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Yokohama's "Hydrogen Society" Initiatives

横滨的“氢社会”倡议

Climate Change Policy Headquarters,
City of Yokohama

横滨市气候变化政策总部



Overview of Yokohama

横浜概况

Plan of Japan

日本规划

Plan of Yokohama

横浜规划

Efforts of Yokohama

横浜措施

Overview of Yokohama

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Overview of Yokohama 横滨概况



Overview of Yokohama 横滨概况

东海道新干线-每日频率

Tokaido Shinkansen
Frequency per day

350
(as of March 2015)



All local and express trains stop
at Shin Yokohama Station

*1 Central Japan Railway Company Annual Report 2015

Tokaido / Sanyo Shinkansen 东海道/三洋新干线

Shin Yokohama	1h16min	Nagoya 名古屋
	1h50min	Kyoto 京都
	2h04min	Shin Osaka 新大阪
	2h19min	Shin Kobe 新神戸
	3h32min	Hiroshima 广岛市

Minimum travel time (source: JR Central)



— By Shinkansen
- - - By Shinkansen (under construction)
— By Air



横滨

羽田机场

Yokohama ↔ Haneda Airport

京急线
Keikyu Line

23 min^{*2}

京急机场大巴
Keikyu Limousine Bus

Approx. **25 min**^{*3}

*2 By using Airport Express (direct service). Travel time from Yokohama Station to Haneda Airport International Terminal Station

*3 Travel time from Yokohama City Air Terminal (YCAT) to Haneda Airport Terminal 1

Source: Keikyu Corporation and Keihin Kyuko Bus Co., Ltd.

TATSUNO



CHIYODA CORPORATION



JXTGエネルギー

YNU 横浜国立大学

YOKOHAMA National University



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1. Energy conservation / Low carbon 资源保护/低碳

- Because high energy efficiency is realized by utilizing fuel cell, we can significantly save energy. Since carbon dioxide is not discharged at the utilization stage, it can be energy that does not emit carbon dioxide by utilizing hydrogen derived from renewable energy or by combining CCS* at the time of production.

*CCS: Recovery and storage of carbon dioxide (碳捕获与封存)

- 使用燃料电池能效高，可以显著地节约能源。由于在使用阶段不排放二氧化碳，所以利用从可再生能源中产生的氢或在生产时结合碳捕获与封存，不会产生碳排放。

2. Disaster-resistant town development · Diversification of energy supply sources 能源供应来源多元化

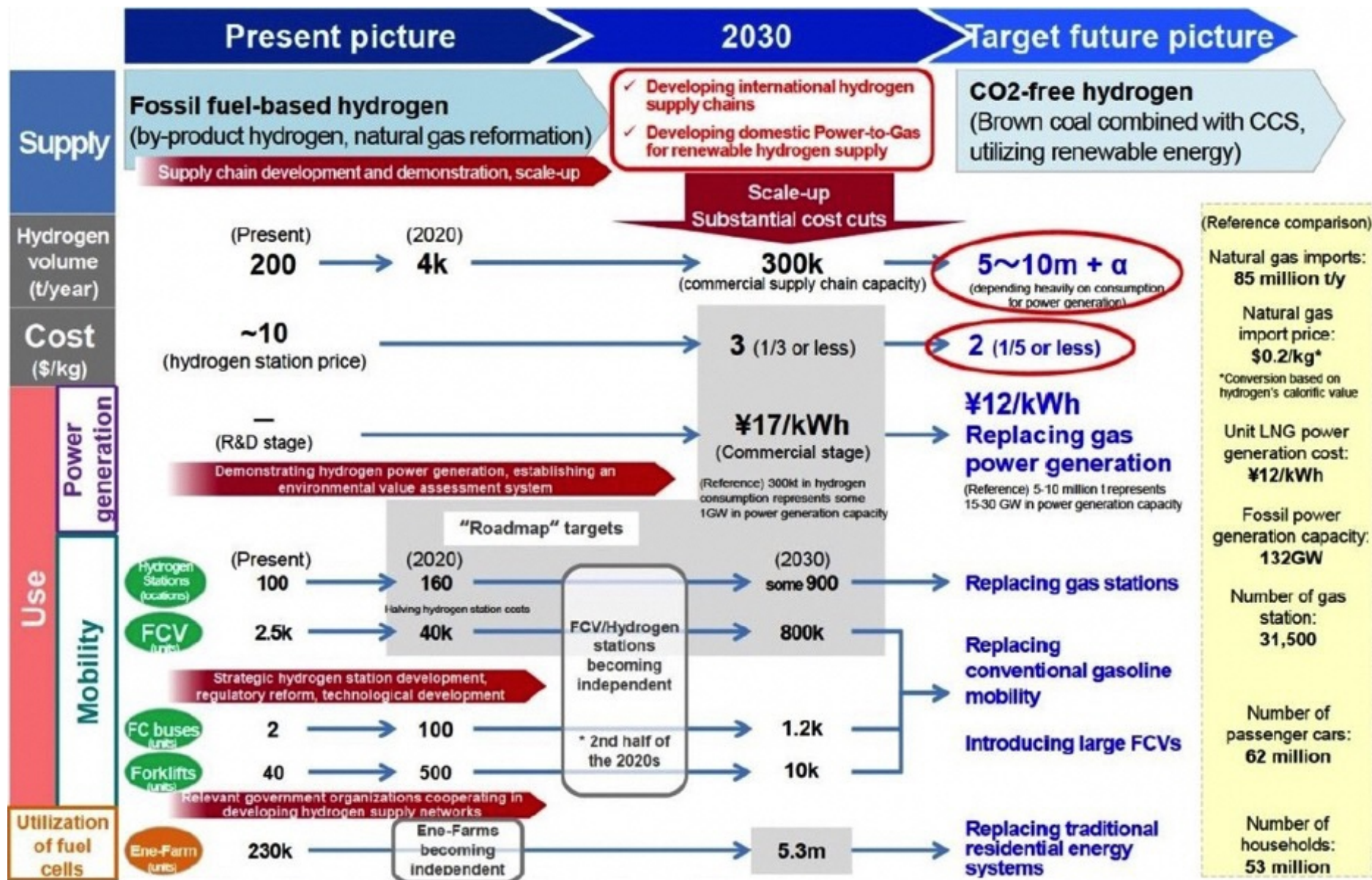
- Stationary fuel cells and fuel cell vehicles / buses can be used as emergency power supplies
- It can be manufactured from various primary energy sources such as unused energy such as by-product hydrogen and crude oil-associated gas, renewable energy, etc. There is a possibility that it will be added to the choice of energy other than fossil fuel in the future.
- 固定燃料电池和燃料电池车辆/公共汽车可作为应急供电设备
- 它可以从各种一次能源中生产出来。在未来，它有可能被添加到化石燃料以外的能源选择中。

3. Industry Promotion / Regional Revitalization 产业促进/区域振兴

- The base of fuel cell related industry is wide and Japan has strong competitiveness
- In hydrogen production, it is also possible to utilize regional resources such as renewable energy. Therefore, there is a possibility that it will lead to local areas.
- 燃料电池相关产业基础广泛，日本具有较强的竞争力
- 在制氢方面，也有可能利用区域资源，例如可再生能源。因此，有可能带动地方发展。

Plan of Japan (Basic Hydrogen Strategy)

日本规划 (氢策略)



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Yokohama city Action Plan for Global Warming Countermeasures

《横浜城市应对全球变暖行动计划》

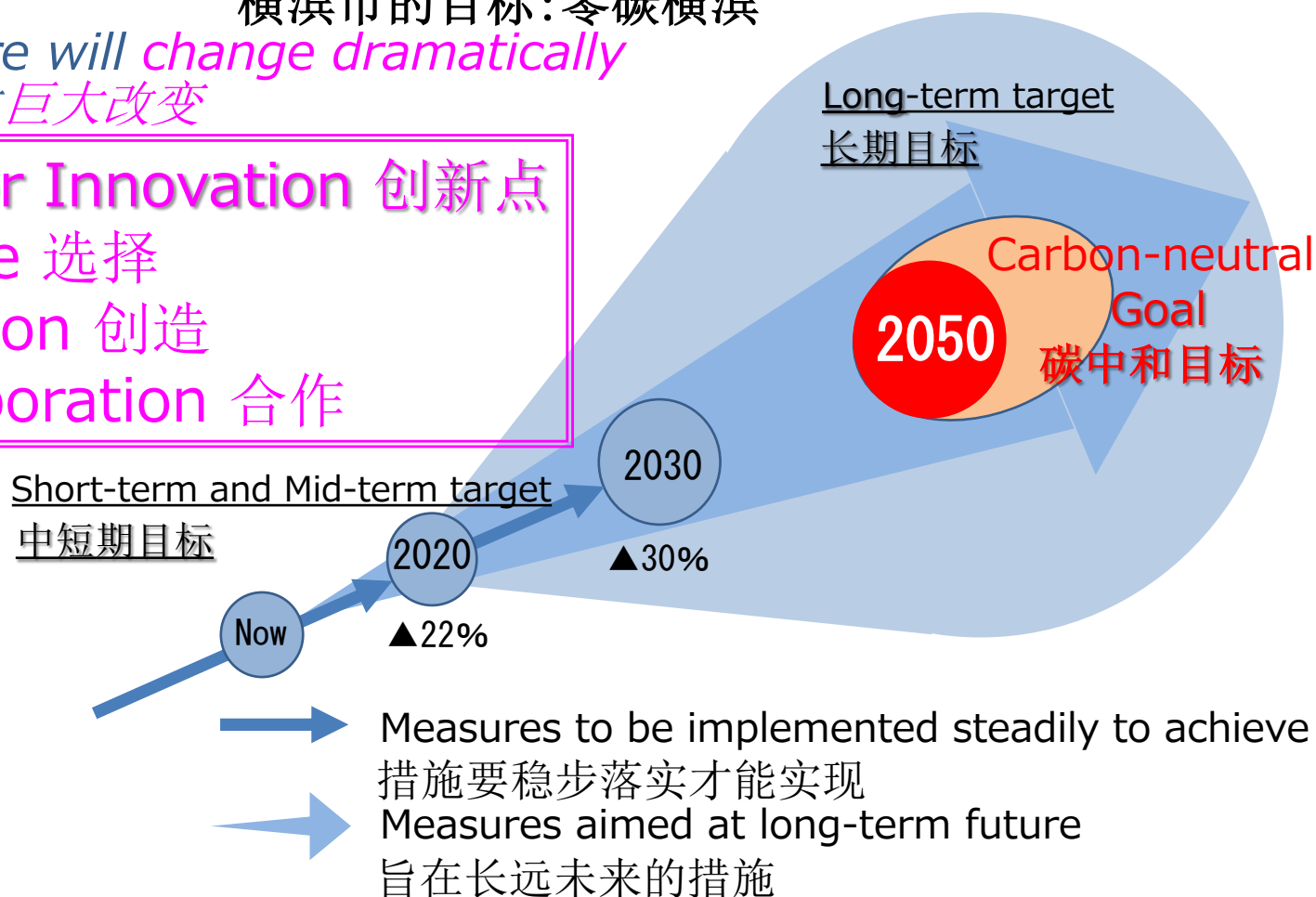
Yokohama City's Aim : Zero Carbon Yokohama

横浜市的目標: 零碳横浜

Social structure will *change dramatically*
社会结构将发生巨大改变

● Points for Innovation 创新点

- ① Choice 选择
- ② Creation 创造
- ③ Collaboration 合作



Yokohama city Action Plan for Global Warming Countermeasures

《横浜城市应对全球变暖行动计划》

- **Positioning the future image "town that is skillfully using renewable energy" and promote the utilization of hydrogen energy to realize a hydrogen society with a view to the future.**

定位未来“巧用可再生能源的小镇”形象，推动氢能利用，实现面向未来的氢能社会。

- **Major measures 主要举措**

- Examination of digestion gas increase using MBT(Mechanical Biological Treatment)system
采用MBT(机械生物处理)系统检测消化气体的增加量
 - Accept the city's biomass to sewage facilities and increase digestion gas as a raw material of hydrogen by methane fermentation utilizing the existing digestion tank
接受城市生物质能污水处理设施，利用现有消化罐，增加消化气作为氢气发酵原料
- Promoting of surface use of hydrogen etc.,
促进表面使用的氢等
- Promoting of construction of hydrogen stations
促进氢气站的建设
- Promoting of diffusion of fuel cell vehicles (FCV)
促进燃料电动机动车（流量控制阀）的扩散
- Promoting of diffusion of fuel cell bus
促进燃料电动大巴（流量控制阀）的扩散



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① Promoting of introduction of fuel cell vehicles 推广使用燃料电池车

- Fuel cell vehicles 燃料电池汽车
- Fuel cell bus 燃料电池公交车

② Promoting construction of hydrogen refueling stations 推进加氢站建设

- Hydrogen refueling stations 氢气站

③ Promoting dissemination of stationary fuel cells 促进固定燃料电池的推广

- Residential fuel cells (Ene-Farm) 家用燃料电池 (Ene-Farm)
- Fuel cells of industrial or commercial use 工业或商业用燃料电池

④ Keihin Project 京滨项目 (低碳氢供应链示范项目) (Low-Carbon Hydrogen Supply Chain Demonstration Project)

⑤ Public awareness 公众意识

⑥ Information transmission and cooperation 信息传递与合作

① Promoting introduction of fuel cell vehicles 推广使用燃料电池车

Fuel cell vehicles 燃料电池汽车

- Introduced 13 fuel cell vehicles in total for public vehicles 共引进13辆燃料电池汽车用作公共交通工具
Planning to introduce three vehicles in FY2019. 计划在2019财年引进3辆车。
In principle, EV or PHV or FCV will be introduced as public vehicles from FY 2020.
原则上, 从2020财年起, 电动汽车或插电式混合动力汽车或燃料电池汽车将用作公共交通工具。
All public vehicles will be next generation vehicles by FY 2030.
到2030财年, 所有公交车将更新换代。
- Implemented subsidies for purchasing FCV for citizens and business operators.
- 对购买燃料电池汽车的市民和企业实行补贴
 - Budget in FY2019 : 250,000 yen (2,300 USD) per car × 60
在2019财年预算: 25万日元 (2300美元) 每辆车 × 60
 - ※ Total subsidies of Japan, Kanagawa prefecture and Yokohama city is 2.97 million yen (27,700USD) 日本、神奈川县、横滨市补贴总额297万日元 (27,700美元)
 - ※ MIRAI: 6.7million yen (62,500USD) (Tax excluded) 丰田MIRAI: 670万日元 (62,500美元) (不含税)
- About 100 fuel cell vehicles spread in the city (at Jul.2018)
该市有约100辆燃料电池汽车 (2018年7月)

Fuel cell bus 燃料电池公交车

- With the "Rugby World Cup 2019™" as the opportunity, plan to introduce the FC bus to the Yokohama municipal bus in FY2019.
以“橄榄球世界杯2019”为契机, 横滨市营巴士计划在2019财年引入燃料电池公交车。



Public vehicle (FCV)



FC-Bus "SORA"
(Source: TOYOTA)

② Promoting construction of hydrogen refueling stations 推动加氢站建设

Hydrogen stations 氢站

- **Six* commercial hydrogen refueling stations are developed and operated.**
(Stationary type is 4, mobile type is 2 and simple type is 1.)
开发和运营6个商用加氢站。 * highest among domestic municipalities.
- **Implementation of construction cost for promotion** 实施工程造价推广
Budget in 2019 : Stationary type 40million yen (373,000 USD), mobile type 1.2million yen (11,200USD), simple type 10million yen (93,300USD)

Yokohama's Hydrogen Refueling Stations

<Stationary type>

- ① Asahi Ward (opened Feb 2015)
- ② Izumi Ward (opened Feb 2015)
- ③ Minami Ward (opened Mar 2016)
- ④ Kohoku Ward (opened Mar 2017)

<Mobile type>

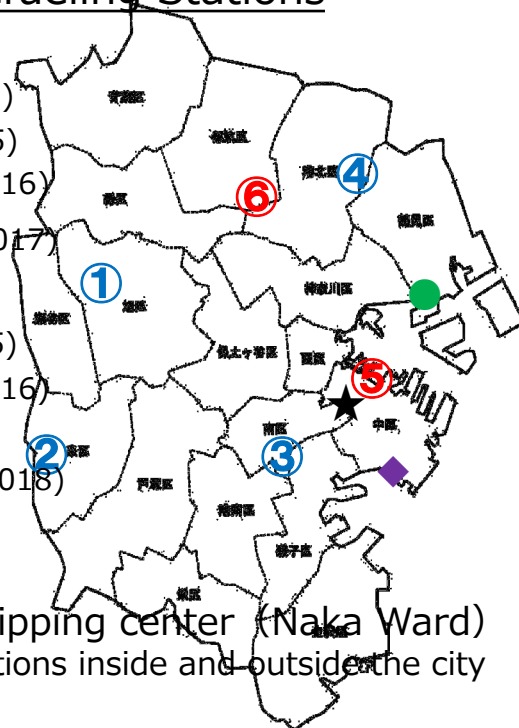
- ⑤ Naka Ward (opened Nov 2015)
- ⑥ Tsuzuki Ward (opened Feb 2016)

<Simple type>

- Tsurumi Ward (opened Mar 2018)

- ◆ Hydrogen production & shipping center (Naka Ward)
※ Hydrogen is supplied to stations inside and outside the city

- ★ City Hall



Stationary type :
Tsunashima
Hydrogen Station

Source:
JXTG Energy Co., Ltd.

Mobile type :
Oosanbashi
Hydrogen Station



Simple type :
Renewable Energy
Hydrogen Station
(Kanagawa Prefecture)

Residential fuel cells (Ene-Farm) 家用燃料电池(Ene-Farm)

- Approximately 16,000 residential fuel cells (Ene-Farm) are using in the city (at the end of Mar 2018)
大约16,000个家用燃料电池(Ene-Farm)(2018年3月底)
- Implemented subsidies for purchasing Ene-Farm for citizens.
(Budget in 2019 : 30,000yen(280USD) per unit ×300)
对购买Ene-Farm燃料电池的市民实行补贴。



Residential fuel cells
(Ene-Farm)

(Source: Tokyo Gas Co., Ltd.)

Fuel cells of industrial or commercial use 工业或商业用燃料电池

- Commercial fuel cells (200KW) will be introduced in the new city hall building to be used from 2020
从2020年起,新市政厅大楼将采用商用燃料电池(200KW)
- Hydrogen-based Autonomous Energy Supply System has been set in Yokohama Port Cargo Center (Y-CC) for a demonstration experiment in an energy management and usage energy in case of disasters.
以氢能为基础的自主能源供应系统设立在横滨港货运中心(Y-CC),对灾害情况下的能源管理和使用进行了示范实验。
- Implemented subsidies for purchasing commercial fuel cells. (Budget in 2019 : 100,000yen(930USD) per 1KW,total is up to 2.5million yen per unit)
对购买商用燃料电池实行补贴。



New City Hall



Hydrogen-based Autonomous
Energy Supply System

(Source : Toshiba Energy Systems Co., Ltd.)

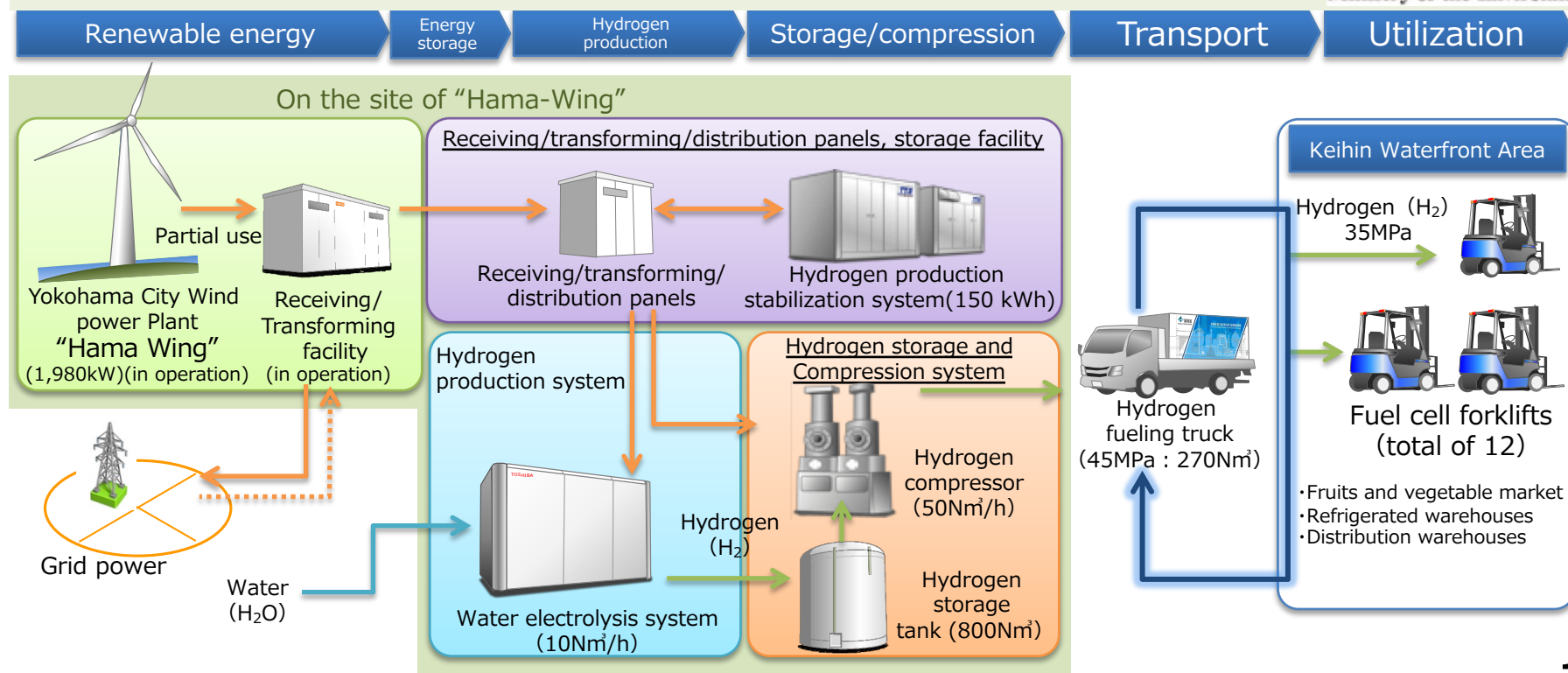
④ Keihin Project 京滨项目 (低碳氢供应链示范项目) (Low-Carbon Hydrogen Supply Chain Demonstration Project)

The project intends to carry out a demonstration of the supply chain through the storage and delivery of low-carbon hydrogen produced at the Yokohama Wind Power Plant (Hama Wing) to power fuel cell forklifts, thereby contributing to future regional development and global warming countermeasures.

【Ministry of the Environment commissioned project】

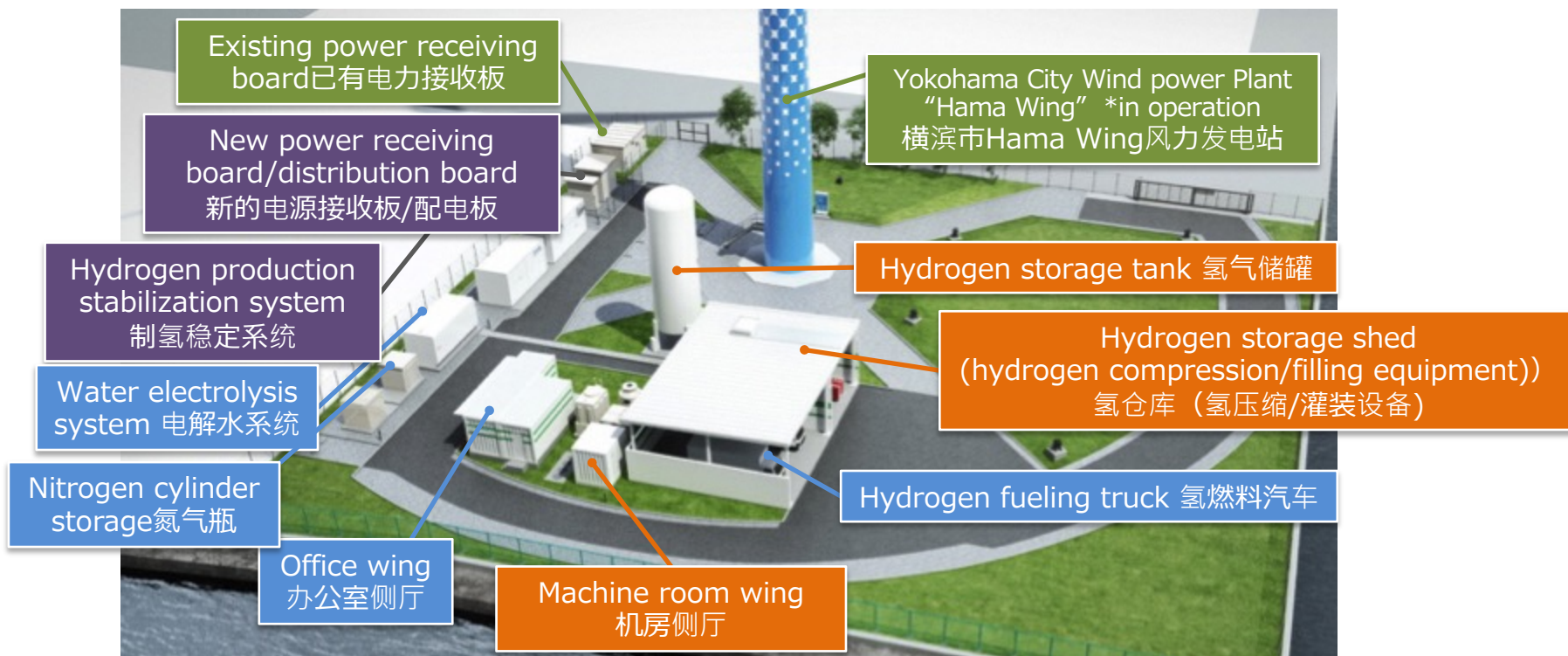
低碳氢供应链示范项目旨在通过储存和输送由横滨风力发电站 (Hama Wing) 生产的低碳氢，为燃料电池叉车提供动力，从而对未来区域发展和应对全球变暖做出贡献。

【环保部委托项目】



④ Keihin Project 京滨项目 (低碳氢供应链示范项目) (Low-Carbon Hydrogen Supply Chain Demonstration Project)

Model of Hama Wing site premises Hama Wing 风力发电站模型



④ Keihin Project 京滨项目 (低碳氢供应链示范项目) (Low-Carbon Hydrogen Supply Chain Demonstration Project)



Specific items to be verified by the project 项目验证

The business case for hydrogen supply chains and future expansion to other regions will be verified, through cost analysis and measurement of the project's contribution to global warming countermeasures.

通过对项目在应对全球变暖方面的贡献进行成本分析和测量，将验证氢供应链以及继续向其他地区推广的商业合理性。

➤ **Hydrogen cost 氢成本**

- ☐ The demonstration project will use evaluations of current conditions (demonstration project costs) to examine future courses of action required to reduce hydrogen costs, including verification of savings from economies of scale and identification of the steps needed to implement deregulation.

示范项目将利用对目前情况的评价(示范项目费用)来审查减少氢成本所需的未来行动方针，包括核查规模经济的节省和查明执行解除管制所需的步骤。

- ☐ The project will also examine the development of a promotional and deployment model through technological innovation, as well as the development of full-scale supply chains, based on projections of needs in 2030.

该项目还将根据2030年的需求预测，研究通过技术创新发展促进和部署模式，以及发展全面的供应链。

➤ **CO2 emissions reductions 二氧化碳减排**

- ☐ The project aims to construct a low-carbon hydrogen supply chain that can reduce overall CO2 emissions by about 80% when compared with conventional approaches.

该项目旨在构建一个低碳氢供应链，与传统方法相比，可将二氧化碳总排放量减少约80%。

- ☐ The project will examine measures for further reducing CO2 emissions.

该项目将研究进一步减少二氧化碳排放的措施。

⑤ Public awareness 公众意识



In cooperation with neighboring municipalities etc., we conducted test drive and exhibition of fuel cell vehicles at various events such as public awareness event of next-generation automobile etc.

与周边城市合作，开展燃料电池汽车试驾和展示的各类活动。



Creation of a leaflet for easy understanding of hydrogen energy
为方便理解氢能而制作的小册子



Participation in the planning of portal site on hydrogen energy
参与氢能门户网站的规划

⑤ Public awareness 公众意识

Yokohama Hydrogen Energy Council 横滨氢能理事会

Participate in industry-academia-government collaborative organization "Yokohama Hydrogen Energy Council" which aim to create "Kanagawa model for safe hydrogen energy" by returning research results on reliability, safety and usefulness of hydrogen energy to society



Yokohama Hydrogen Energy Council Establishment Commemoration Seminar

Yokohama National University
横滨国立大学

- Green Hydrogen Research Center
绿色氢能研究中心
- Risk symbiosis society
Creation center
风险共生学会

Yokohama Hydrogen Energy Council
Planning of events for awareness raising activity

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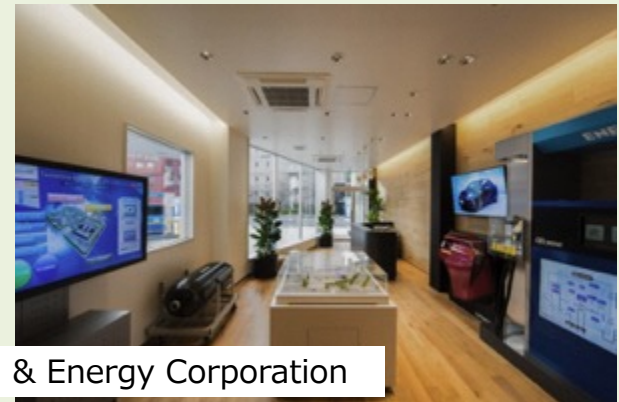
- JXTG Energy Co., Ltd.
- Iwatani Sangyo Co., Ltd.
- Chiyoda Corporation Construction Co., Ltd.
- Tokyo Gas Co., Ltd.
- Toshiba Energy Systems & Solutions Corporation
- Nissan Motor Co., Ltd.
- Hitachi, Ltd.

G

- Kanagawa pref.
- Yokohama city
- Kawasaki city
- Sagamihara city

Show Room 展厅 (suiso terrace)

JXTG Nippon Oil & Energy Corporation opened a show room named "suiso terrace" at Yokohama Tsunashima Hydrogen Station.



Source: JXTG Nippon Oil & Energy Corporation

⑥ Information transmission and cooperation 信息传递与合作

ICHS2015 YOKOHAMA

(International Conference on Hydrogen Safety)

ICHS2015横滨

(氢安全国际会议)



IPHE2018 YOKOHAMA

氢能经济国际合作伙伴 横滨



第六届中国(上海)国际博览会
2018年技术博览会

The 6th China(Shanghai) International
Technology Fair 2018



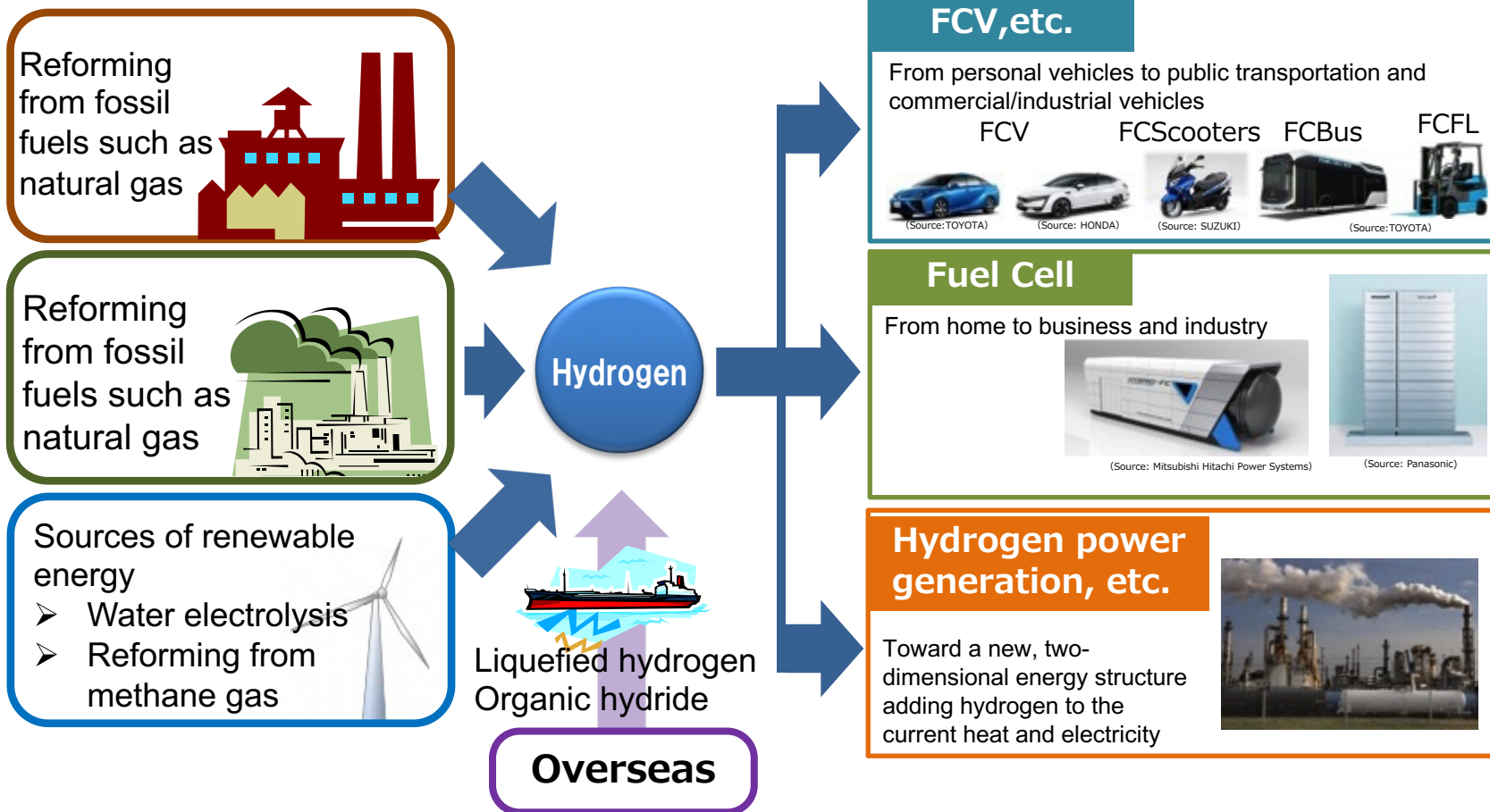
设施考察
Facility tour

Spread of Hydrogen Use 氢应用范围

The technology of companies and expertise of universities in Yokohama possess great potential for each of the stages in manufacturing, transporting/storing and using hydrogen
In cooperation with all of you, such as the country, related groups, etc., we will proceed efforts to realize a hydrogen society.

公司先进的技术以及大学完备的专业知识，使得横滨在制造、运输/储存和使用氢的每一个阶段都具有巨大的潜力；我们将与各界人士携手合作，共同推进“氢社会”建设。

Spread of Hydrogen Use 氢应用范围



SDGs FutureCity Yokohama 可持续发展目标未来城市 横滨

Plans based on SDGs and the Paris Agreement

基于可持续发展目标和巴黎协议的计划

Economy
经济

Society
社会

Environment
环境

SUSTAINABLE
DEVELOPMENT GOALS
17 GOALS TO TRANSFORM OUR WORLD

 Zero Carbon
Yokohama

Vision 愿景

Realizing a city that creates new value and prosperity through its economy, culture, and the arts, With the environment at its heart.

实现以环境为中心，通过经济、文化和艺术创造新的价值和繁荣的城市



Chinatown
唐人街



Minato Mirai
港未来



**Yokohama Port Opening
Memorial Hall**
横滨港开放纪念馆

Thank you for your attention.

谢谢



**Yamate Diplomat's
House**
雅门外交官之家



Sankeien Garden
三溪园



Zoorasia Yokohama
横滨动物园