸しで民間資金を活用して設置 | 12施設 | 1,566.3kW |
| 合計 | **112施設** | **2,879.3kW** |

※同一施設に複数設置している施設は1つとしてカウント。

## 太陽光発電（取組の一例）

○ 住宅向け再生可能エネルギー機器等導入支援事業補助金

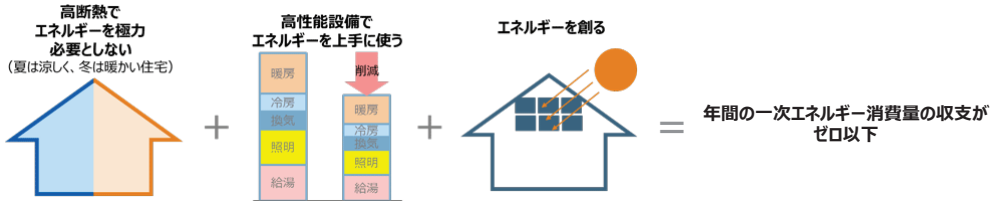
市は、市民・事業者等が以下の機器を導入し、一定の基準を満たした場合に、費用の一部を補助しています。

■太陽光発電システム

■電気自動車・燃料電池自動車・既設の集合住宅へ導入した充電設備

■ZEH＋（※）の要件を満たした住宅へ導入した太陽光発電システム・燃料電池システム・HEMS及び高効率給湯設備

**件数：計396件**
**合計額：計24,682,000円**
(2023年度)




ZEH（ネット・ゼロ・エネルギー・ハウス）のイメージ（出典：資源エネルギー庁HP）

※ZEH+：ZEHを、さらなる省エネルギー・設備の効率的運用等によって、再生可能エネルギーの自家消費率拡大をめざした住宅



## 水素（取組の一例）

○ 市の公用車に燃料電池自動車（FCV）を導入しています。

堺市公用車

○ 市は民間企業と連携し、ゼロエミッション車（ZEV）を中心とした電動車の普及や水素エネルギーの利活用に向けた取組を進めています。


FCトラック試乗会

FCV電源共有を利用した
クリスマスツリー点灯デモンストレーション

災害時を想定した作業用電源としての
FCV活用実験



## 水素（取組の一例）

○ 堺市内には、水素関連企業が複数立地しています。

■中外炉工業株式会社　※都市間連携事業の共同事業者
トヨタ自動車株式会社と水素バーナを共同開発。
二酸化炭素排出量ゼロ、優れた低NOx性能と高い安全性を実現。

水素バーナ
(出典：中外炉工業
株式会社HP)

■ハイドロエッジ株式会社
天然ガスを水蒸気改質し、水素ガスを製造。
液化窒素の冷熱と水素の圧縮・膨張で得られる冷熱を使って水素を液化。

改質器
(出典：ハイドロエッジ
株式会社HP)

■加地テック株式会社
水素ガスを110MPaに昇圧可能な空冷オイルレス圧縮機を開発。

圧縮機
(出典：加地テック株
式会社HP)



# 4.堺市の省エネルギー推進に係る取組

## 市の省エネの取組の一例

○ 事業所向け省エネ設備等導入支援事業補助金
市は、市内工場等が既存設備を省エネ機器に更新することにより、
一定以上の省エネ効果が見込める場合に、費用の一部を補助しています。

**件数：計12件**
(2023年度)

○ 空気圧縮機・省エネアドバイザー派遣事業（省エネ診断）
メーカーの専門家を派遣し、測定結果をもとに空気圧縮機の省エネ・コスト削減の方法を提案しています。

**件数：計10件**
(2023年度)



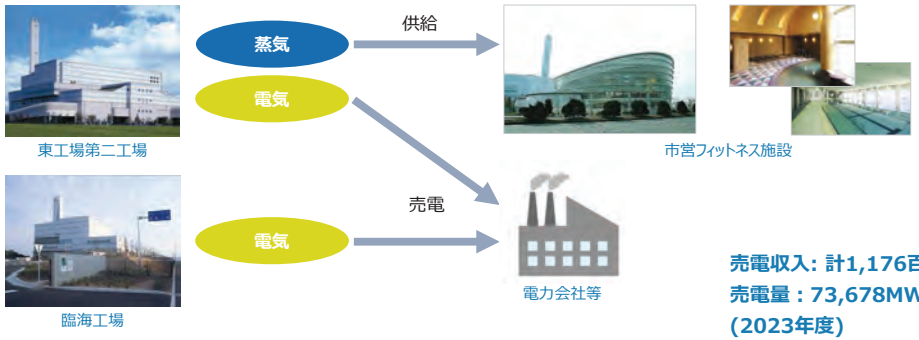
# 5.堺市の脱炭素化に関するその他の取組

## 市の清掃工場での余熱利用

○ 市の一般廃棄物処理施設（クリーンセンター東工場第二工場及び臨海工場）では、廃棄物を焼却した際の余熱で発電し、電力会社等に売電しています。

○ 東工場第二工場では余熱から蒸気も生成し、隣接する市営フィットネス施設の温水プール等の熱源として利用しています。

※現在休止中の東工場第一工場（日立造船㈱が施工）でも過去に、蒸気の供給を実施。
都市間連携事業の共同事業者Hitachi Zosen Vietnam Co., Ltd.は日立造船㈱ のグループ会社。

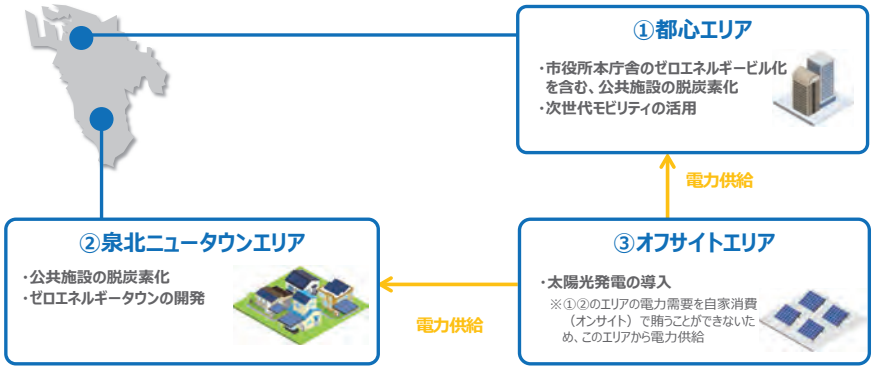



**売電収入: 計1,176百万円**
**売電量：73,678MWh**
**(2023年度)**



## 日本政府から選定された脱炭素先行地域「堺エネルギー地産地消プロジェクト」

○ 市域のGHG排出量を2013 年度比で50%以上削減することを目標に、①商業ビルや住宅が集積する都心エリア及び②ニュータウンエリアにおいて、ゼロエネルギービルやゼロエネルギータウンの開発に取り組んでいます。



# Challenges and approach towards large-scale introduction of renewable energy

*Naoki Kobayashi, Ph.D*
*Senior Specialist, Business Strategy Operation*
*Nippon Koei Energy Solutions*

25. 7. 2024

## Table of contents



**VRE: Variable Renewable Energy**
- **PV* and wind power are VRE.**
- **Hydro power plant is renewable energy, but not VRE.**

**PV: Photovoltaic, solar power plant**




# 1. Challenges for high VRE penetration



## Characteristics and challenges for high penetration of VRE

| Characteristics of VRE | Challenges for high penetration of VRE | Example of countermeasure |
|---|---|---|
| • Power output depends on the climate like solar radiation and wind conditions.<br>• Power output is intermittent and not adjustable. | • Supply and demand balance* in the whole power grid becomes difficult.<br>• Frequency fluctuation | Energy storage like battery, pumped-hydro power plant and so on |
| • Suitable sites for renewable energy are highly unevenly distributed regionally. | • Grid congestion from high renewable energy penetration area to high demand area | • Grid enforcement<br>• Directing demand to the suitable locations |

Supply and demand balance*:
Generated power must always be equal to demand for stable operation of power grid.

source: created by author

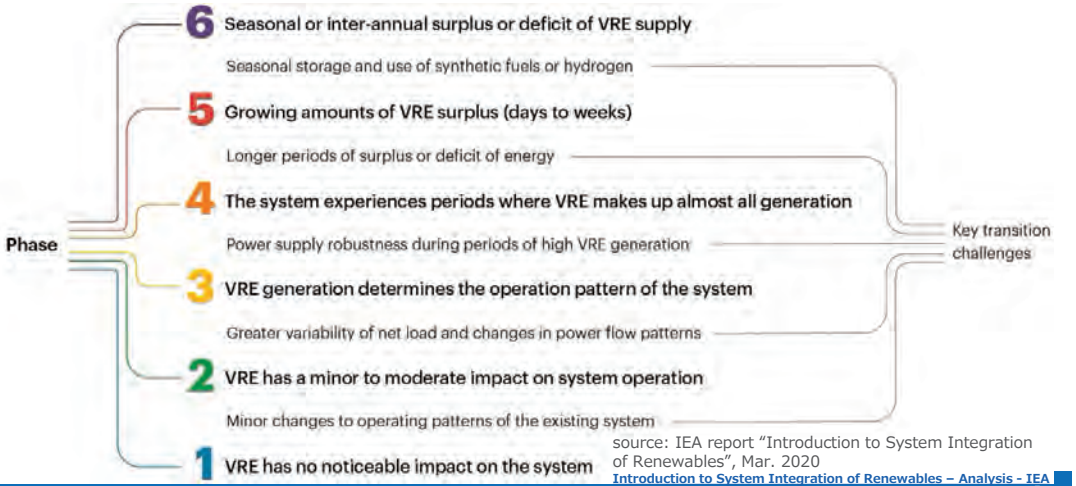
## (reference) Power system operational challenges in high VRE penetration

| | |
|---|---|
| CONGESTION | • Currently, 25 overload 220/110kV lines/transformers<br>• 500kV regional transmission<br>• 220 RE power plants haven't been fully dispatched due to local congestion |
| RENEWABLE SURPLUS | During low-peak hours, especially weekends and Tet Holiday, over-generation occurs due to high renewable penetration |
| SYSTEM INERTIA | • Low system inertia<br>=> Risk of system instability |
| RE FORECAST ERRORS | High RE forecast errors increase the absolute value of imbalance and bring difficulties in system planning |
| SUPPORTING MECHANISM | • The incentive mechanism for ancillary services is not attractive<br>=> lack of reserve to meet the uncertainty of renewables<br>• Currently there is no mechanism for BESS |
| FAULT RIDE THROUGH/LOW SCR | There is no specific regulation on the fault ride through of renewable energy sources => The adjustment parameters of the solar inverters and wind turbines are always kept at the rated parameters set by the issuer => The serious incident occurs because the fault ride through parameters are not properly set (accidents May 13, 2021, June 2, 2021)<br>Low SCR → power swing |

source: NLDC "Update on Vietnam power system and electricity market operation", Jun. 2023
Vietnam's Electricity market reform (vepg.vn)



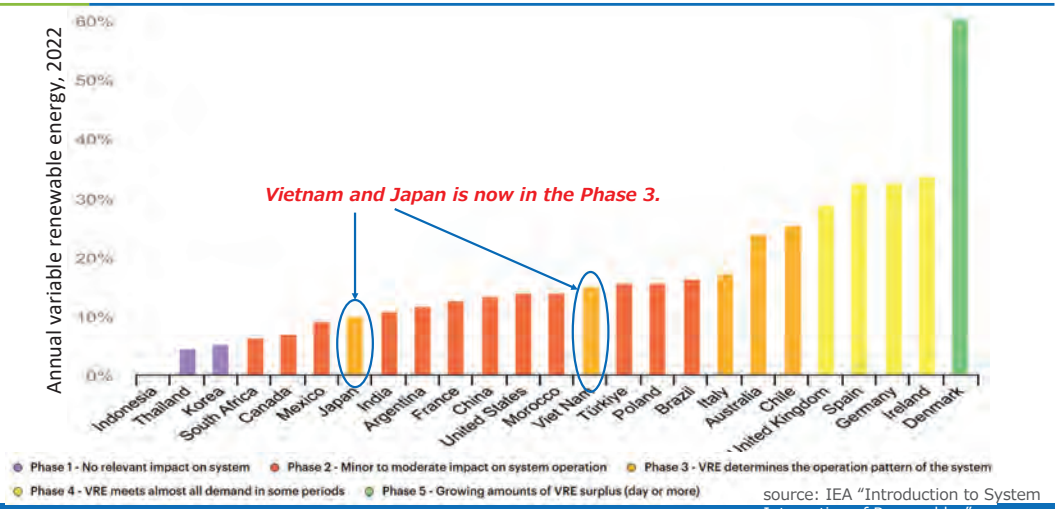
## Key characteristics and challenges in the different phase of VRE penetration




source: IEA report "Introduction to System Integration of Renewables", Mar. 2020
Introduction to System Integration of Renewables – Analysis - IEA



## Annual variable renewable energy share and corresponding system integration phase in selected countries/regions, 2022

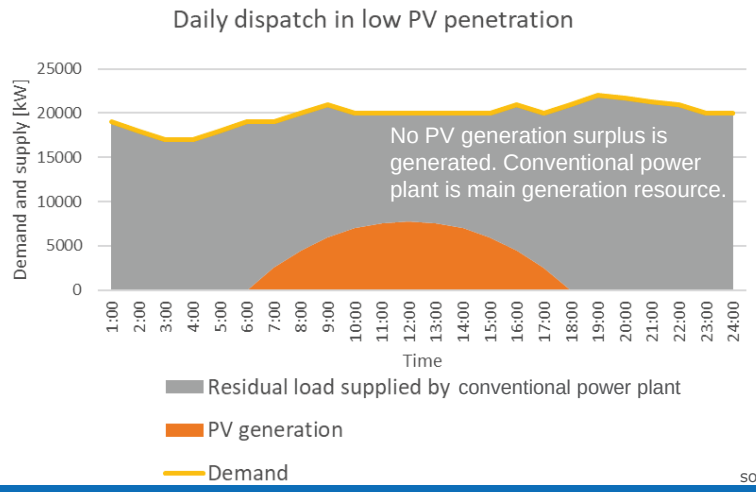



source: IEA "Introduction to System Integration of Renewables"
Renewable Integration – Topics - IEA



# 2. Supply and demand balance in high VRE penetration

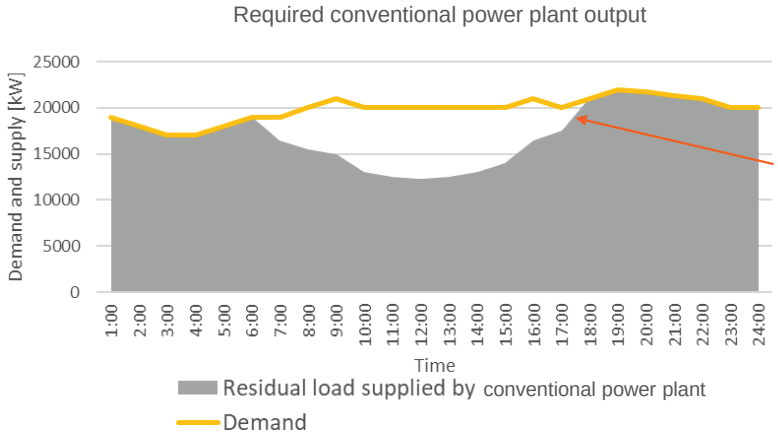
## Daily dispatch in low PV penetration level




source: created by author




## Daily dispatch in low PV penetration level

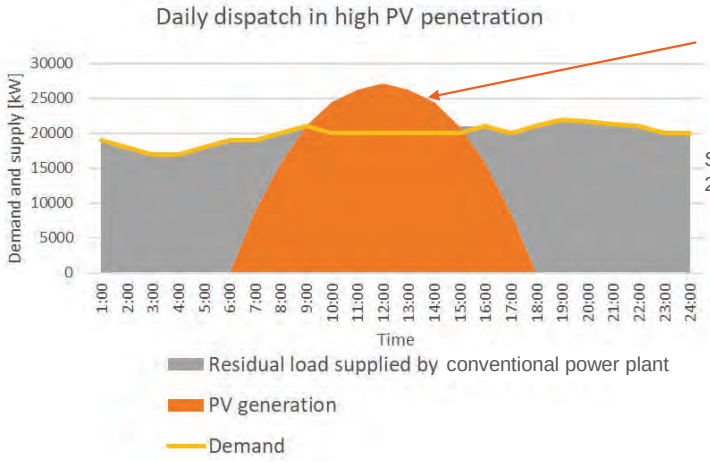



Required conventional power plant output change becomes fast, and the plant operation is a little more complex than before.

source: created by author




## Daily dispatch in high PV penetration level without BESS*




PV generation surplus is generated. PV curtailment or other countermeasures are essential.

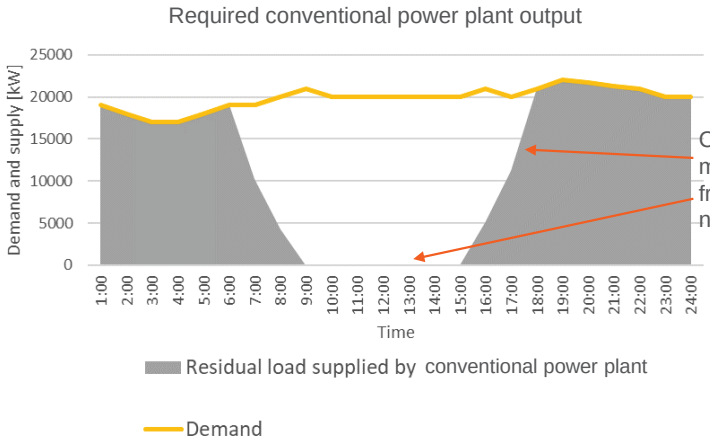
Self-consumption rooftop PV is limited to 2,600MW by 2030 in PDP8**.

BESS*: battery energy storage system
PDP8** : Vietnam's eighth national power development plan

source: created by author



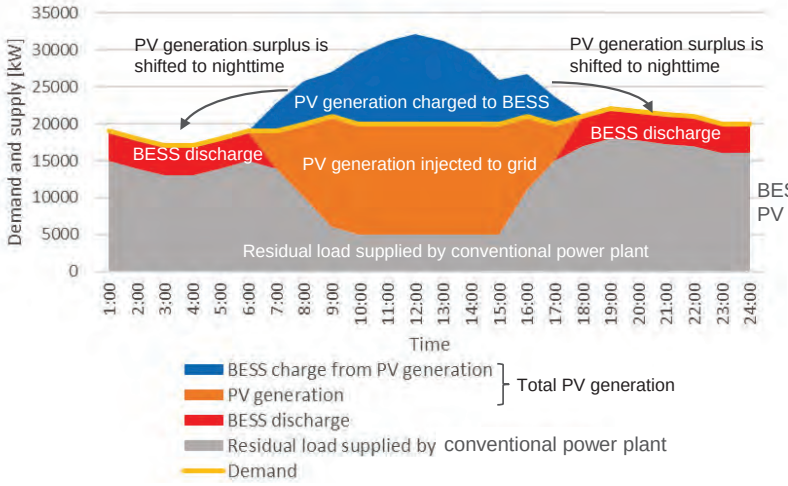

## Daily dispatch in high PV penetration level without BESS




Conventional power plant output must be changed very fast and frequent startup/shutdown is necessary.

source: created by author

## Daily dispatch in high PV penetration level with BESS

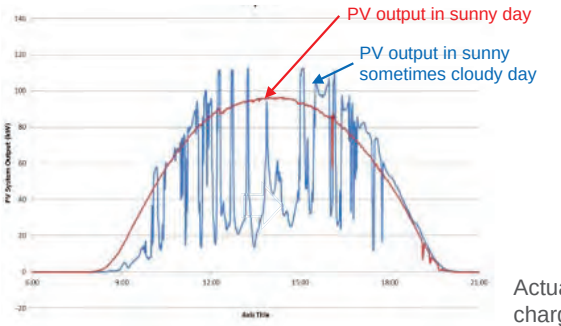


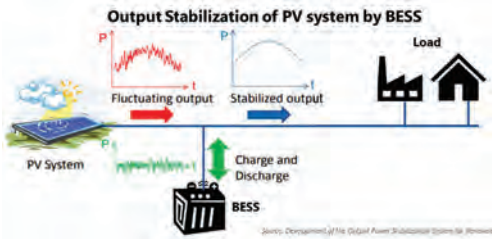

BESS has a possibility to mitigate PV installation capacity limit.

source: created by author




## Actual PV generation output fluctuation



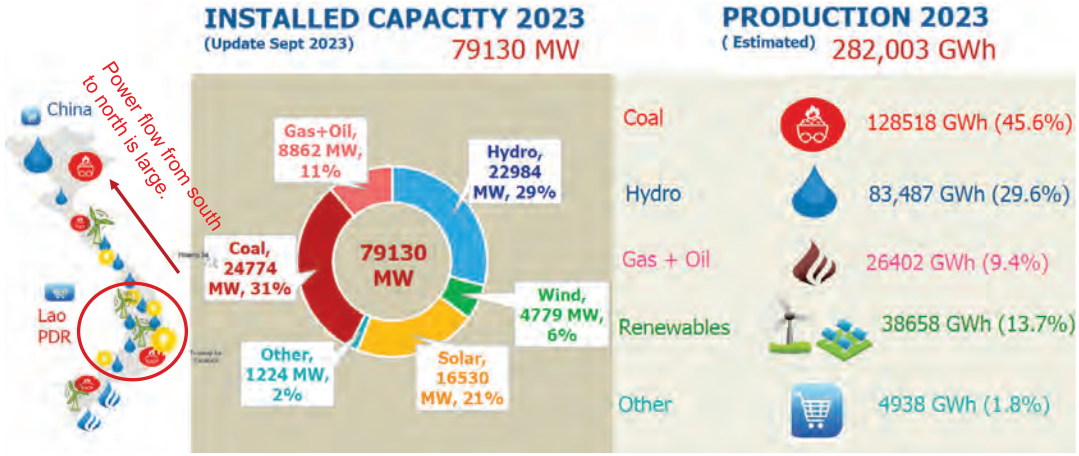

Actual required speed change of BESS charge and discharge is very fast!




# 3. Grid congestion in high VRE penetration



## Power generation in Vietnam



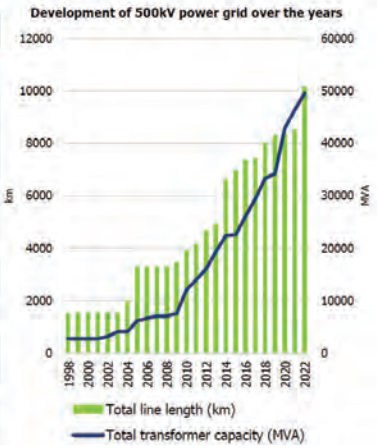

Large scale PV site is concentrated in southern Vietnam.

source: NLDC “Overview of the Vietnam power system and recommendation on BESS installing”, Sep. 2023

PowerPoint Presentation (vepg.vn)

## Power grid in Vietnam

| | 500 kV | 220 kV |
|---|---|---|
| Line | 10152 km | 19567 km |
| Shunt reactor | 7330.4 MVAr | 25 MVAr |
| Series capacitor | 19/21.5/3 0.5 Ohm 2000 A | - |
| Shunt capacitor | - | - |
| SVC | - | - |
| Substation | 49500 MVA | 72848 MVA |
| Transformer | 450/600/900 MVA | 63/125/250 MVA |




500kV transmission line enforcement is proceeding.

source: NLDC “Overview of the Vietnam power system and recommendation on BESS installing”, Sep. 2023





NIPPON KOEI ENERGY SOLUTIONS

# Introduction of Hydrogen Energy in Vietnam

**Dr. Pham Hung Cuong**

**President: VINA HYDROGEN Co. Ltd.**

Ba Ria Vung Tau, 25th July 2024



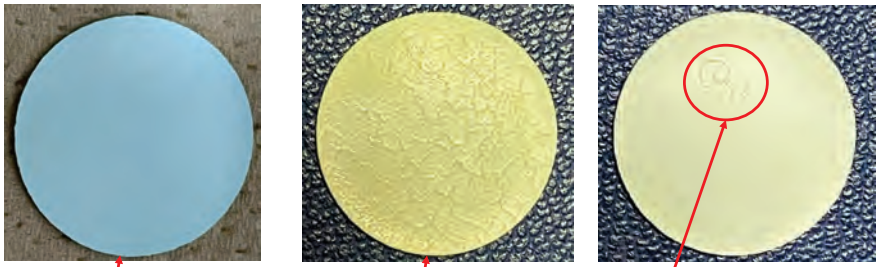
## Business of VINA HYDROGEN:

- ❖ VINA HYDROGEN was established on May 25th, 2022 in Hanoi, Vietnam.
- ❖ We have provided consulting services for business areas, such as businesses related to Waste to Hydrogen and Renewable Energy to Hydrogen
- ❖ VINA HYDROGEN provides advice to governments and businesses on the Hydrogen field. We have supported customers to work with the local and central Vietnamese government.
- ❖ We are also making software for the Hydrogen field using AI generative:
- ❑ Making AI software to detect the failure products of Hydrogen materials.
- ❑ Making AI software combined with a Drone to inspect hidden corners, heights, and locations of Hydrogen pipelines or related to Hydrogen Production (from Wind turbines or solar panels)



## Making AI software to detect the failure products of Hydrogen materials

**Hydrogen materials for Hydrogen Production**



Good

Error: Many cracks

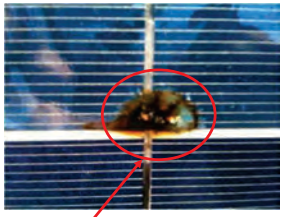
Abnomality



## Making AI software combined with a Drone to inspect hidden corners, and locations of Hydrogen pipelines or related to Hydrogen Production (from Wind turbines or solar panels)

Abnomality

Abnomality

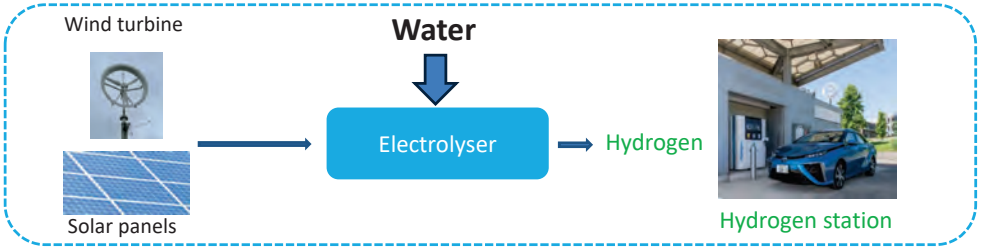


Solar pannels

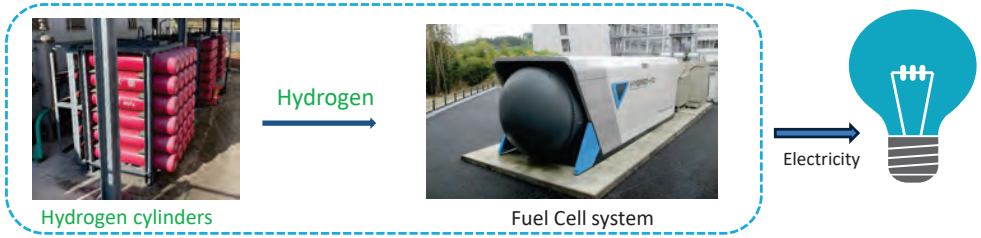
Abnomality

## Green Hydrogen

### 1. Power to Hydrogen




### 2. Hydrogen to Power






## Overview policies and support for hydrogen utilization/production in Viet Nam

**1. Hydrogen energy production**

**1.1. Period up to 2030**

- Deploying and applying advanced technology in the world in green hydrogen energy production in Vietnam.

- Deploy and apply world-class advanced technology in carbon capture/use (CCS/CCUS) associated with hydrogen energy production from other energy sources (such as coal, oil and gas, etc.).

- Strive for hydrogen production capacity from renewable energy and other carbon capture processes to reach about 100 - 500 thousand tons/year by 2030.

**1.2. Orientation to 2050**

- Strive for hydrogen production capacity from renewable energy and other carbon capture processes to reach about 10 - 20 million tons/year by 2050.

Source: National Hydrogen Strategy in Vietnam





**2. Using hydrogen energy**

**2.1 Period up to 2030**

- Gradually develop the hydrogen energy market following and in sync with the fuel conversion roadmap in energy-using sectors of the economy, including electricity production, transportation, industrial, etc.

- Deploy and test application of hydrogen-derived energy in several fields with the ability to take advantage of existing infrastructure under the ability to ensure system safety and reasonable price, specifically:

Electricity production + Transportation + Industry

**2.2 Orientation to 2050**

- Promote the application of green hydrogen energy and hydrogen-derived fuels in all energy-using sectors to decarbonize the economy and contribute to achieving zero stream emissions in 2050, which:

Electricity production + Transportation + Industry

- Form and develop a market for hydrogen-derived energy

- Strive for the proportion of hydrogen energy and hydrogen-derived fuel to reach about 10% of final energy consumption demand.

Source: National Hydrogen Strategy in Vietnam





**3. Storing, Transporting, and Distributing Hydrogen Energy**

**3.1 Period up to 2030**

- Research and pilot implementation of existing energy industry infrastructure to store, transport, and distribute hydrogen energy following the system's ability to ensure safety and reasonable prices.

- Research and pilot construction of specialized equipment production centers/facilities serving hydrogen energy transportation, storage, and distribution.

- Research and pilot the construction of hydrogen energy distribution systems for the transportation sector on roads and areas with favorable conditions.

**3.2 Orientation to 2050**

- Develop and perfect the infrastructure system for storing, distributing, and using hydrogen with a market scale of 10 - 20 million tons/year.

- Deploy and expand hydrogen distribution systems for the transportation sector nationwide under the general world trend.

Source: National Hydrogen Strategy in Vietnam

**4 Regarding Hydrogen Energy Export**

**4.1 Period up to 2030**

Take advantage of abundant natural resources of renewable energy (wind, solar, etc.) and geographical location advantages, and encourage investment in green hydrogen energy production for export to ensure energy security, national defense, security, and economic efficiency.

**4.2 Orientation to 2050**

Forming a comprehensive energy industry ecosystem based on renewable energy, new energy, and green hydrogen energy, aiming to become a clean energy industrial center and export of renewable energy and hydrogen energy green of the area.

Source: National Hydrogen Strategy in Vietnam





## Opportunities, challenges and future directions in Hydrogen Energy in Vietnam

**Solar irradiation in north Vietnam: Normal**


**Wind energy in Hai Phong: Average**

**Solar irradiation in south Vietnam: Good**

**Wind energy in Binh Thuan, Ninh Thuan: Good**



### Green Hydrogen Production Plant Project in Duyen Hai, Tra vinh (under construction)

- Construction of this project, in which The Green Solutions is investing, began 30/3 in Duyen Hai, Tra vinh.
- The plant will have an annual production capacity of 24,000 tons of hydrogen and 195,000 tons oxygen for medical use.
- The total investment for the project is approximately VND 8 trillion (equivalent to US$300 million).
- Investor: TGS TRÀ VINH GREEN HYDROGEN Company


Source: https://moit.gov.vn/phat-trien-ben-vung/khoi-cong-xay-dung-nha-may-san-xuat-hydro-xanh-tra-vinh.html



**Thank you so much for your kind attention**

NIPPON KOEI

# JCM (Joint Crediting Mechanism) subsidy program for installing renewable energy/energy saving facilities

Workshop towards Carbon Neutral on 2050 under cooperation between Ba Ria – Vung Tau province and Sakai city

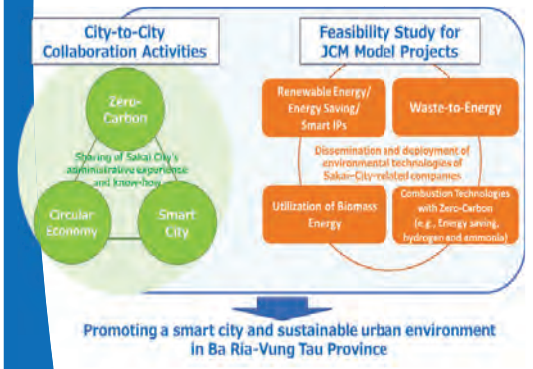
Session 2: Workshop session for disseminating zero/low carbon technologies under cooperation between Ba Ria – Vung Tau province and Sakai city

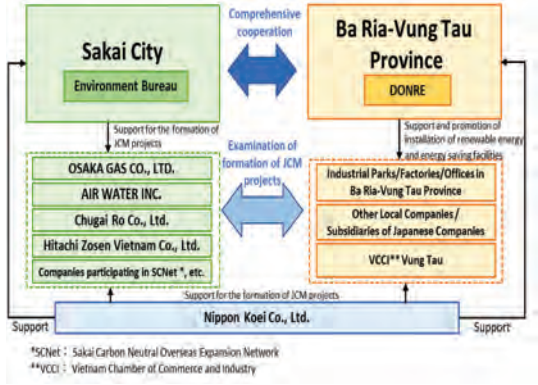
July 2024

## Promotion of Zero-Carbon Smart City through City-to-City Collaboration between Ba Ria-Vung Tau Province and Sakai City

NIPPON KOEI

Based on the Memorandum of Understanding (MOU) related Zero-Carbon city among both province/city in Dec 2023, we aim to study and develop decarbonization projects in Ba Ria – Vung Tau province.



## What is JCM(Joint Crediting Mechanism) ? - Outline-

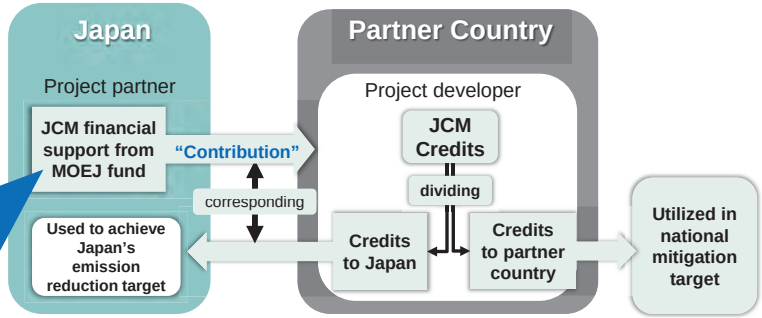
NIPPON KOEI

**Incentive: Support of initial investment cost up to 30 - 50% from Government of Japan**

- Facilitating diffusion of leading low/zero carbon technologies and contributing to sustainable development of developing countries.
- Appropriately evaluating contributions to GHG emission reductions and use them to achieve emission reduction target of Japan and partner country.
- In Vietnam, the JCM procedure is specified and should follow Circular 17/2015/TT-BTNMT (under amendment) issued by MONRE based on the agreement between Vietnamese government and Japanese government.

**Total budget: approx. JPY 12.8 bill. (VND 2.1 trill. ) for 3 years from FY2024**

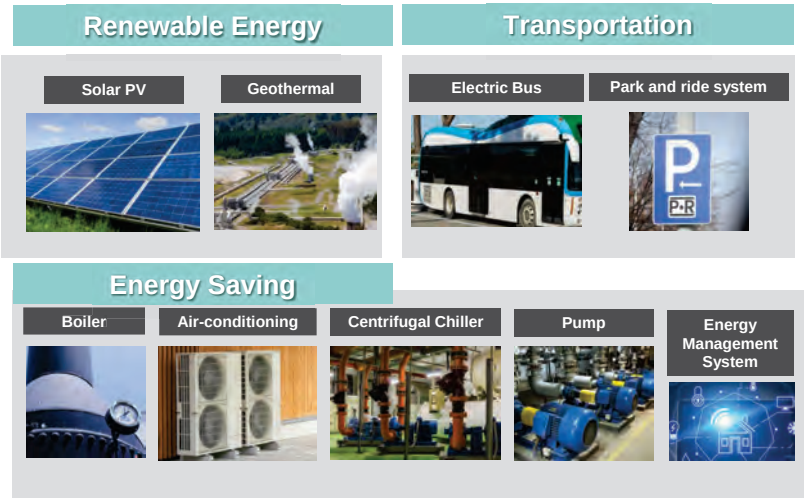
**JPY 200 mil. (VND 32 bill.) for three years for one model project**



## Applicable technologies (sample)

NIPPON KOEI



## Conditions of JCM Model Projects

NIPPON KOEI

**Maximum Percentage of Financial Support**

| Number of already selected project(s) in Vietnam | 0 | 1 – 3 | 4 – 7 | 8 – 9 | More than 10 |
|---|---|---|---|---|---|
| Percentage of financial support | **Up to 50%** | **Up to 40%** | **Up to 30%** | **Up to 20%** | Not applicable |

**Cost-effectiveness** **4,000 JPY (approx. 650, 000 VND )/tCO2eq or lower**

Note) Depending on conditions such as type of technology and number of similar technological projects in a partner country

**Cost-effectiveness for GHG emission reductions [JPY/ tCO2eq]**

**= Amount of financial support [JPY]) / Total emission reductions of GHGs [tCO2eq]**

* Total emission reductions [tCO2eq] = GHG emission reductions per year [tCO2eq/y] × legal durable years of the facilities/equipment as stipulated in the Japanese law [y]

* Amount of financial support [JPY]= Costs Covered by Financial Support [%]× Percentage of financial support [%]

**Costs Covered by Financial Support**

- ✓ Cost of facilities/equipment (including monitoring equipment)
- ✓ Cost of main construction work (excluding civil engineering work)
- ✓ Cost of ancillary work
- ✓ Cost of machinery and instrument
- ✓ Cost of survey and testing
- ✓ Cost of administrative work, etc.




## Selected JCM Model Projects in Vietnam

NIPPON KOEI

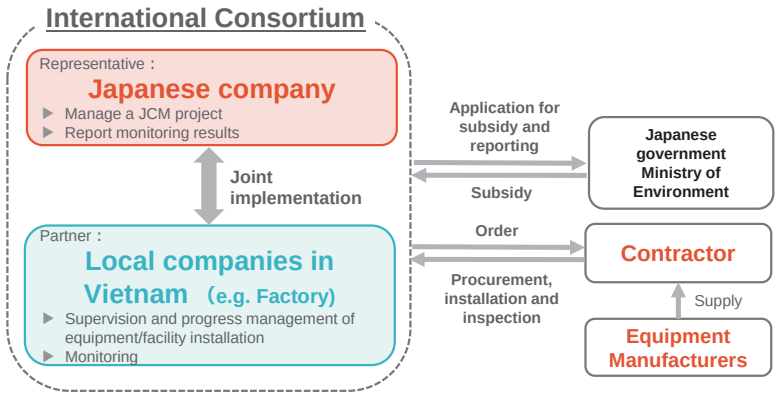
| Sector (JCM Model Projects) | Number of Projects (2013 – 2024) |
|---|---|
| Energy Efficiency | 20 |
| Renewable Energy | 25 |
| Transport | 2 |
| Waste Handling and Disposal | 1 |
| F-gas (Fluorinated gas) Recovery and Destruction | 2 |
| **Total** | **50** |


Source: https://gec.jp/jcm/projects/




## Implementation Structure of JCM Model Project

NIPPON KOEI



# Introduction of our energy solutions aiming for carbon neutrality

July 25th, 2024

OSAKA GAS CO., LTD.
ASIA ENERGY BUSINESS DEPT,
ENERGY RESOUCES AND INTERNATIONAL BUSINESS UNIT
Shunya Nozaki

## 1. About Daigas group (Osaka Gas)



## Outline of Daigas group

**Upstream investment**


**Upstream investment in 5countries**

- Acquired 100% of the outstanding shares of Sabine Oil & Gas Corporation in July 2019
- First time that a Japanese company purchases a U.S. based shale gas developer

**LNG transportation**

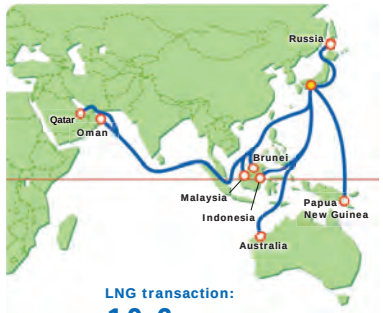
**8 vessels Our own group carriers**

**LNG receiving terminals**

**2 locations Number of LNG terminals**

- Apoximately 50 years of operational experience

**LNG procurement**




**LNG transaction: 10.6 million tons**

**Gas transmission and distribution***

**Approx. 63,600km**

Equivalent to 1.5 times the circumference of the globe
Total length of pipeline extensions

*operated by
OSAKA GAS NETWORK CO.,LTD

**Gas marketing**


Residential Fuel Cell

**Approx. 5.0 million customers**

Number of gas supply customers

- Residential cogeneration systems(engines, fuel cells)

**Power business**

**Approx. 4.8GW**

Power sources owned by the group

- Power plants in 5 countries
- Approx. 1.7 million electricty supply customers in Japan
- Approx. 3.9 GW owned by Daigas Group in Japan



## Our target for Carbon Neutral

- **2050: Carbon Neutral through decarbonization of Natural Gas/Electricity realized by innovation, and provision of solutions to achieve sustainable society.**
- **FY2030: As a milestone, aggressive target for $CO_2$ reduction with extension of our strong capability. (Energy saving, Advanced utilization of Natural Gas, Renewables)**

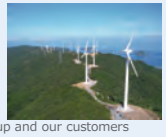
**I** Striving to become carbon neutral in our group business through innovation

**2050**
Carbon Neutral

**II** Contributing to the reduction of $CO_2$ emissions throughout society

**FY2030**

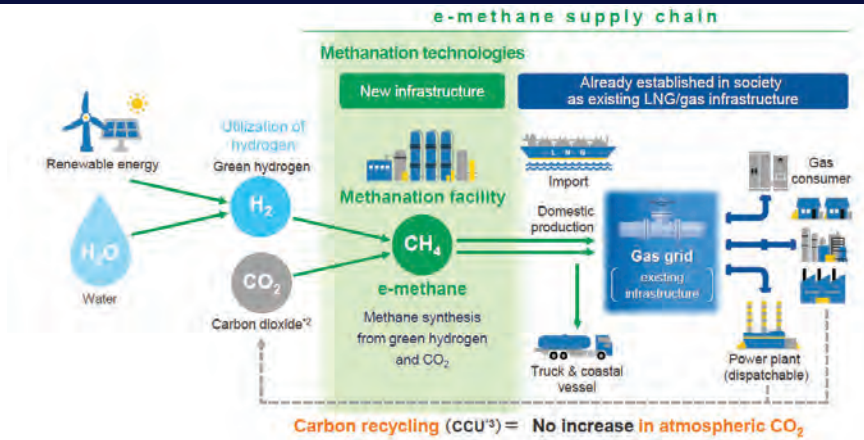
- 5 GW of renewables development contribution on a global basis
- Nearly 50% of our power portfolio in Japan consisting of renewables*1
- 10 million tons/year*2 of CO2 emissions reduction contribution



*1 Including power sources applicable to the feed-in tariff (FIT) system such as solar, wind, and biomass
*2 Equivalent to approximately one-third of the current CO2 emissions (approximately 33 million tons/year) of our group and our customers

## e-methane: key carbon neutral energy carrier

- e-methane is a carbon neutral hydrogen carrier*1 synthesized through methanation using $CO_2$ captured from emissions.
- Working on Phased transition to minimize the social costs for energy conversion, especially in the thermal energy field.




*1 Hydrogen compounds that achieve efficient storage, transport, and utilization of hydrogen, which cannot be stored and transported over long distances efficiently in its gaseous state
*2 Biogenic $CO_2$ and possibly DAC(Direct Air Capture) might be utilized in the future.
*3 Carbon dioxide Capture and Utilization



## $CO_2$ emissions reduction with natural gas utilization

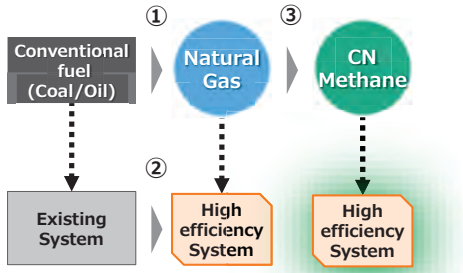
- Practical and sustainable steps to energy transition are essential in Asia.
- Reducing emissions with energy-saving technologies besides fuel conversion.
- Seamless transition by using natural gas/e-methane in existing equipment as is.

### Three steps for energy transition for CN

①**Fuel conversion**
Switching from conventional fuel (coal, fuel oil, diesel oil, etc.) to Natural Gas can drastically reduce carbon emissions.

②**Installing High-efficiency System**
Converting to natural gas can open the door to select highly efficient systems and replacing the existing system can significantly reduce energy consumption.

③**Switching to Carbon Neutral Methane**
In the future, there might be an option to switch the Natural Gas to Carbon Neutral Methane for further carbon reduction.





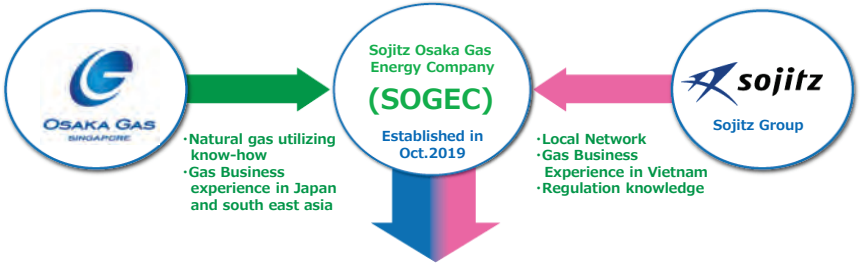

## 2. Our businesses in Vietnam



## SOJITZ OSAKA GAS ENERGY COMPANY (SOGEC)

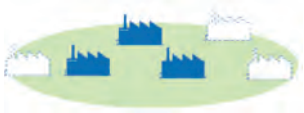
### Natural gas retail business with energy savings

SOGEC sales natural gas to industrial customers by pipeline in Phu My 3 specialized industrial park and by CNG in other area




Gas supply station

Phu My 3 S.I.P.
(Pipeline supply)



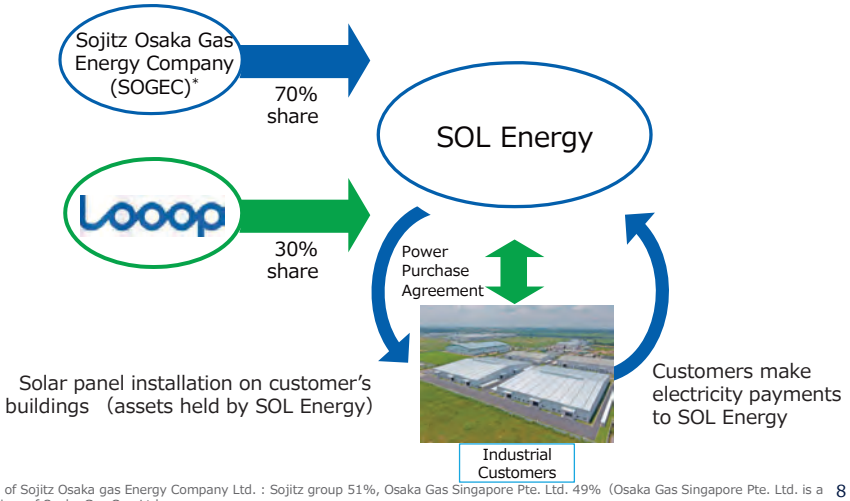
Individual industrial customers
(CNG supply)

# SOL Energy Company Limited（SOL）

## Solar power business

**Recent activity**

SOL Energy plans to install rooftop solar panel that can provide over 10MW of solar power to customers at the Sojitz-operated Long Duc Industrial park in Southern Vietnam's Dong Nai province




*Equity ownership of Sojitz Osaka gas Energy Company Ltd. : Sojitz group 51%, Osaka Gas Singapore Pte. Ltd. 49% (Osaka Gas Singapore Pte. Ltd. is a fully owned subsidiary of Osaka Gas Co., Ltd.



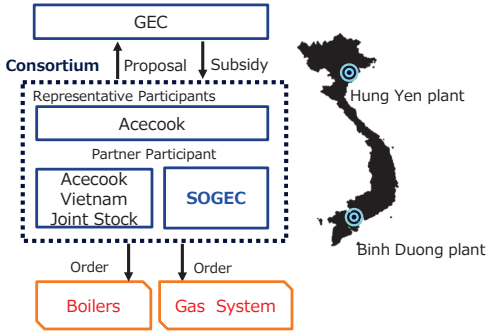
# Introduction of High Efficiency Boiler System to Food Factory

**➢ This project reduces energy consumption by the boiler operations and contributes to greenhouse gas (GHG) emissions reductions in Vietnamese industry sector**

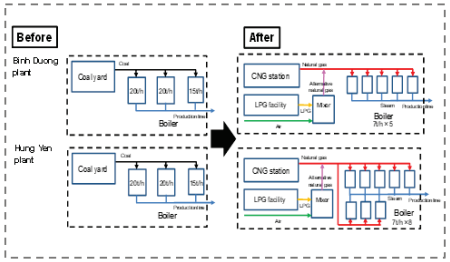
## Outline of GHG Mitigation Activity

- This project replaces existing coal boilers at the Binh Duong plant and Hung Yen plant operated by Acecook Co., Ltd. with high-efficiency once-through boilers and also converts fuel from coal to CNG and LPG. The boiler system flexibly responds to fuel market trends and reduces greenhouse gas (GHG) emissions.

## Outline of the project




## System




Expected GHG Emission Reductions
**7,631 tCO2-eq./year**



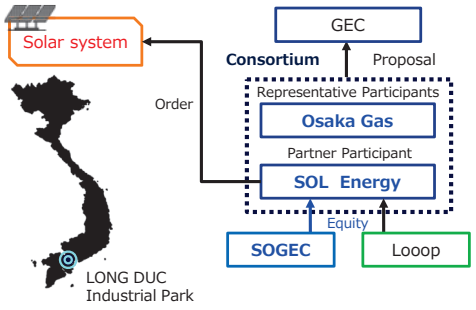
# Introduction of 9.8 MW Rooftop Solar Power System in Industrial Park

**➢ This project contributes to the Power Development Plan 8 which plans to expand with spread of renewable energy in Vietnam.**

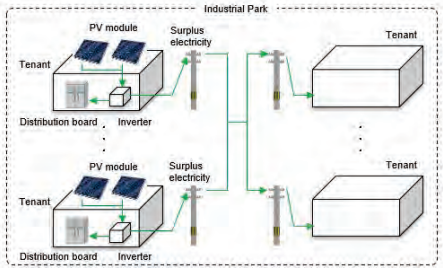
## Outline of GHG Mitigation Activity

- 9.8 MW solar power system is introduced on the rooftops of 8 tenants in Long Duc Industrial Park (LDIP) in Dong Nai province. The generated electricity is self-consumed by each tenant and surplus electricity is supplied to the LDIP management. The generated electricity is fully utilized, which reduces GHG emission.

## Outline of the project




## System




Expected GHG Emission Reductions
**4,312 tCO2-eq./year**



# Thank you

# *Decarbonization Solutions*

Meeting society's needs with nature's blessings.
AIR WATER

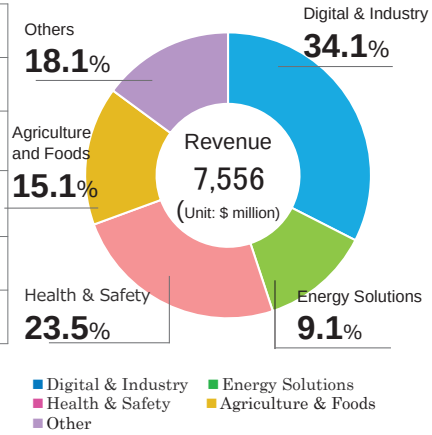
25,7,2024



## 1 . Company Overview



| | |
|---|---|
| Established | 1929 |
| Head Quarter | Osaka, Japan |
| Number of Group Companies | 276 Companies |
| Number of Employees | 20,109 |
| Revenue | $ 7,556 Million (Consolidated) |
| Operating Profit | $ 468 Million (Consolidated) |




As of March 31, 2023, Exchange rate : JPY 133/ US$



## 2. Our 4 Business Groups



Turning social issues into business opportunities: creating synergies by integrating across different business groups

| Growth Axis | Business Group | Basic Policy | Social Issues & Megatrend to face |
|---|---|---|---|
| Global environment | Digital & Industry | **Contribute to rapidly growing digital sector**<br>• Integrate semiconductor-related gases and chemicals<br>• Overseas business expansion in growing India | ■ Smart society / DX progress<br>■ Digital technology innovation |
| | Energy Solutions | **Contribute to Decarbonized and Sound Material-Cycle Society**<br>• Integrate solutions for energy and environmental sectors<br>• Incubate new business model related to resource recycling and clean energy | ■ **Hydrogen**<br>■ **Decarbonization**<br>■ Clean Energy<br>■ Recycling<br>■ Environmental regulations |
| Wellness (Healthy life) | Health & Safety | **Contribute to the health, safety and security of people**<br>• Shift to healthcare (rehabilitation/health) area<br>• Create new value to secure human life and property | ■ Super aging society<br>■ Improve hygiene awareness<br>■ Natural disasters / BCP reinforcement<br>■ Focus on well-being |
| | Agriculture & Foods | **Contribute to the advancement of local agriculture & improve food satisfaction**<br>• Improve smart agriculture technology & create a new business model based on logistics and processing functions<br>• Strengthen branding and develop functional foods | ■ Population explosion / Food shortage<br>■ Guaranteed food safety<br>■ Reduce food loss & waste |

We, the Green Innovation Development Center belong to the Energy Solutions Group.
We engage in various development of clean energy systems for the Global Environment.



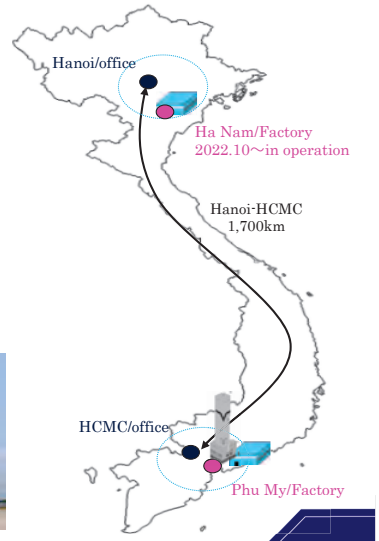
## 3. AIR WATER VIETNAM CO., LTD.



- HCMC Office： 5 F, Miss Ao Dai Building, 21 Nguyen Trung Ngan St, Ben Nghe Ward, Dist 1, HCMC
- HANOI Office：13F, TTC Tower, No.19 Duy Tan St, Dich Vong Hau Ward, Cau Giay District, Hanoi
- Employees：61
- Business scope：
  Production and Supply of industrial Gas, medical gas

Ha Nam Factory

Phu My Factory



## 4. Methane fermentation system

Meeting society's needs with nature's blessings. AIR WATER

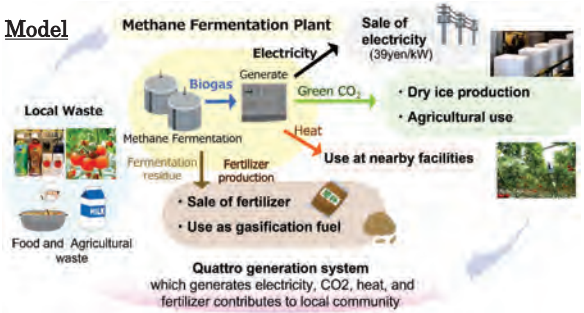
**Methane fermentation system** can turn agricultural and food waste into energy as biogas. Based on the knowledge from the demonstration plant, our first commercial plant is under construction.

**Demonstration plant**

| | |
|---|---|
| Throughput | 1 ton/day |
| Type of material | Coffee, tea waste |
| Biogas yield | 120Nm3/day |

Junior high school students visit

**Model**




**【Feasibility Study of food waste from wholesale Market in HCMC】**

We studied with Hitachi-zosen(Hitz) in 2016

From this study we recognized the potential demand for local energy production and consumption from renewable sources.

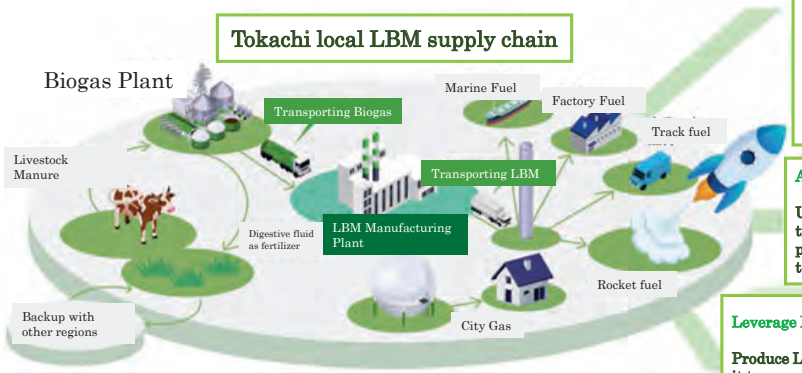



## 5. Liquefied Biomethane (LBM) Supply chain

Meeting society's needs with nature's blessings. AIR WATER

We aim to "decarbonize existing natural gas supply chain" by collecting and transporting unused biogas, processing it into liquefied biomethane (LBM), which is an alternative to LNG, and supplying it to consumers.

**Tokachi local LBM supply chain**




**Ideas**

We want to use biogas derived from livestock manure.
We want to introduce decarbonized energy with dairy farmers

**Applying gas-related technologies**

Utilizing know-how in gas repair and transportation, gas separation and purification technologies, and technologies related to stable supply

**Leverage LNG sales infrastructure**

Produce LBM as CO2-free fuel and supply it to users who promote decarbonization as an alternative to LNG

◆ **Ministry of the Environment, "Development and demonstration of regional co-creation and cross-sector carbon neutral technologies"**

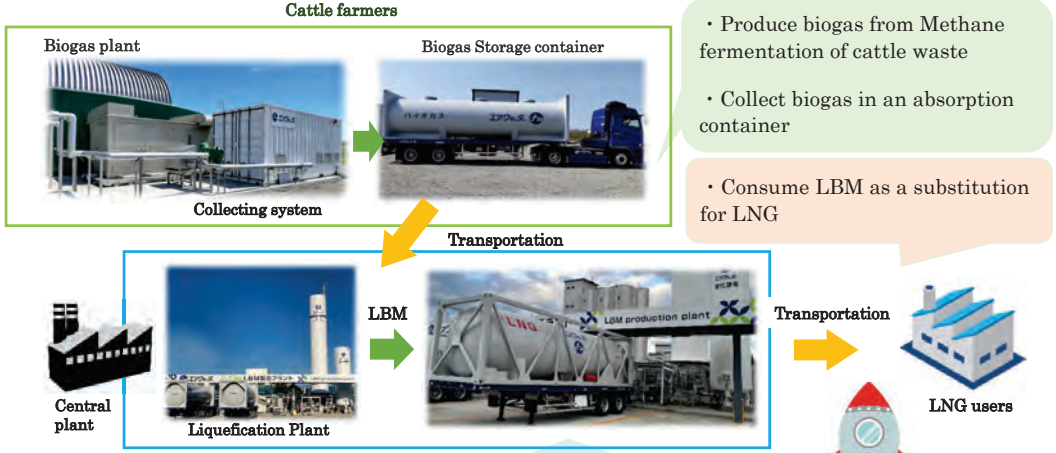
・Implementation system: Representative businesses AIR WATER INC.
・Development business term: 2021-2023 (2 years + 1 year extension)

・Development element:
①Biogas storage special container
②LBM production system of methane-pure 4N
③Demonstration of LBM Quality by Users



## 5. Liquefied Biomethane (LBM) Supply chain

Meeting society's needs with nature's blessings. AIR WATER




・Produce biogas from Methane fermentation of cattle waste

・Collect biogas in an absorption container

・Consume LBM as a substitution for LNG

・Extract Biogas from absorption container
・Remove $H_2O$ and $CO_2$ to purify $CH_4$ over 99.99%
・Liquefy Bio-Methane
・Fill LBM in containers



## 6. Biomethane Local Supply chain in India (Feasibility Study)

Meeting society's needs with nature's blessings. AIR WATER

**In India, They have a target of achieving energy self-sufficiency by the country's 100th Independence Day in 2047. Given the thriving agricultural sector, the use of biomass energy is being promoted.**

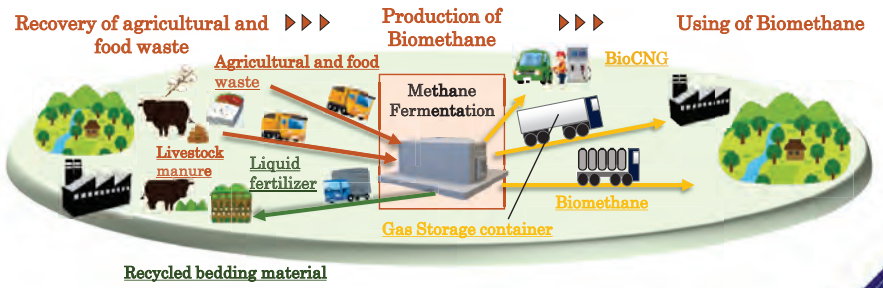
・Biomass potential
・Environmentally conscious policies

×

Meeting society's needs with nature's blessings. AIR WATER

・Methane fermentation
・Gas purify technology
・Business Experience in India

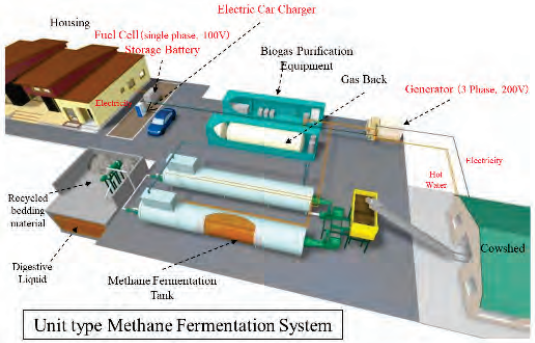
**Concept: Biomethan Local Supply Chain in India**



# 7. Unit type fermentation system

Meeting society's needs with nature's blessings. AIR WATER

## Unit type fermentation system




Unit type Methane Fermentation System

Fermentation Tank

Point

- Easy to move
- Low Construction period
- Reasonable

Unused resouce

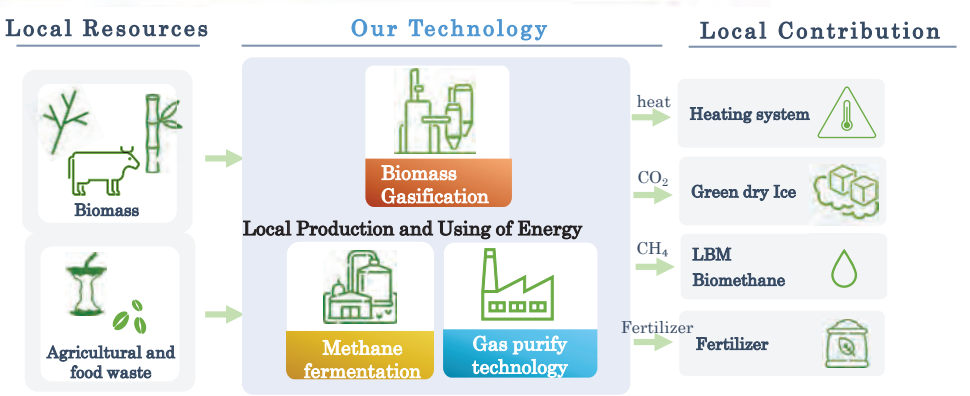
Renewable Energy

**Aim: Expanding to all over the world**



# Conclusion

Meeting society's needs with nature's blessings. AIR WATER




We promote to spread Biomethane(BM) as new sustainable energy.
Should you have any problem with agricultural and/or food residues, please contact Air Water for assistance.

Contact: Air Water Viet Nam Co., LTD.

# Decarbonizing Technology for Industrial Furnace

ZERO EMISSIONS CHALLENGE

July 25,2024

Product Deveropment Dept.
Chugai Ro Co., Ltd.





## Index







## 1. Corporate profile

| Title | Details |
|---|---|
| Country | Japan |
| Company name | CHUGAI RO CO.,LTD. |
| Head office | Osaka, Japan |
| Incorporated | April, 1945 |
| Capital | JP ¥6,176.72 million |
| Number or employees | Total 450 |
| Branches, Laboratories, Factories | -Sakai Works (Osaka)<br>-Tokyo branch<br>-Nagoya sales office (Aichi)<br>-Kokua factory (Fukuoka) |

Our aim is to be a technology company which is focused on next-generation thermal technology that will build a prosperous future for both humanity and the earth.



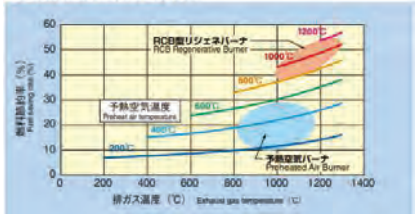



## 2. CO2 emission reduction burner system

### FEATURES

- Available Heat : 85% or over
- Ultra-low NOx technology adopted
- Regenerator models in a flexible variety of styles
- Temperature efficiency：80% or over
- Available to a variety of fuels

燃料節約率
FUEL SAVING RATE




REHEATING FURNACE
実施例：加熱炉

ALUMINUM MELTING FURNACE
実施例：アルミ溶解炉

HIGH SPEED SELF-REGENERATIVE BURNER
（特長：省スペース、コンパクト）

FORGING FURNACE
実施例：鍛造炉

## 3. Hydrogen burner system

### FEATURES

- **Zero CO2 Emission**
  Since hydrogen does not contain carbon, it does not emit carbon dioxide.
- **Low NOx Emission**
  Low NOx performance is achieved by lowering the flame temperature with our unique combustion technology.
- **High level of Safety**
  It has a burner structure in which fuel is ejected from a nozzle and then mixed with air. Since air and fuel are supplied separately, flashback is unlikely to occur combustion and it is possible to burn safely.

$H_2$-HSGB hydrogen burner
用途：窯業用、金属過熱、熱処理炉等

SINGLE-END TYPE
RADIANT TUBE HYDROGEN BURNER
用途：浸炭炉

W-TYPE
RADIANT TUBE HYDROGEN BURNER
用途：浸炭炉

HYDROGEN BURNER FOR
PAINT DRYING OF AUTOMOBILE BODY
用途：塗装乾燥炉

PACKAGE TYPE
HYDROGEN BURNER
用途：小型ボイラ

For example,
if multiple burners are installed, it is possible to use only one hydrogen burner.





## 4. Ammonia burner fundamental study

- Type of Fuel : Ammonia (without auxiliary fuel)
- Type of Air : Normal Air (without oxygen enrichment)
- Type of Ignition : Direct Ignition with Spark Plug at Room Temperature
- Furnace Temperature : Up to 1200℃
- NOx Emission : Same as Natural Gas combustion

実験用バーナ
出典：中外炉サーモテックニュース Vol.08

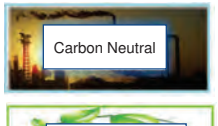




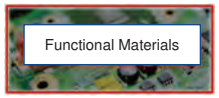
## 5. Thermal Technology Creative Center

Revitalizing innovation through “co-creation” inside and outside the company

Thermal Technology Creative Center





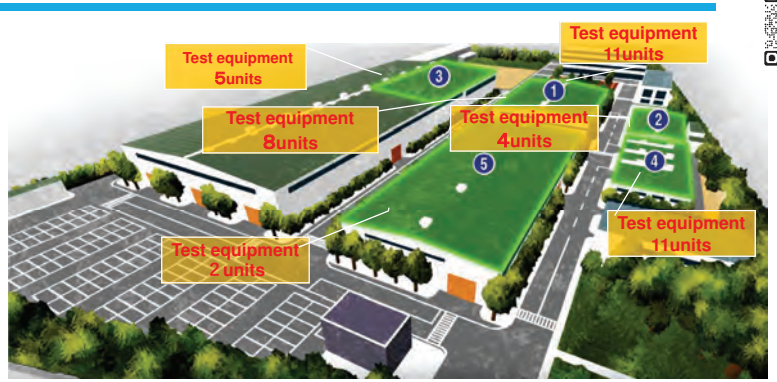



Co-creation Space





## 5. Thermal Technology Creative Center




**①Thermal Technology Creative Center**
（H2/NH3 Combustion, Furnaces for Solid Electrolytes ）

**②Zero emission Laboratory**
（ resource recycling process applications）

**③Vacuum carburizing Laboratory**
（Vacuum Carburizing Furnaces etc.）

**④Metal Heat treatment Laboratory**
（Gas Carburizing Furnace, Nitriding Furnace etc.）

**⑤Converting Technology Laboratory**
（Wefer Coating Equipment ：RS COATER™ etc.）

**41 test equipment**

Hitachi Zosen Corporation

# Hitachi Zosen Corporation's Circular Economy Models for treating wastes

1. Sustainable Waste Management
2. Renewable gas technologies driving the Circular Economy




## Introduction of HITACHI ZOSEN CORPORATION

| | |
|---|---|
| Company's Name | HITACHI ZOSEN CORPORATION |
| Founded | 1881<br>by Edward Hazlett Hunter (from UK) |
| Incorporated | 1934 |
| Headquarters | Osaka and Tokyo |
| Stock market | Listed on Tokyo Stock Exchange |
| Offices | 154 (124 consolidated subsidiaries and 30 affiliates). |
| Employees | 11,400 (consolidated) |
| Paid-in Capital | 45.44 billion yen<br>(≒ US$ 318 million) |
| Net Sales | 492.6 billion yen<br>(≒ US$ 3,45 million) |
| Net Income | 15.5 billion yen<br>(≒ US$ 108.5 million) |

(As of 31/03/2023) 1 JPY = US$ 0.007


**Sales Structure by Business Segment**




## Introduction of HITACHI ZOSEN CORPORATION


**Major Overseas Offices & Subsidiaries**

| HITACHI ZOSEN VIETNAM | |
|---|---|
| Establishment | 2004 |
| Office | Ho Chi Minh city (Headquarter), Hanoi (Branch) |
| Employees | 100 |
| Business field | • Detailed engineering for Plant (CAD 2D drawing & 3D model)<br>• Procurement<br>• O&M business<br>• Business supports |



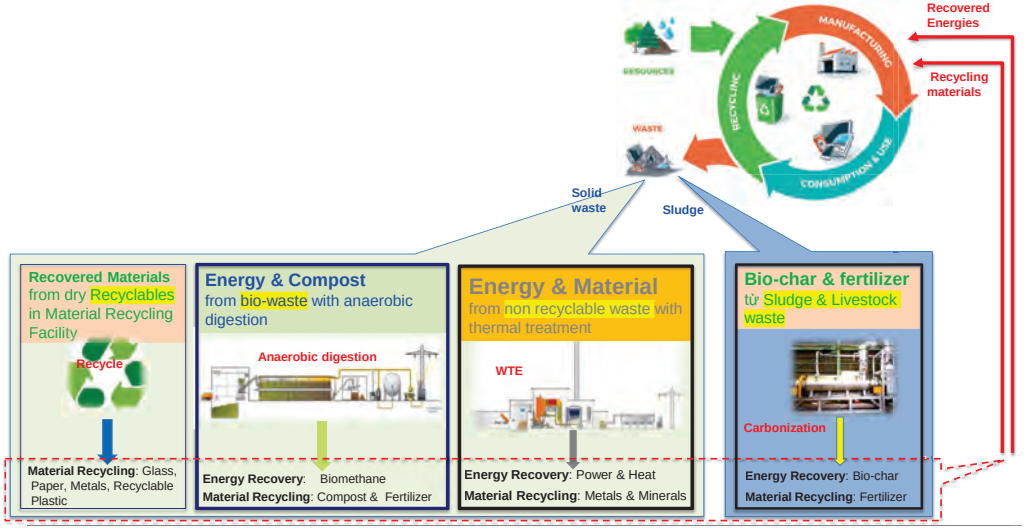

Hitachi Zosen Corporation

# MÔ HÌNH 1 / Model 1

## Quản lý chất thải bền vững

Sustainable Waste Management

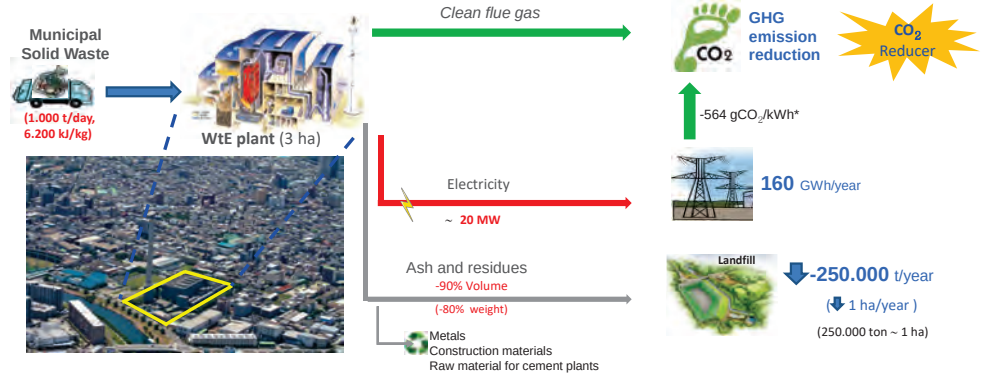
## MODEL 1 : Sustainable Waste Management







## MODEL 1: Sustainable Waste Management - (1) Waste – to – Energy




**Proven technology (Engineering):**
- Good adaptability of various wastes (pre-treatment is not required)
- Reliable operation (less trouble), Long lifespan (8000 hrs/yr x 20-25 yrs)
- High volume reduction of waste

**Environmental impact:**
- Meeting strict gas emission standards
- Low greenhouse emission ($CO_2$ reducer)
- Generating stable clean energy
- Recycling by-products
- Completely hygienic management

**Economic aspects:**
Profitable business:
- Selling electricity, Recycling material
- Carbon credits (JCM)
- Economic development


- https://www.jica.go.jp/activities/issues/climate/ku57pq00001o9grg-att/separate_table.pdf

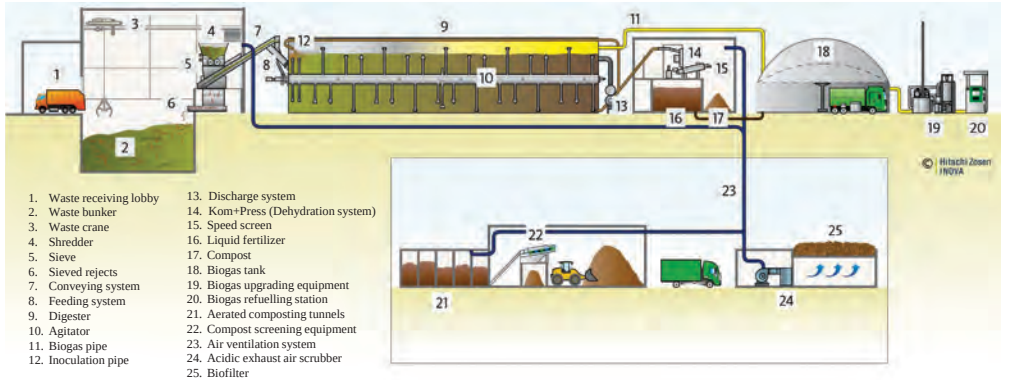


## MODEL 1: Sustainable Waste Management - (1) Waste – to – Energy





## MODEL 1: Sustainable Waste Management (2) Anaerobic Digestion with Kompogas

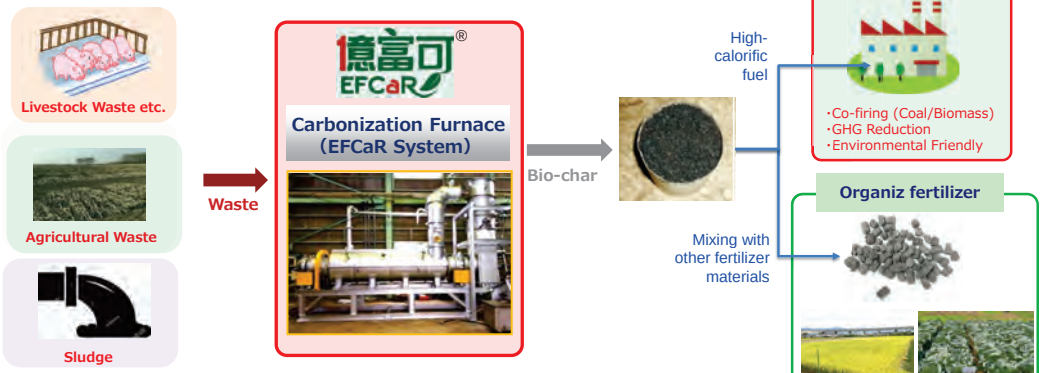


## MODEL 1: Sustainable Waste Management - (3) Carbonization

Hitz Hitachi Zosen Corporation

**E**nergy **F**ree **Ca**rbonizing for **R**esource recovery (EFCaR®)

**Carbon hóa không dùng năng lượng để phục hồi Tài nguyên**




- Continuous carbonization with uniform temperature without heat source
- Produced carbide which has high calories since making it with low temperature is applicable for mixed ingredients for fertilizer directly or utilize as an alternative fuel for coal.




Hitz Hitachi Zosen Corporation

# MÔ HÌNH 2 / Model 2

**Các công nghệ khí (năng lượng) tái tạo thúc đẩy nền Kinh tế tuần hoàn**

**Renewable gas technologies driving the Circular Economy**




## MODEL 2: Renewable gas technologies driving the Circular Economy (Gas upgrading)

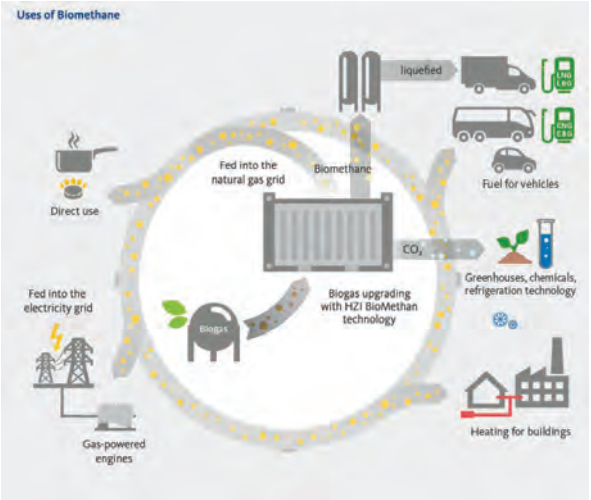
Hitz Hitachi Zosen Corporation

**Renewable gas technologies:**

**2-1. Gas upgrading**:
Raw biogas → high-purity biomethane (LNG, CNG)

### BioMethan Gas Upgrading

- This technology convert raw biogases into high-purity biomethane that can be used as a versatile energy source.
- The high-purity biomethane can be used for several purposes: (i) LNG, CNG for vehicles, (ii) daily direct use, (iii) generation of electricity, (iv) heating for building.
- A by-product of the process is carbon dioxide, which can be used to generate additional revenues in the form of gaseous, liquefied or solid carbon dioxide deployed as an industrial product gas







## MODEL 2: Renewable gas technologies driving the Circular Economy (Power-to-gas)

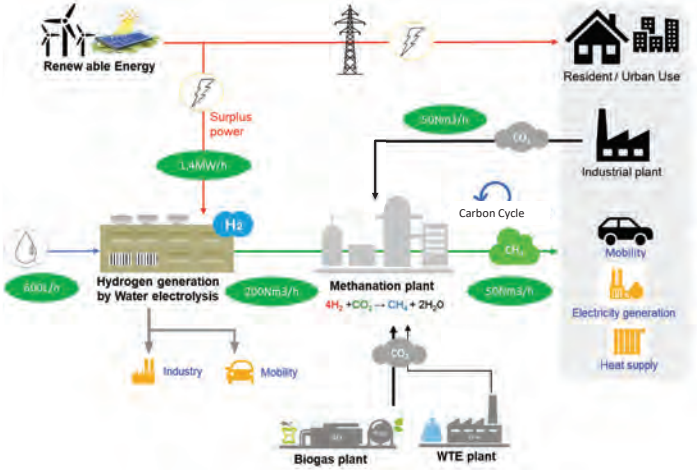
Hitz Hitachi Zosen Corporation

**Renewable gas technologies:**

**2-3. Power to gas**: conversion of electricity into storable gases such as synthetic natural gas (SNG), hydrogen, methane gas.

### Power-to-Gas

- Power-to-gas technologies are designed to make renewable energy from volatile sources of electricity storable and to decarbonise energy and industrial systems.
- Power-to-gas technology is an integral component of today's energy business and cutting-edge infrastructure.
- We provide turnkey plants that can be combined with existing EfW and biogas installations or other electricity and industrial CO2 producers, enhancing overall plant efficiency and directly boosting economic efficiency.




- *Water electrolysis: generating hydrogen (polymer electrolytic membrane (PEM)): using renewable energy*
- *Methanation: by chemical reaction between CO2 and hydrogen (Hydrogen is created from renewable energy)*

# 添付 2　第 2 回テーマ別ミーティング資料

TÍNH BÀ RỊA - VŨNG TÀU

# Solutions and actions of Ba Ria - Vung Tau Province towards the goal of carbon neutrality by 2050

## Current status and challenges in solid waste management

**Presenter: Tran Thuong Tho**
**Head of Environmental Management Department, Department of Natural Resources and Environment of Ba Ria - Vung Tau province**

Ba Ria city, October 31 , 2024

UBND TỈNH BÀ RỊA - VŨNG TÀU
SỞ TÀI NGUYÊN VÀ MÔI TRƯỜNG

TÍNH BÀ RỊA - VŨNG TÀU

# CONTENT

- **Current status on solid waste management at Ba Ria – Vung Tau province**
- **Difficulties, challenges and opportunities**

UBND TỈNH BÀ RỊA - VŨNG TÀU
SỞ TÀI NGUYÊN VÀ MÔI TRƯỜNG



TÍNH BÀ RỊA - VŨNG TÀU

1. **Provincial planning according to Decision 1629/QD-TTg dated December 16, 2023 of the Prime Minister approving the planning of Ba Ria - Vung Tau province for the period 2021-2030, with a vision to 2050**
2. **Decision No. 611/QD-TTg dated July 8, 2024 of the Prime Minister approving the National Environmental Protection Planning for the period 2021 - 2030, with a vision to 2050**
3. **Decision No. 17/2024/QD-UBND dated May 27, 2024 of the Provincial People's Committee regulating waste management in Ba Ria - Vung Tau province.**
4. **Decision No. 27/2024/QD-UBND dated September 30, 2024 of the Provincial People's Committee Approving the Decision regulating road routes, transportation time of domestic solid waste, ordinary industrial solid waste requiring treatment and hazardous waste in Ba Ria - Vung Tau province**





TÍNH BÀ RỊA - VŨNG TÀU

**Decision 1629/QD- TTg December 16, 2023 of Prime Minister on approving the Planning of Ba Ria - Vung Tau province period 2021-2030, vision to 2050**

c) Waste treatment area

- Build a modern solid waste management system, organize the classification of household waste at source; collect, reuse, recycle and thoroughly treat with advanced and appropriate technologies, quickly reduce the amount of waste that must be buried. By 2030, household solid waste, after classification, will basically be treated according to the Circular Economic models: recycling, organic fertilizer production and incineration and power generation technology.

- Building solid waste treatment plants using Waste to Energy technology in Toc Tien (Phu My Town), Dat Do 1 Industrial Park and Vung Tau City to combine with solid waste treatment plants using recycling technology, producing organic fertilizers, ensuring the treatment of all solid waste generated in the mainland of the province. For Con Dao, a solid waste treatment plant using incineration-power generation technology will be built for Con Dao.

- Arrange waste transfer stations that meet technical requirements on environmental protection according to regulations of the Ministry of Natural Resources and Environment , to store classified domestic solid waste, while waiting for transportation to the treatment site.

**Decision 1629/QD- TTg December 16, 2023 of Prime Minister on approving the Planning of Ba Ria - Vung Tau province period 2021-2030, vision to 2050**

**Forecasting the discharged and to be collected urban domestic solid waste in BRVT province**

| TT | Administrative units | Urban domestic solid waste to be discharged (ton/day) | | Urban domestic solid waste to be collected (ton/day) | |
|---|---|---|---|---|---|
| | | Năm 2025 | Năm 2030 | Năm 2020 | Năm 2030 |
| 1 | TP. Vũng Tàu | 488 | 523 | 488 | 523 |
| 2 | TP. Bà Rịa | 166 | 177 | 166 | 177 |
| 3 | TX. Phú Mỹ | 190 | 286 | 190 | 286 |
| 4 | H. Châu Đức | 203 | 275 | 183 | 275 |
| 5 | H. Long Điền | 171 | 257 | 154 | 257 |
| 6 | H. Đất Đỏ | 144 | 219 | 130 | 219 |
| 7 | H. Xuyên Mộc | 80 | 121 | 72 | 121 |
| 8 | H. Côn Đảo | 6 | 13 | 5 | 13 |
| | **Tổng** | **1.448** | **1.870** | **1.388** | **1.870** |





**Decision 1629/QD- TTg December 16, 2023 of Prime Minister on approving the Planning of Ba Ria - Vung Tau province period 2021-2030, vision to 2050**

**Domestic solid waste treatment areas till 2030**

| No. | Works | Capacity / Expected areas | Location |
|---|---|---|---|
| 1 | WtE plant at Toc Tien treatment area | 1,000 tons/day | Toc Tien waste treatment area |
| 2 | WtE plant at Vung Tau city | 1,000 tons/day | Long Son, Vung Tau |
| 3 | Domestic solid waste treatment plant at Con Dao island | 36 tons/day; expecting to increase the capacity to 66.23 tons/day | Con Dao island |
| 4 | WtE plant at Dat Do district | 600 tons/day | Dat Do 1 Industrial park |





**Decision No. 611/QD-TTg dated July 8, 2024 of the Prime Minister approving the National Environmental Protection Plan for the 2021-2030 period, with a vision to 2050**

- Technology orientation for centralized waste treatment areas at national, regional and provincial levels :

+ For domestic solid waste treatment technology: Diversify treatment technologies to minimize the amount of waste directly buried. Encourage the application of advanced and modern waste treatment and recycling technologies, combining energy recovery, the best available techniques, utilizing food waste (leftover food, vegetables, fruits, etc.) as animal feed, poultry and organic fertilizer production.

+ Continue to strengthen the co-treatment of hazardous waste, ordinary industrial solid waste and domestic solid waste ; encourage cooperation and linkage in the treatment of organic domestic solid waste for animal feed, poultry and organic fertilizer.





**Decision No. 17/2024/QD-UBND dated May 27, 2024 of the Provincial People's Committee on waste management regulations in Ba Ria - Vung Tau province. This Decision takes effect from June 10, 2024..**

This regulation stipulates the classification of domestic solid waste at source; regulates the collection, transportation and treatment of bulky waste; regulates the management of domestic solid waste; regulates the collection, transportation and treatment of medical solid waste in accordance with the conditions of Ba Ria - Vung Tau province according to the provisions of the Law on Environmental Protection dated November 17, 2020.

This regulation applies to state agencies, organizations, communities, households and individuals with activities related to domestic solid waste, bulky waste and medical waste in Ba Ria - Vung Tau province.

Domestic solid waste generated from households and individuals is classified according to the following principles:

a) Food waste; b) Solid waste that can be reused and recycled; c) Other domestic solid waste, including: Bulky solid waste , Hazardous waste , Other remaining domestic solid waste that must be treated ( shells of all kinds of nuts; pulp of all kinds, eggshells, coconut fiber, straw, rice husks from domestic activities; mats, rattan pillows, bamboo pillows; animal and poultry hair; coffee grounds of all kinds, tea grounds (tea bags), bagasse, sugarcane residue, corn cobs; household gardening waste such as leaves, roots, small branches, grass, flowers; animal feces and dead animal carcasses not due to epidemics; diapers, diapers, bandages, toilet paper, used tissues; used wet wipes; cotton pads, masks; foam boxes of all kinds; disposable plastic products; chewing gum residue, cigarette butts; adhesive tape, cotton swabs, dental floss, medicine packaging; plastic shoes, sandals, rulers, plastic spoons, ladles (patches); pens, lighters that have run out of gas, toothbrushes, toothpaste tubes, boxes; other types of plastic; hard shells of seafood; coal slag from domestic activities; ceramic, porcelain, and porcelain waste. )

**Decision No. 17/2024/QD-UBND dated May 27, 2024 of the Provincial People's Committee on waste management regulations in Ba Ria - Vung Tau province. This Decision takes effect from June 10, 2024.**

- After being classified, domestic solid waste must be contained in prescribed packaging and stored in suitable areas before being transferred as follows:

+ Food waste must be contained in green packaging as prescribed and must be transferred to a collection and transportation facility selected by local authorities.

+ Reusable and recyclable waste is contained in regular packaging, where the waste inside can be seen , etc. Encourage households and individuals to collect maximum waste that can be reused and recycled and transfer it to organizations and individuals for reuse and recycling .

+ Bulky solid waste must be compacted and reduced in volume so that it can be stored within the residential premises of households and individuals, ensuring that it does not cause loss of aesthetics or environmental pollution, and must be transferred to a collection and transportation facility selected by the local authority as notified by the local authority;

+ Hazardous waste is contained in regular yellow packaging so that it can be stored inside the residential premises of households and individuals to ensure safety and avoid dispersion into the environment until transferred to a collection and transportation facility selected by local authorities ;

+ Domestic solid waste that must be treated must be contained in gray packaging according to regulations and transferred to a collection and transportation facility selected by local authorities .





**Decision No. 17/2024/QD-UBND dated May 27, 2024 of the Provincial People's Committee on waste management regulations in Ba Ria - Vung Tau province. This Decision takes effect from June 10, 2024.**

The frequency of collection and transportation of solid waste generated from households and individuals is decided by the People's Committee at the district level or the People's Committee at the commune level, if authorized, but must ensure at least the following:

a) For inner-city areas: the frequency of collection and transportation of food waste and domestic solid waste must be treated once a day ; the frequency of collection of bulky solid waste and hazardous waste must be at least once a month ;

b) For the remaining areas: the frequency of collection and transportation of food waste and domestic solid waste must be handled at least 02 days/time; the frequency of collection of bulky solid waste and hazardous waste must be at least 02 months/time.





**Decision No. 27/2024/QD-UBND dated September 30, 2024 of the Provincial People's Committee Approving the Decision regulating road routes, transportation time of domestic solid waste, ordinary industrial solid waste requiring treatment and hazardous waste in Ba Ria - Vung Tau province. This Decision takes effect from October 11, 2024.**

This Decision applies to relevant departments, units, People's Committees of districts, towns and cities in Ba Ria - Vung Tau province, People's Committees of communes, wards and towns, agencies, organizations and individuals collecting and transporting domestic solid waste, ordinary industrial solid waste that must be treated and hazardous waste in Ba Ria - Vung Tau province .

1. For collection and transportation of domestic solid waste

b) Vehicles transporting domestic solid waste are allowed to operate on traffic routes, except for prohibited routes as prescribed by the Road Traffic Law. For prohibited road areas where domestic solid waste is generated, transport vehicles must have a permit to enter prohibited roads as prescribed.

c) For urban roads: time for transporting domestic solid waste is from 10:00 p.m. the previous day to 5:00 a.m. the next day .

d) For extra-urban roads, roads in industrial parks and concentrated industrial clusters: time for transporting domestic solid waste at all hours of the day .





**- Units in charging collection and transportation of domestic solid waste at BRVT province:**

1. Chau Duc Urban Development and Construction Joint Stock Company
2. Ba Ria Urban Services Joint Stock Company
3. Dat Do District Urban Works Company
4. Nguyen Huynh Company Limited (Long Dien)
5. Phuong Dong Building Construction and Trading Service Company Limited (Long Dien)
6. Phuc Duc Truong An Company Limited (Long Dien)
7. Tan Thanh Urban Services Joint Stock Company (Phu My)
8. Phu My Xanh Environmental Investment Joint Stock Company (Phu My)
9. Truong Xanh My Xuan Trading Service Company Limited (Phu My)
10. Hung Tan Construction and Trading Service Company Limited (Xuyen Moc)
11. Vung Tau Urban Works and Environmental Services Joint Stock Company
12. Hai Long Environment Sanitation Services Company Limited, 1216/68D 30/4 Street, Ward 12, Vung Tau City.
13. Hiep Anh Vung Tau Company Limited, 59 Le Quang Dinh, Vung Tau City.
14. Gia Linh Urban Construction and Services Co., Ltd., A13 Phuong Nam Villa, Ward 8, Vung Tau City.
15. Trong Linh Environmental Services Private firm, 290/10/10A Nguyen Huu Canh, Vung Tau City

## Difficulties and Challenges

**Law on Environmental Protection 2020, Article 79. Fees of collection, transportation and treatment of domestic solid waste**

1. The Fee of collection, transportation and treatment of solid waste from households and individuals is calculated based on the following:

a) Comply with the provisions of law on prices;

b) Based on the mass or volume of classified waste ;

c) Solid waste that can be reused, recycled, and hazardous waste generated from households and individuals that have been classified separately do not have to pay for collection, transportation, and treatment services .

..

5. The Minister of Natural Resources and Environment shall provide guidance on the method of pricing domestic solid waste treatment services; prescribe economic and technical norms for collection, transportation and treatment of domestic solid waste ; provide technical guidance on classification of domestic solid waste; and provide guidance on the implementation of the provisions in Clause 1 of this Article.

6. The People's Committee at the provincial level shall specify in detail the management of domestic solid waste of households and individuals in the locality; specify specific prices for the collection, transportation and treatment of domestic solid waste; specify the form and level of expenses that households and individuals must pay for the collection, transportation and treatment of domestic solid waste based on the mass or volume of classified waste.

UBND TỈNH BÀ RỊA - VŨNG TÀU
SỞ TÀI NGUYÊN VÀ MÔI TRƯỜNG

## Opportunities

1. **Invest in solid waste treatment plants and waste recycling in accordance with the Provincial Planning and the National Environmental Protection Planning.**
2. **Provide solid waste collection, transportation and treatment services.**
3. **Transfer technology, purchase and sell equipment, exchange learning experiences.**
4. **Propaganda activities to raise public awareness.**

UBND TỈNH BÀ RỊA - VŨNG TÀU
SỞ TÀI NGUYÊN VÀ MÔI TRƯỜNG

# Thank you very much for your listenning!

UBND TỈNH BÀ RỊA - VŨNG TÀU
SỞ TÀI NGUYÊN VÀ MÔI TRƯỜNG

# 堺市の一般廃棄物処理の現状及び課題

2024年10月31日
堺市　環境局　環境事業部　環境事業管理課

## アジェンダ





## 1．堺市について ※2024年8月末現在

**堺市の概要**

- 人口　807,377人
  （ベトナム国籍の方： 4,873人）
- 世帯数　374,019世帯
- 事業所数　31,989事業所（2021年度現在）
- 面積　149.83km$^2$

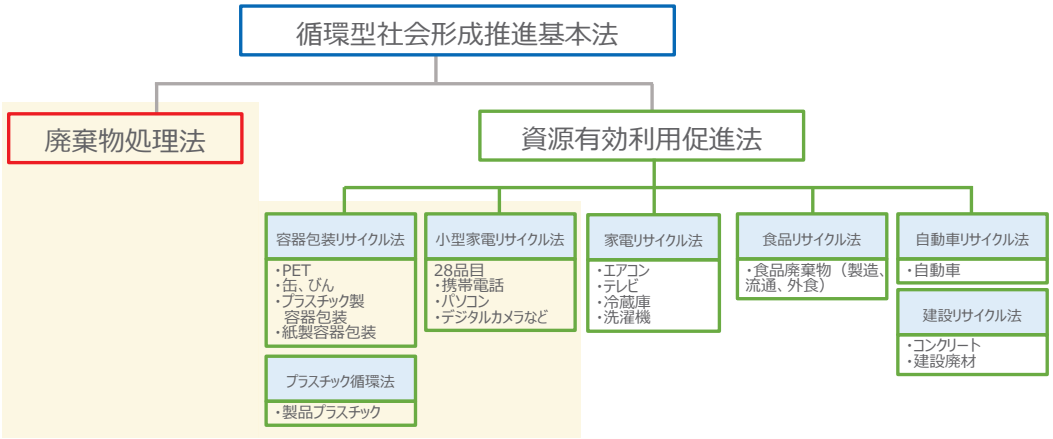



## アジェンダ


1．堺市について
2．日本の廃棄物に関する法律と廃棄物の分類
3．堺市の一般廃棄物処理の現状
4．堺市の一般廃棄物処理の流れ
5．堺市の一般廃棄物処理の課題

## 2．日本の廃棄物に関する法律と廃棄物の分類

### 日本の廃棄物に関する法律体系




**本日の説明の対象**

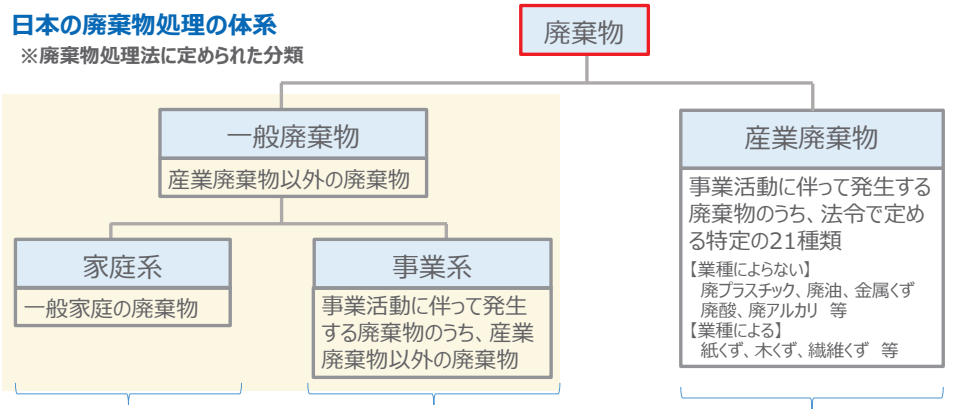
※法律名称については、略称。



## 2．日本の廃棄物に関する法律と廃棄物の分類

### 日本の廃棄物処理の体系

**※廃棄物処理法に定められた分類**




処理責任：市民
処理　　：市町村又は許可事業者

処理責任：事業活動を行う事業者
処理　　：市町村又は許可事業者

処理責任：事業活動を行う事業者
処理　　：許可事業者



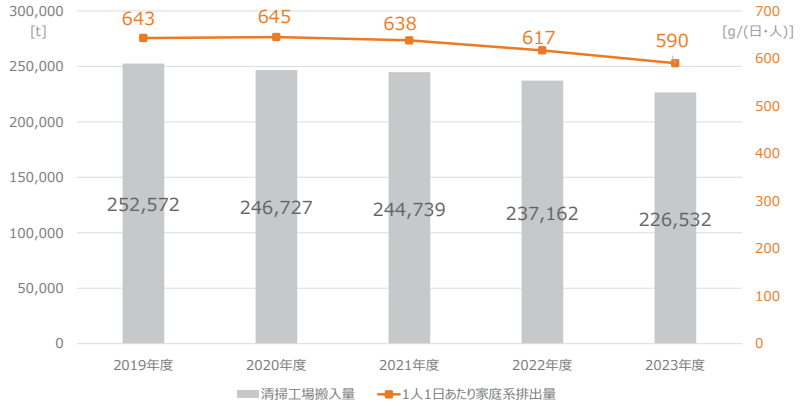
## アジェンダ





## 3．堺市の一般廃棄物処理の現状

### 廃棄物の排出量と処理量の推移



## ３．堺市の一般廃棄物処理の現状

### 最新（2023年度）の一般廃棄物排出量、処理量及び処理費用の実績

○ 2023年度の一般廃棄物排出量及び処理量の実績。

| 区分 | | 数量 |
|---|---|---|
| 一般廃棄物総排出量 | | 258,392 t |
| | 家庭系一般廃棄物排出量 | 176,581 t |
| | 事業系一般廃棄物排出量 | 75,117 t |
| 資源化量 | | 43,826 t |
| 清掃工場搬入量 | | 226,532 t<br>（1日あたり：約621 t） |
| 最終処分量 | | 18,339 t |



## ３．堺市の一般廃棄物処理の現状

○ 最新（2023年度）の一般廃棄物処理に係る費用の実績

| 項目 | | 経費 |
|---|---|---|
| 総額 | | 109.3 億円 |
| | 収集運搬 | 56.4 億円 |
| | 中間処理<br>（清掃工場等） | 42.6 億円 |
| | 最終処分（埋立） | 3.0 億円 |

○一般廃棄物処理の人員

| 区分 | 数量 |
|---|---|
| 市職員 | 180人（うち、収集運搬36 人） |
| 収集運搬委託業者 | 約400 人 |



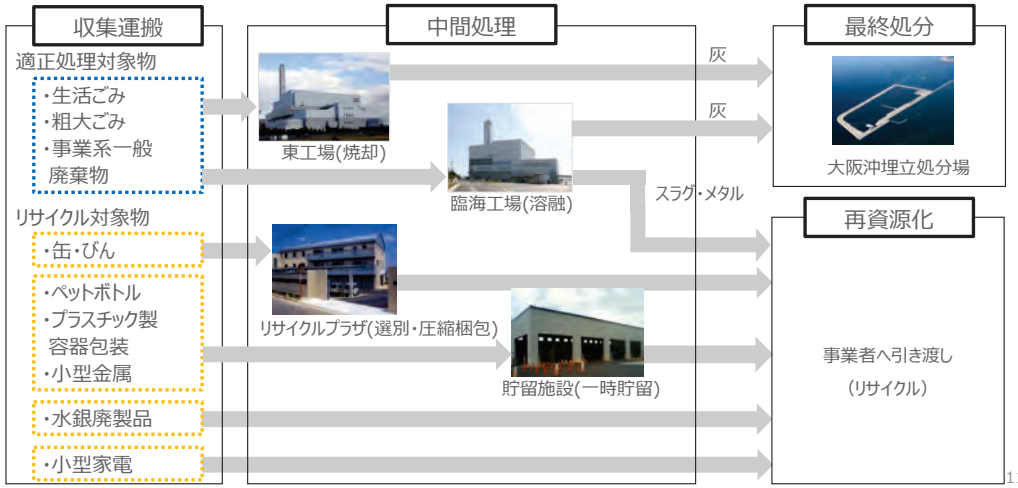
## アジェンダ





## ４．堺市の一般廃棄物処理の流れ　（全体フロー）

### 堺市の一般廃棄物処理の全体フロー



## ４．堺市の一般廃棄物処理の流れ　（収集運搬）

### 堺市の収集方式と分別品目について

○各戸収集：市が市民の家の前で収集する廃棄物

| 分別品目 | 廃棄物の例 | 収集頻度 | 収集者 |
|---|---|---|---|
| 生活ごみ | 生ごみ、紙くず、プラスチック製品　など | 週2回 | 委託業者 |
| プラスチック製容器包装 | プラスチック製の食品トレイ・洗剤容器など | 週1回 | 委託業者 |
| 缶・びん | 飲料、調味料などの缶・びん | 月2回 | 委託業者 |
| ペットボトル | ペットボトル製の飲料容器　など | 月2回 | 委託業者 |
| 小型金属 | 30cm以下、80%以上金属のもの | 月1回 | 委託業者 |
| 粗大ごみ(不燃小物類) | 家具、自転車、ガラス類　など | 申込制 | 市職員<br>（一部、委託業者） |

○拠点回収：市民が市内の拠点（回収BOX ）に持ち込み、市が回収を行う廃棄物

| 分別品目 | 廃棄物の例 | 収集頻度 | 収集者 |
|---|---|---|---|
| 水銀使用廃製品 | 蛍光管、ボタン電池、水銀体温計　など | 週1回程度 | 市職員 |
| 小型家電（8cm×30cm以内） | スマートフォン、デジタルカメラ　など | 週1回程度 | 市職員 |



## ４．堺市の一般廃棄物処理の流れ　（中間処理①）

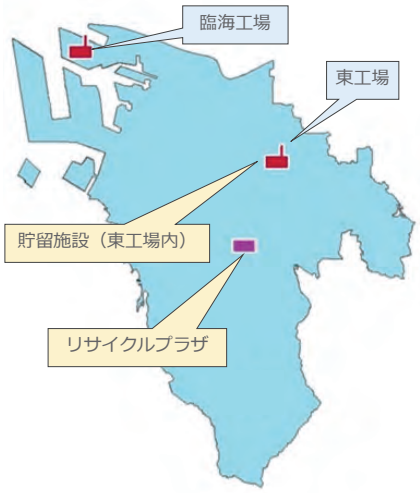
### 堺市の廃棄物関連施設

○焼却等処理施設

| 施設名称 | 設備 | 処理能力 | 余熱利用等 | 稼働開始年 |
|---|---|---|---|---|
| 東工場 | 焼却 | 460t/日 | 発電、公共施設の温水施設 | 1997年 |
| | 破砕 | 50t/日 | | |
| 臨海工場 | 溶融 | 450t/日 | 発電 | 2013年 |
| | 破砕 | 16t/日 | | |

○再商品化関連施設

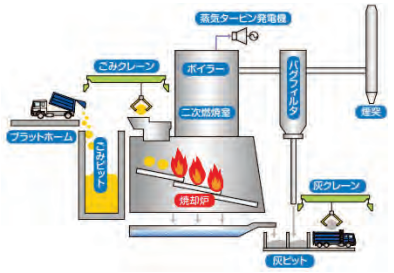
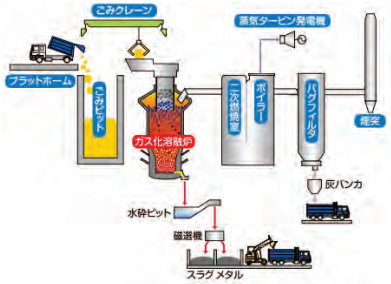
| 施設名称 | 対象物 | 処理能力など | 稼働開始年 |
|---|---|---|---|
| リサイクルプラザ | 缶、びん | 30t/日 | 1995年 |
| 貯留施設 | ペットボトル、プラスチック容器包装、小型金属 | 2,204㎡ | 2009年 |






## ４．堺市の一般廃棄物処理の流れ　（中間処理②）

### 焼却等処理施設の処理

| | 焼却（東工場） | 溶融（臨海工場） |
|---|---|---|
| 処理方式 | 全連続燃焼式 | シャフト炉式全連続ガス化溶融方式 |
| 処理フロー |  |  |
| 灰の発生率 | 高い | 低い |
| 温室効果ガス発生量 | 少ない | 多い |

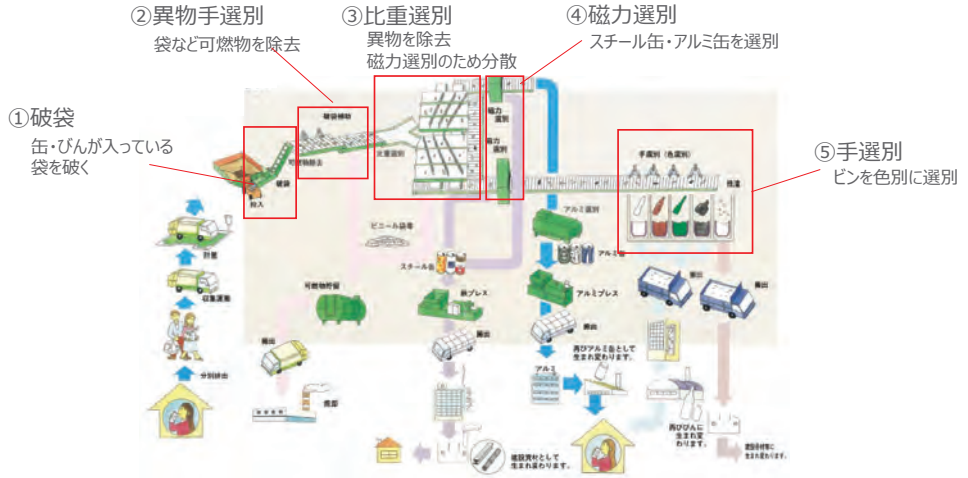






## ４．堺市の一般廃棄物処理の流れ　（中間処理③）

### 再商品化中間処理施設（リサイクルプラザ）の処理



## ４．堺市の一般廃棄物処理の流れ　（再資源化）

**再資源化物について**

缶

アルミ缶、自動車部品など

びん

びん、ビー玉など

プラスチック製容器包装

パレット、プランター、コークス炉化学原料など

ペットボトル

作業服、ペットボトル、卵パックなど

小型金属

建設用鋼材など

スラグ・メタル

アスファルト骨材など

水銀廃製品：鉄・ガラス・水銀 等

小型家電：金・銀・銅・鉄 等



## アジェンダ





## ５．堺市の一般廃棄物処理の課題

**課題について**

収集運搬

・委託業者の収集物に産業廃棄物が約16%混入
・資源の分別収集に多額のコストを要している

中間処理

・工場の稼働率が高い
・工場の立地が市内の北部に集中している（収集運搬の効率化へ影響）

リサイクル推進

・生活ごみに分別収集品目対象が約9%混入
・生活ごみに手付かずの食品、食べ残しなど食品ロスが約35%混入
・事業系一般廃棄物に減量化・リサイクル可能なものが約61%混入



Thank you for your attention

# Introduction of DX in Waste Management

Towards carbon neutral under cooperation between Ba Ria – Vung Tau province and Sakai city

2024/10/31
Circular Economy Promotion Dept.
Yuichi TEZUKA
日本工営株式会社

## Agenda

1. Overview of DX in the Waste Management Sector in Japan
2. Examples of DX in the Waste Management Sector in Japan
3. Overview of DX in the Waste Management Sector in Vietnam
4. Examples of DX in the Waste Management Sector in Vietnam
5. Consideration of introduction to Ba Ria Vung Tau Province
6. Introduction of available Japanese schemes

## 1. Overview of DX-related policies in Japan

Digital Agency — Launched September 1, 2021

The Plan for a Comprehensive Review of Regulations in light of the Digital Principles (2022)

Priority Policy Program for Realizing Digital Society (2022)


Review is required…..

Waste Management and Public Cleansing Act (1970, Revision 2020)

Source :
https://www.digital.go.jp/assets/contents/node/basic_page/field_ref_resources/ed91c288-7d40-4a9b-9d86-1007f256ada6/c83a6759/20240528_en_organization_outline.pdf
https://www.env.go.jp/recycle/waste/reg_ref/index_digital.html

## 1. Overview of DX-related policies in Japan


**Case Studies of AI, IoT, etc. in Industrial Waste Management (MOEJ 2020)**

Source: https://www.env.go.jp/recycle/recycle/waste/it.html
https://iot-recycle.com/news/file/2022031402.pdf

CARD: Council for Advanced Resource circulation and Digitalization
JSMCWM: Japan Society of Material Cycles and Waste Management
MOEJ:Ministry of the Environment, Japan


**DX Guideline for Waste Management and Recycling Businesses (CARD and JSMCWM 2022)**

## 2. Examples of DX in the Waste Management Sector in Japan

NIPPON KOEI

| Phase | AI・IoT technology | | | | | | |
|---|---|---|---|---|---|---|---|
| | Electronic tags | ICT (Wifi, LTE, 5G, etc.) | Sensors | Image Recognition | AI (machine learning, optimization computation) | Robots, automatic cranes | Chat bots / other |
| Admin & Contract | Medical Waste Tracking and Management System | | | | | | |
| Discharge & Collection | | Measuring the waste volume by sensor and image analysis<br>Optimization of collection routes based on sensor-based waste volume data<br>Track image history management, automatic volume measurement | | | Automatic creation of transport plans and TMS, and optimization of collection routes | | |
| Crushing | | Remote monitoring of crushers using IoT (preventive maintenance) | | | | Automa… | |
| | | | Fire prevention using spark sensors | | | …emory, etc : automatic sorting and unscrewing | |
| Sorting & Recycling | | | Automatic sorting: Sorting by a combination of sensors, image recognition, AI (machine learning) and robot arms | | | | |
| Incineration | | | AI system (automatic operation system) suitable for remote monitoring and maintenance of incineration facilities, automatic control of incinerators, and operation control of incineration facilities | | | Automatic crane operation, maintenance management | |
| Landfill | | Gas detection at covered landfills, automatic operation of ventilation and deodorization equipment, remote monitoring of heavy equipment | | | | | Drone monitoring |

Focus on the following with consideration of CO2 reduction effects
- Optimization of collection and transportation
- Optimization of incineration facility operation
- Upgrading of sorting and recycling

Source: https://www.env.go.jp/content/900535535.pdf



## 2. Examples of DX in the Waste Management Sector in Japan

NIPPON KOEI

### ● Optimization collection and transportation

| Item | Content |
|---|---|
| Organization | Shirai Group Co.Ltd |
| Technology | AI vehicle allocation simulation service |
| Technology Characteristics | AI calculates the optimal collection course based on basic information related to waste collection. AI assists the staff in charge of allocation in setting the collection course for each vehicle and reviewing the course, which used to be a time-consuming task. |
| Technology Benefits | ✓ Improved efficiency of vehicle allocation operations (reduced work hours)<br>✓ Reduction of logistics costs (10% reduction in the number of vehicles is certain, and a reduction of 15% or more is possible)<br>✓ Strengthening of the management base (by reduction of logistics costs through reduction of the number of vehicles, reduction of operation hours, etc.) |
| Effect on CO2 emissions | In the case of Tokyo, the number of vehicles is expected to be reduced by approximately 15% (750 vehicles/5,000 vehicles) through the revision of collection routes, resulting in an annual reduction of approximately 9,000 tons of CO2 emissions. |
| Budget Scale | About 100,000 to 500,000 yen（about 17,000,000 to 84,500,000 VND）<br>( depends on the complexity of the requirements in the case) |

Source: https://www.env.go.jp/recycle/recycle/waste/it.html



## 2. Examples of DX in the Waste Management Sector in Japan

NIPPON KOEI

### ● Optimization of incineration facility operation

| Item | Content |
|---|---|
| Organization | Kanadevia Corporation |
| Technology | Combustion Status Prediction System” |
| Technology Characteristics | The **Automatic Combustion Control (ACC)** of waste to energy plants rarely exceeds the control range and requires the intervention of skilled operators. To improve this, two AI models were introduced. This improves operational stability and efficiency.<br>Normal maintenance model: Optimizes combustion and maintains stable operation.<br>Abnormality avoidance model: Predicts combustion deterioration and implements emergency avoidance. |
| Technology Benefits | ✓ Combustion deterioration time was reduced by 58% and the number of manual interventions was reduced by 86%.<br>(Demonstration Experiment 2023 ) |
| Effect on CO2 emissions | — |
| Budget Scale | — |

Source: https://www.kanadevia.com/hitz-tech/pdf/2023r36_1_01.pdf



## 2. Examples of DX in the Waste Management Sector in Japan

NIPPON KOEI

### ● Upgrading of sorting and recycling

| Item | Content |
|---|---|
| Organization | RYOHSHIN Co.,Ltd |
| Technology | AI automatic sorting robots “AIBenkei” and “AIMusashi |
| Technology Characteristics | AI-equipped systems analyze the color, texture, shape, and pattern from images captured by cameras to identify the characteristics of the material. Based on this information, two types of robots and systems can be used to sort with 95% accuracy. |
| Technology Benefits | ✓ Labor savings (40% reduction at domestic installations), increased plant operating hours (2-3 shifts can be scheduled, 24-hour operation possible), reduced labor costs for manual sorting operators, lower labor/burden to hire new employees (recruiting, training, harmonizing with existing employees, etc.)<br>✓ Increased sorting accuracy (up to 95% vs. 90% manual sorting), production stability ( ability to operate the same way and at the same speed every day)<br>✓ Acquired data ( ability to utilize big data collected from all over the world)<br>✓ Improved occupational health (reduced risk of occupational accidents) |
| Effect on CO2 emissions | Electricity consumption (CO2 emissions) is about the same as when air conditioning is used for manual operations (about 4.5 kWh per unit) |

Source: https://www.env.go.jp/recycle/recycle/waste/it.html

## 2. Examples of DX in the Waste Management Sector in Japan

NIPPON KOEI

- Other (Integrated management system of waste management operation)

| Item | Content |
|---|---|
| Organization | ＪＥＭＳ Inc. |
| Technology | Integrated management system “KankyoShogun R” |
| Technology Characteristics | A core system that enables integrated management of diverse operations (sales and contracts, reception, vehicle allocation, collection and transportation, manifest management, sales payment, billing, etc.) specialized for the waste treatment and recycling industry. |
| Technology Benefits | ✓ Visualization of waste management, including waste location, treatment methods, and final disposal<br>✓ Improved operational efficiency as well as reduced workload due to the elimination of human labor and management effort<br>✓ Cost reductions due to the improved operational efficiency described above |
| Effect on CO2 emissions | — |
| Budget Scale | — |

Source: https://www.env.go.jp/recycle/recycle/waste/it.html



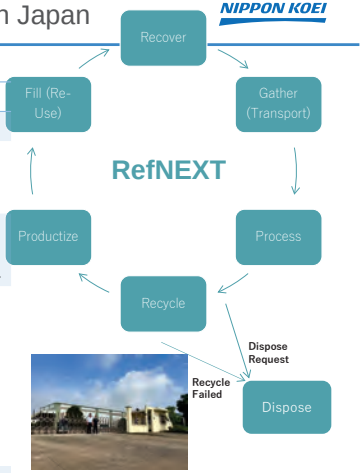
## 2. Examples of DX in the Waste Management Sector in Japan

NIPPON KOEI

- Other (Digital management of refrigerant)

| Item | Content |
|---|---|
| Organization | GenbaNEXT Limited |
| Technology | One-Stop Digital Solution for centralized Recovery, Collection, Reclaim-Reuse and Destroy of Fluorocarbons (HFCs, HCFCs and CFCs) |
| Technology Characteristics | RefNEXT is a Platform for digital management of refrigerant fill, recover, transport, process, recycle, dispose, productize and reuse, a mechanism to realize Circular Economy for Refrigerants. |
| Technology Benefits | ✓ Equipment manufacturers / owners can grasp Carbon Footprint per unit<br>✓ Government bodies can grasp initial and periodic charging/recovery amount of refrigerant in each equipment to make ODS(Ozone-depleting substances)/HFC(hydrofluorocarbons) bank a reality<br>✓ Recyclers / disposers can easily manage operations and data gathering from collection to recycle/dispose |
| Effect on CO2 emissions | Help to quantify CO2 emission reduction from recovery and recycle/disposer operations |
| Budget Scale | - |

Source: GenbaNEXT Limited and MZ VINA COMPANY LIMITED




GenbaNEXT has been utilized for refrigerant management in Vietnam by MZ VINA COMPANY which started to operate for freon regeneration in My Xuan IP in BRVT province in 2023.





## 3. Overview of DX in the Waste Management Sector in Vietnam

NIPPON KOEI

National DX Program until 2025” (Decision No. 749/QD-Ttg)

(2020)

E-government | Digital Economy | Digital Society

PRIORITY SECTORS FOR DIGITAL TRANSFORMATION


Source: https://cicc.or.jp/english/wp-content/uploads/231213Vietnam.pdf



## 5. Consideration of introduction to Ba Ria Vung Tau Province

NIPPON KOEI

**Issues in Waste Collection in Vietnam According to JETRO Survey**

✓ Inefficient data management with conventional recording methods (paper, Excel files)
✓ Inefficient communication methods among the parties involved due to too many collection units
✓ Inefficient performance management of cleaning crews (collection, transportation, charging fees)
✓ GPS on collection vehicles used only to manage collection routes

**For reference**

- **Integrated management system of waste management operation**
- **AI vehicle allocation simulation service**
- **Optimization of collection routes using IoT sensors**

Source: https://www.jetro.go.jp/ext_images/_Reports/02/2024/8ac6832759c4f311/202408_VN_logistics_environment_healthcare.pdf

## 5. Consideration for applying to Ba Ria - Vung Tau Province

NIPPON KOEI

### ◆Study more good practices in Vietnam and other countries

- ✓ Site visit tour to neighboring city such as Ho Chi Minh city and Long Anh province

- ✓ Visit to DX center in Japan such as Advanced Information Technology Cetner (A.I/TEC / Kanadevia), using an opportunity of city-to-city cooperation seminar to be invited by Ministry of Environment, Japan

Ref. Kanadevia Advanced InformationTechnology Center (A.I/TEC). | Kanadevia Corporation

### ◆Develop a demonstration DX project in model area/sector in BRVT

- ✓ DX application for tracking system of specific industrial waste, or other area (see page.12)

*Let us know your needs and interests*



## 6. Introduction of available Japanese schemes

NIPPON KOEI

| Organization | Name of Subsidized Project | Target Projects | Period | Subsidy rate/amount |
|---|---|---|---|---|
| Japan International Cooperation Agency (JICA) | SDGs Business Supporting Survey | All fields (those that are effective for the social and economic development of developing countries) | Up to 1 year<br>Up to 2 years and 6 months | Up to 15 million yen for Needs Confirmation Survey<br>Up to 40 million yen for Business Validation Survey |
| Ministry of Economy, Trade and Industry | Global South Future-Oriented Co-Creation Project | Information and communication, energy, transportation, infrastructure, etc. ・Medical, healthcare, agriculture/food, waste management, etc. ・Digital platform, etc. | Within 3 years | FS project: Up to 100 million yen<br>Validation project: Up to 500 million yen<br>Of the project cost, large enterprise within 1/2<br>Small and Medium-sized enterprise within2/3 |
| Ministry of the Environment | FS on introduction waste management technology | Overseas businesses that provide services related to the collection, transportation, intermediate treatment, recycling, and final disposal of waste, etc. and establish the necessary facilities for such businesses. | Within 9 months | Up to 9 million yen |

Source: https://www.jica.go.jp/activities/schemes/priv_partner/activities/sme/__icsFiles/afieldfile/2024/10/16/ind_summary_en_202409r.pdf
https://www.env.go.jp/earth/coop/lowcarbon-asia/english/project/
https://www.meti.go.jp/information/publicoffer/kobo/2024/k240909001.html

# 堺市のサーキュラーエコノミーに向けた
# 一般廃棄物処理の減量･リサイクルの取組

2024年10月31日
堺市　環境局　環境事業部　環境事業管理課



## アジェンダ

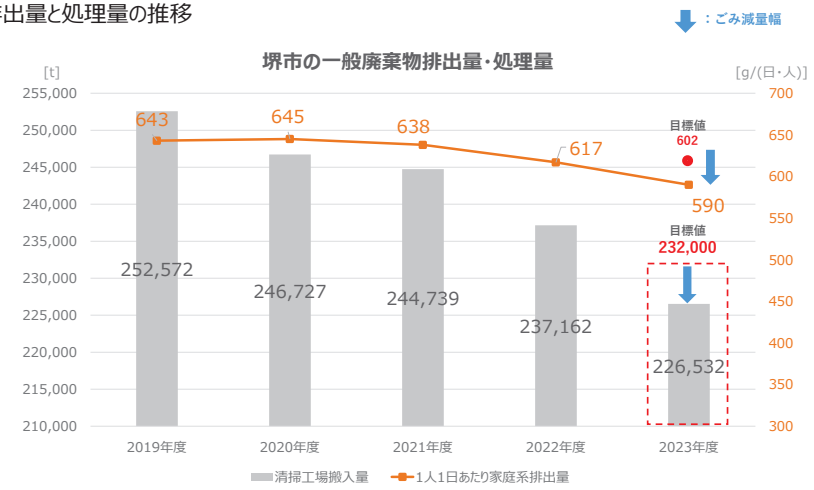
1．堺市の一般廃棄物の現状

2．堺市の一般廃棄物の減量･リサイクルに関する取組

3．その他のcircular economyに関する取組

## 1．堺市の一般廃棄物の現状

○廃棄物の排出量と処理量の推移






## 1．堺市の一般廃棄物の現状

○堺市の一般廃棄物の減量･リサイクル（サーキュラーエコノミー）の考え方

**4R運動**

| | | |
|---|---|---|
| 1 | Refuse（断る） | ごみになる物を発生源から断つ<br>（例）マイバッグ、マイボトル、マイカトラリーを携帯する。 |
| 2 | Reduce（減らす） | ごみが少なくなるように行動する<br>（例）必要な分だけ買って必要な分だけつくる。詰め替え容器を使う。 |
| 3 | Reuse（繰返し使う） | 使わなくなった物を他に活用する<br>（例）必要としている人に譲る |
| 4 | Recycle（再資源化） | 積極的にリサイクルして有効活用する。<br>（例）正しく分別してごみを出す。再生資源でできた商品を使う。 |

## アジェンダ

1．堺市の一般廃棄物の現状

2．堺市の一般廃棄物の減量･リサイクルに関する取組

3．その他のcircular economyに関する取組



## 2．堺市の一般廃棄物の減量･リサイクルに関する取組

### Refuseの取組

○マイバッグの利用促進

レジ袋の削減のため、市内スーパーや商業施設で、マイバックを配布するイベントブースを設置。

イベントブースの様子


周知用ポスター



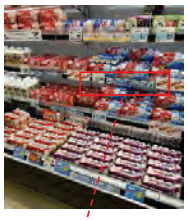
## 2．堺市の一般廃棄物の減量に関する取組

### Reduceの取組

○食品ロス削減の促進

賞味期限切れによる食料品の廃棄物削減のため、スーパーやコンビニエンスストアで、
陳列棚の手前から商品を取ることを促進するPOPを設置。

店舗にPOPが設置された様子 →



↓POPの絵




## 2．堺市の一般廃棄物の減量に関する取組

### Reuseの取組

○粗大ごみ削減、新規購入の抑制の促進

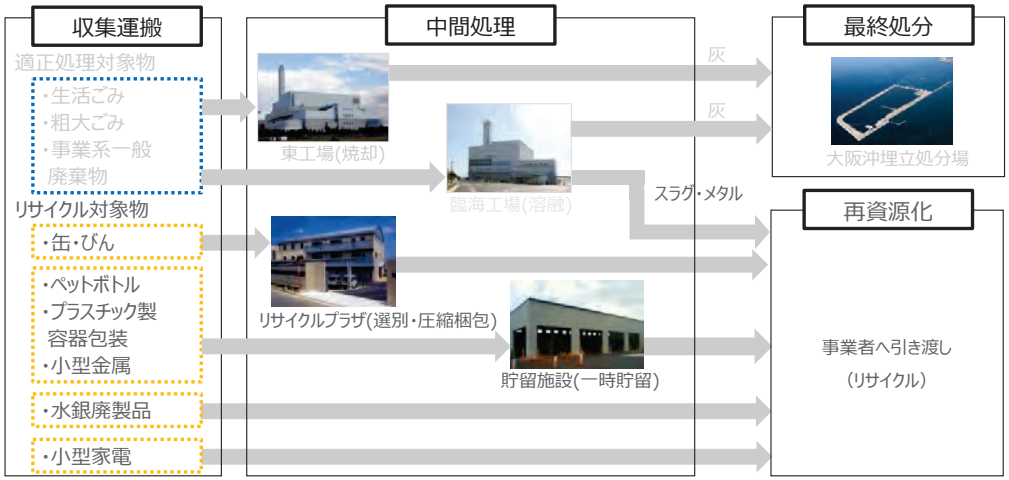
株式会社ジモティーと協定を締結して市民同士のリユースの促進。
当該事業者によるアプリ又はWEBサービスを利用して、堺市清掃工場へ搬入された粗大ごみのうち
綺麗なものを無償で市民へ提供。

■ジモティーの概要


実際に提供した粗大ごみ

## 2．堺市の一般廃棄物の減量に関する取組

### Recycleの取組






## 2．堺市の一般廃棄物の減量に関する取組

### Recycleの取組

**缶**

：アルミ缶、自動車部品など

**びん**

：びん、ビー玉など

**プラスチック製容器包装**

：パレット、プランター、コークス炉化学原料など

**ペットボトル**

：作業服、ペットボトル、卵パックなど

**小型金属**

：建設用鋼材など

**スラグ・メタル**

：アスファルト骨材など

**水銀廃製品**：鉄・ガラス・水銀 等

**小型家電**：金・銀・銅・鉄 等



## アジェンダ



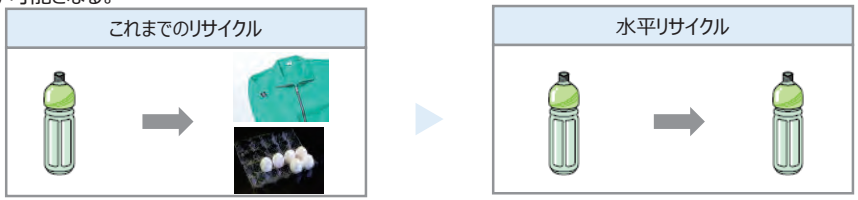


## 3．その他のcircular economyに関する取組

### 堺市の取組

○新たなRecycleの取組（ペットボトルの水平リサイクルの導入）

より永続的に資源循環を達成するため、廃棄物とリサイクルしたものが同じものになる「水平リサイクル」を2025年に導入予定。
これまで（ペットボトルから製品へ）のリサイクルは1度しかできないが、この取組によって複数回リサイクルすることが可能となる。

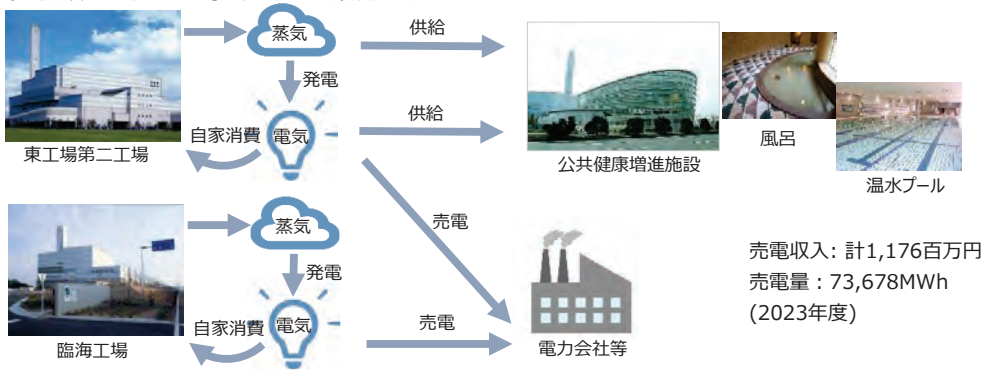


## 3．その他のcircular economyに関する取組

**堺市の取組**

○市の清掃工場での余熱利用

市の一般廃棄物処理施設（クリーンセンター東工場第二工場及び臨海工場）では、廃棄物を焼却した際の余熱で発電し、電力会社等に売電しています。東工場第二工場では余熱から蒸気も生成し、隣接する市営フィットネス施設の温水プール等の熱源として利用しています。




売電収入：計1,176百万円
売電量：73,678MWh
(2023年度)

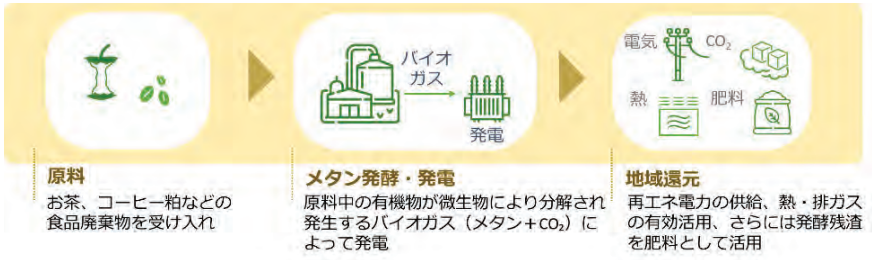


## 3．その他のcircular economyに関する取組

**民間企業の取組**

○バイオメタン発酵技術の開発

様々な原料（家畜ふん尿や食品廃棄物など）から、エネルギーを創出する技術を開発しています。




出典：エア・ウォーター㈱HP



## 3．その他のcircular economyに関する取組

**民間企業の取組**

○廃木材によるバイオエタノールの製造

DINS関西㈱のバイオエタノール事業所（堺市に所在）では、廃木材を原料として燃料用バイオエタノールを製造しています。また、プラント内で使用する蒸気や電気などのエネルギーを、すべてバイオマス燃料で賄っています。


出典： DINS関西㈱HP

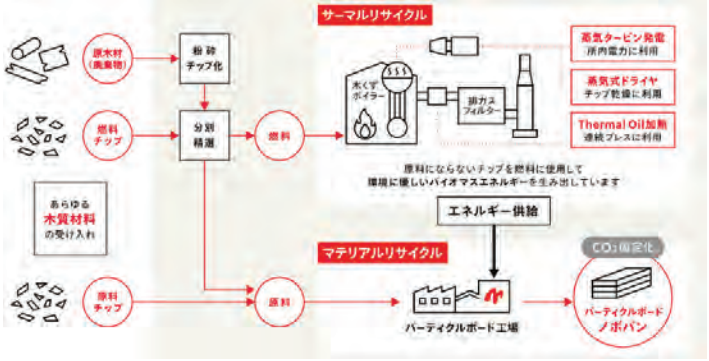


## 3．その他のcircular economyに関する取組

**民間企業の取組**

○木質廃棄物によるボード製造及びエネルギー創出

日本ノボパン工業㈱ （堺市に所在）では、多様な木質材料（木質チップ・廃木材など）を受け入れ、パーティクルボードを製造しています。また、ボード原料に適さない木質材料を焼却処理・熱回収し、工場の全ての電力・熱源を賄っています。




出典：日本ノボパン工業㈱HP

Kanadevia
Technology for people and planet

# Giới thiệu các giải pháp sản xuất Biogas và Biochar

Introduction of solutions for Biogas generation and Biochar production

28 October 2024
Kanadevia Corporation

## Nội dung / Contents

1. Giới thiệu về tập đoàn
   Introduction about us
2. Lên men mê-tan (Biogas)
   Methane fermentation (Biogas)
3. Carbon hóa
   Carbonization

## GIỚI THIỆU VỀ TẬP ĐOÀN
## INTRODUCTION ABOUT US

Tập đoàn Kanadevia (trước đây là Tập đoàn Hiatchi Zosen)
Kanadevia Corporation (formerly known as Hitachi Zosen Corporation)

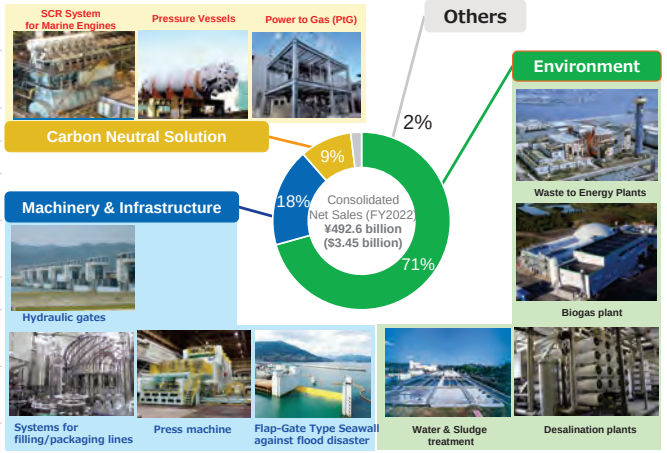
 

## Introduction of Company

Kanadevia
Technology for people and planet

| | |
|---|---|
| Company's Name | KANADEVIA CORPORATION (1/10/2024) HITACHI ZOSEN CORPORATION |
| Founded | 1881 by Edward Hazlett Hunter (from UK) |
| Incorporated | 1934 |
| Headquarters | Osaka and Tokyo |
| Stock market | Listed on Tokyo Stock Exchange |
| Offices | 154 (124 consolidated subsidiaries and 30 affiliates). |
| Employees | 11,400 (consolidated) |
| Paid-in Capital | 45.44 billion yen (≒ US$ 318 million) |
| Net Sales | 492.6 billion yen (≒ US$ 3,45 million) |
| Net Income | 15.5 billion yen (≒ US$ 108.5 million) |

(As of 31/03/2023) 1 JPY = US$ 0.007




Sales Structure by Business Segment

## Introduction of Company


| KANADEVIA VIETNAM | |
|---|---|
| Establishment | 2004 |
| Office | Ho Chi Minh city (Headquarter), Hanoi (Branch) |
| Employees | 100 |
| Business field | • Detailed engineering for Plant (CAD 2D drawing & 3D model)<br>• Procurement<br>• O&M business<br>• Business supports |

**Major Overseas Offices & Subsidiaries** (Environment Business)

## From HITACHI ZOSEN changed to KANADEVIA (Launched from 1st Oct., 2024)

Kanadevia = **Kanaderu** (Japanese word: "to play in harmony") + **via** (Latin word: "way")

- 1881: Osaka Iron Works
- 1943: Hitachi Zosen
- 01/10/2024: Kanadevia

Under the new brand concept of "*striving for harmony between humanity and nature through the power of technology*" we have chosen "Kanadevia" as our new identity, marking the beginning of a new chapter.

| | Old | New |
|---|---|---|
| Trade Name | HITACHI ZOSEN CORPORATION | KANADEVIA CORPORATION |
| Logo | Hitz Hitachi Zosen Corporation | Kanadevia |
| Email domain | @hitachizosen.co.jp | @kanadevia.com |
| Our company in Vietnam | HITACHI ZOSEN VIETNAM CO., LTD. | Kanadevia VIETNAM CO.,LTD. |

# Lên men mê-tan (Biogas)

Methane fermentation (Biogas)

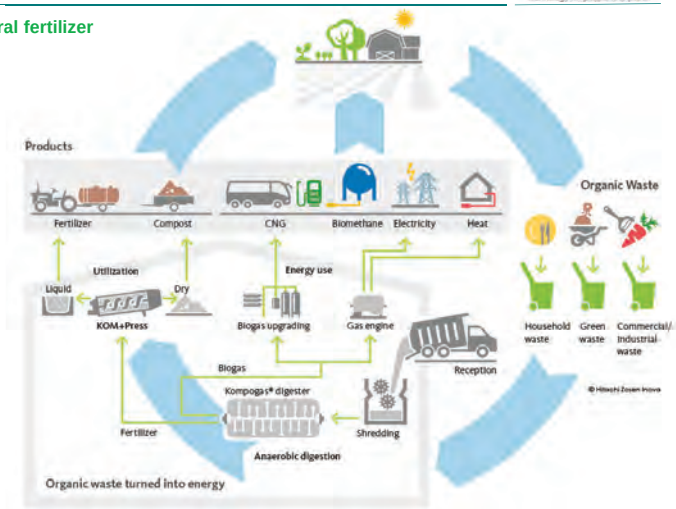
 

## Methane fermentation (Biogas)

**Biogenic wastes → raw biogas and natural fertilizer**

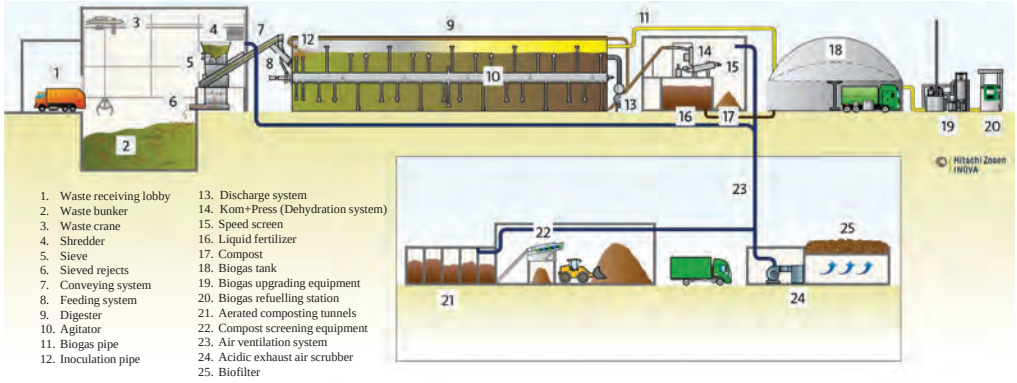
### Kompogas® Anaerobic Digestion

- This technology uses continuous anaerobic digestion to recycle biogenic waste, producing natural fertiliser and renewable energy in the form of green power and heat or biogas as the basis for alternative fuels
- This has become one of the global market leaders, with almost 100 reference plants worldwide.
- Mature technology, flexible component arrangements and largely automated processes guarantee long plant lifetimes, high efficiency and low maintenance costs.
- By recycling organic waste into materials and energy, the process closes the environmental cycle cost-efficiently.



## Methane fermentation (Biogas)





## Methane fermentation (Biogas)

Example: A plant in Swiss

For REFERENCE


https://www.kanadevia-inova.com/renewable-gas/anaerobic-digestion/

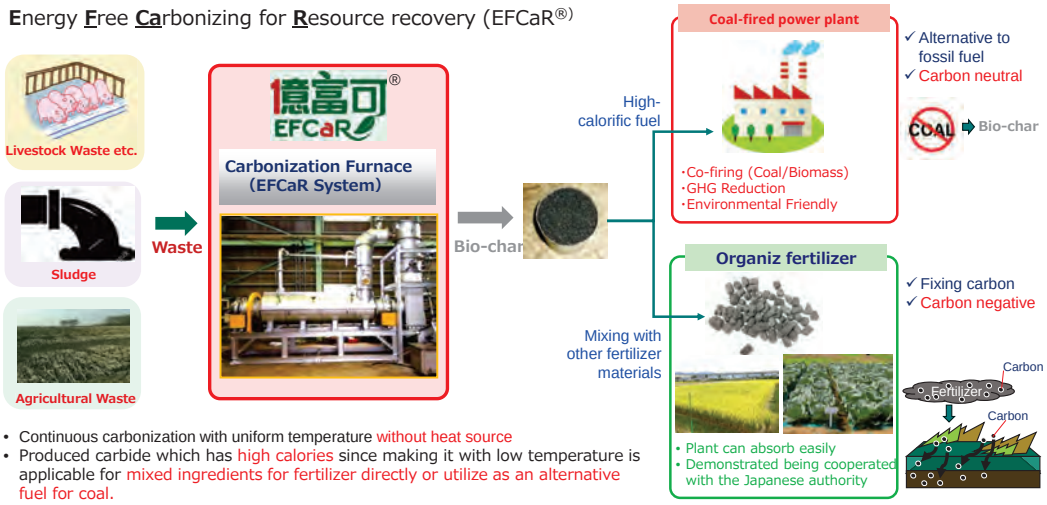
# Carbon hóa

Carbonization

## Carbonization

**E**nergy **F**ree **Ca**rbonizing for **R**esource recovery (EFCaR®)




- Continuous carbonization with uniform temperature without heat source
- Produced carbide which has high calories since making it with low temperature is applicable for mixed ingredients for fertilizer directly or utilize as an alternative fuel for coal.

## Carbonization

Kanadevia

### Circular economy

**EFCaR System**

Carbonization technology without fossil fuels

- **Processing waste ecologically**
- Contribute to decarbonization
- **Prevent environmental pollution by waste**


**Organic waste**
(Livestock waste･Agriculture waste ･Sewage Sludge)

**EFCaR Biochar**

**Low materials for organic fertilizer**

- The biochar contents a lot of phosphorus and can be used as fertilizer, being easy to be absorbed by corps.
- The biochar helps carbon fixation on farm land.

**Using as biomass fuel**

- Having a high calorie content、the biochar can be a fuel for TPG

**Promoting a circular economy and decarbonized society**

NIPPON KOEI

# Promotion of Zero-Carbon Smart City through City-to-City Collaboration between Ba Ria-Vung Tau Province and Sakai City (Phase 1, 3rd year)

## Basic Study on Utilization of Agricultural Biomass in Ba Ria Vung Tau Province

31st October 2024

日本工営株式会社

## Background and Overview

NIPPON KOEI

### The Current Situation and Potential Applications of Discarded Cacao Pod Hulls

OCA
CACAO & CHOCOLATE

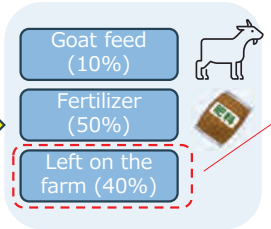
- Established in 2019
- Cacao farms and factory located in Ba Ria-Vung Tau Province
- Manufacture and sale of cacao products without the use of pesticides or additives
- Obtained "Organic JAS certification" from Japan and organic certifications from three other countries, including the United States.

Source: OCA

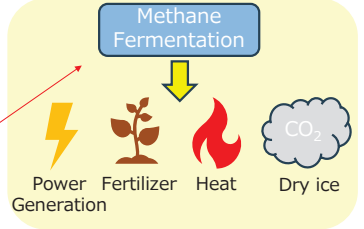
**OCA's Challenges and Requirements**

- Disposing of cacao pods incurs costs.
- Many are left on the farms.
- Seeking to repurpose them for environmental reasons.

Discarded Cacao Pod




Current Usage

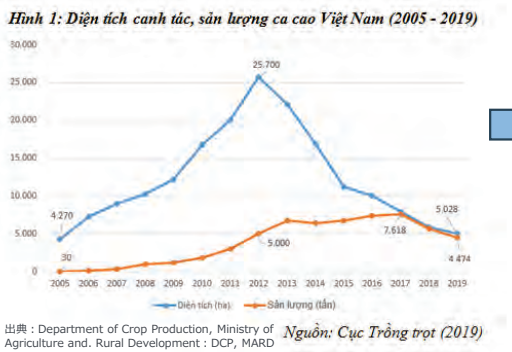



Vision for Effective Utilization




## Trends in the Cacao Industry in Vietnam

NIPPON KOEI




出典：Department of Crop Production, Ministry of Agriculture and. Rural Development : DCP, MARD

Nguồn: Cục Trồng trọt (2019)

Figure: Cacao Cultivation Area (Blue) and Production (Orange) in Vietnam

**<Analysis Results>**

- There has been a significant decrease in the area of cacao farms in Vietnam since 2012, from 25,700 hectares to 5,028 hectares.
- The annual cacao bean production in Vietnam was approximately 4,474 tons in 2019.

**Table: Status of Cacao Production in OCA and Ba Ria-Vung Tau Province**

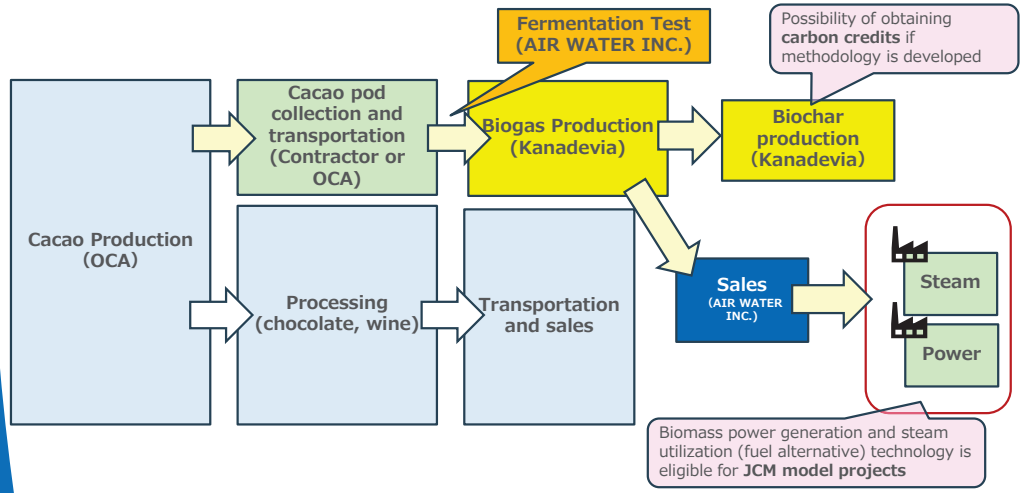
| Item | Cacao Farm of OCA | Cacao Farms in BRVT |
|---|---|---|
| Area (ha) | 230 | 450 |
| Cacao pod volume (ton/ha) | 15 | 15 |
| Biomass Volume (ton/year) | 3,450 | 6,750 |

*Based on interviews with OCA

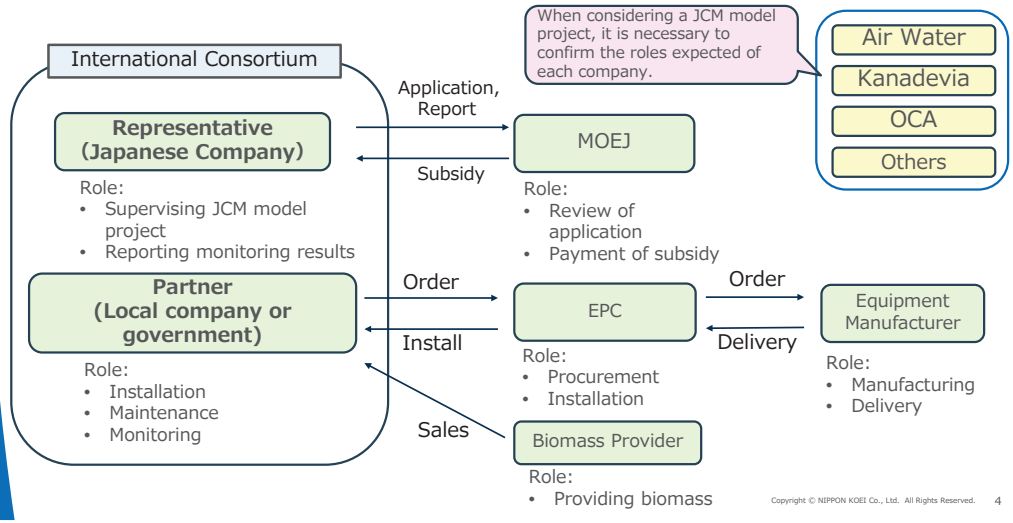



## Image of the Biogas Generation and Utilization Process

NIPPON KOEI



## Image of the Implementation Structure for JCM



## $CO_2$ Emissions Reduction Calculation (provisional): LNG

**Overview**

・Estimated quantity of biogas and thermal energy from cacao pods
・Estimated $CO_2$ emission reductions as an alternative to LNG

**Assumptions Regarding Cacao Pods**

・Estimated production: 3,450 tons/year
・Moisture content: 70%
・Organic matter content: 80%
・Carbon content: 40%
・Fermentation efficiency: 50%
・Methane purity: 60%
・Lower heating value of methane: 50 MJ/ton

**Parameters**

・Total heating value of methane: 12,420 GJ/year
・Emission factor (LNG): 0.0495 $tCO_2/GJ$

Considering the cost-effectiveness, it is desirable to target annual $CO_2$ reductions of 1,000 tons or more for JCM model project.

| Item | Unit | Value | Remarks |
|---|---|---|---|
| A. Cacao pod Production | ton/y | 3,450 | 15 ton/ha |
| B. Organic matter amount | ton/y | 1,035 | =A x dry weight % x organic matter content |
| C. Methane production | ton/y | 248.4 | =B x Fermentation efficiency x Purity |
| D. Methane calorific value | GJ/y | 12,420 | =C x Lower heating value of methane |
| E. Emission factor | $tCO_2/GJ$ | 0.0495 | Value for LNG |
| F. Annual $CO_2$ Emissions Reduction | $tCO_2/y$ | 615 | =D×E |
| G. Useful life (tentative) | year | 15 | |
| H. $CO_2$ Emissions Reduction | $tCO_2$ | 9,225 | =F×G |

## Current Challenges and Future Opportunities

◆ Assessment of the Potential for Biomass Utilization of Cacao Pods:
→Conduct tests to measure the quantity of gas generated.

◆ Securing Biomass Supply:
→Collaborate with other cacao farmers in the BRVT province to ensure a stable supply, involving the mixed use of other unused biomass.

◆ Exploration of Energy Utilization Forms:
→Investigate supply options for neighboring demand and industrial parks.

◆ Securing Profitability:
→Implement feasibility studies (FS) using support schemes from such as METI, JICA and alongside possible phase 2/ following activities of city-to-city collaboration project.

Aiming for the creation of a local production and consumption model that incorporates productivity improvements through the utilization of agricultural residues as fertilizer, as well as enhanced income and livelihoods for businesses and farmers through carbon credit revenues, focusing on decarbonized and sustainable agriculture.

NIPPON KOEI