



NIPPON SANSO HOLDINGS

BofA Securities Hydrogen Conference 2021 Corporate Presentation

June 23, 2021

Tokyo (Japan) with Texas (the United States)

The Gas Professionals

Important Notice

For the purpose of this notice, “presentation” means this document, any oral presentation, any question and answer session and any written or oral material discussed or distributed by NIPPON SANSO Holdings Corporation (“NSHD”) regarding this presentation. This presentation (including any oral briefing and any question-and-answer in connection with it) is not intended to, and does not constitute, represent or form part of any offer, invitation or solicitation of any offer to purchase, otherwise acquire, subscribe for, exchange, sell or otherwise dispose of, any securities or the solicitation of any vote or approval in any jurisdiction. No shares or other securities are being offered to the public by means of this presentation. This presentation is being given (together with any further information which may be provided to the recipient) on the condition that it is for use by the recipient) on the condition that it is for use be the recipient for information purposes only (and not for the evaluation of any investment, acquisition, disposal or any other transaction). Any failure to comply with these restriction may constitute a violation of applicable securities laws. The companies in which NSHD directly and indirectly owns investments are separate entities. In this presentation, “NSHD” is sometimes used for convenience where references are made to NSHD and its subsidiaries in general. Likewise, the words “the Company”, “we”, “us” and “our” are also used to refer to subsidiaries in general or to those who work for them. These expressions are also used where no useful purpose is served by identifying the particular company or companies.

● Forward-Looking Statements

This presentation and any materials distributed in connection with this presentation may contain forward-looking statements, beliefs or opinions regarding NSHD’s future business, future position and results of operations, including estimates, forecasts, targets and plans for NSHD. Without limitation, forward-looking statements often include words such as “targets”, “plans”, “believes”, “hopes”, “continues”, “expects”, “aims”, “intends”, “ensures”, “will”, “may”, “should”, “would”, “could”, “anticipates”, “estimates”, “projects” or similar expressions or the negative thereof. These forward-looking statements are based on assumptions about many important factors, including the following, which could cause actual results to differ materially from those expressed or implied by the forward-looking statements: the economic circumstances surrounding NSHD’s global business, including general economic conditions here and abroad; competitive pressures and developments; changes to applicable laws and regulations; the success of or failure of product development programs; decisions of regulatory authorities and the timing thereof; fluctuations in interest and currency exchanges rates; claims or concerns regarding the safety or efficacy of marketed products or product candidates; the impact of health crises, like the novel COVID-19 pandemic, on NSHD and its customers and suppliers, including foreign governments in countries in which NSHD operates, or on other facets of its business; the timing and impact of PMI (post-merger integration) efforts with acquired companies; the ability to divest assets that are not core to NSHD’s operations and the timing of any such divestment(s); and other factors identified in NSHD’s most recent annual Consolidated Financial Statements on Japanese Securities relevant acts and exchange commission, available on NSHD’s website. NSHD does not undertake to update any of the forward-looking statements contained in this presentation or any other forward-looking statements it may make, except as required by law or stock exchange rule. Past performance is not an indicator of future results and the results or statements of NSHD in this presentation may not be indicative of, and are not an estimate, forecast, guarantee or projection of NSHD’s future results.

● Certain Non-IFRS Financial Measures

This presentation and materials distributed in connection with this presentation include certain financial measures not presented in accordance with International Financial Reporting Standards (“IFRS”), such as Core Operating Income, EPS (Earnings per share), Debt, Net Debt, Adjusted net D/E ratio and Free Cash Flow. NSHD’s management and executive officers evaluates results and makes operating and investment decisions using both IFRS and non-IFRS measures included in this presentation. These non-IFRS measures exclude certain income, cost and cash flow items which are included in, or are calculated differently from, the most closely comparable measures presented in accordance with IFRS. By including these non-IFRS measures, management and executive officers intends to provide investors with additional information to further analyze NSHD’s performance, core results and underlying trends. NSHD’s non-IFRS measures are not prepared in accordance with IFRS and such non-IFRS measures should be considered a supplement to, and not a substitute for, measures prepared in accordance with IFRS. Investors are encouraged to review the reconciliation of non-IFRS financial measures to their most directly comparable IFRS measure, which are on the part of our slide deck.

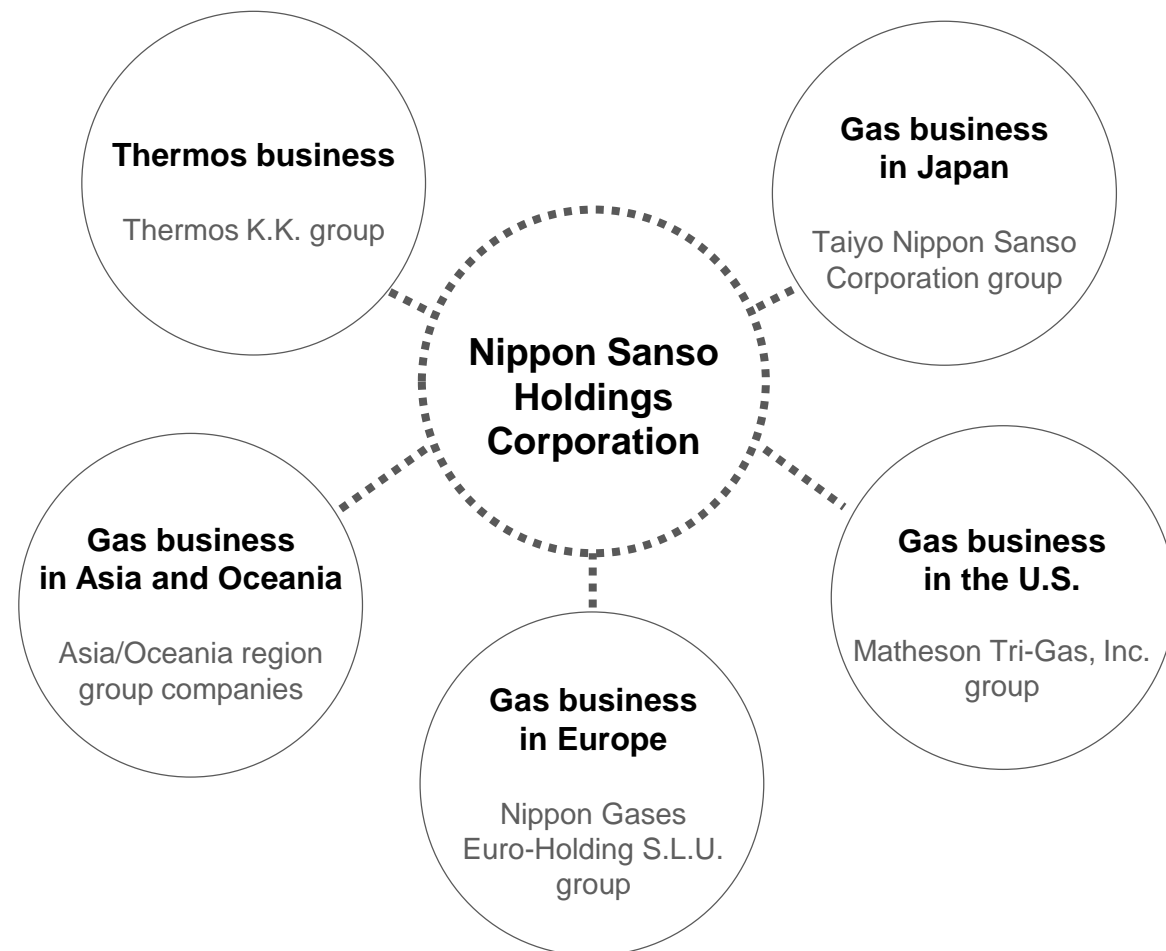
● Financial information

NSHD’s financial statements are prepared in accordance with international Financial Reporting Standards (“IFRS”).

Group Overview

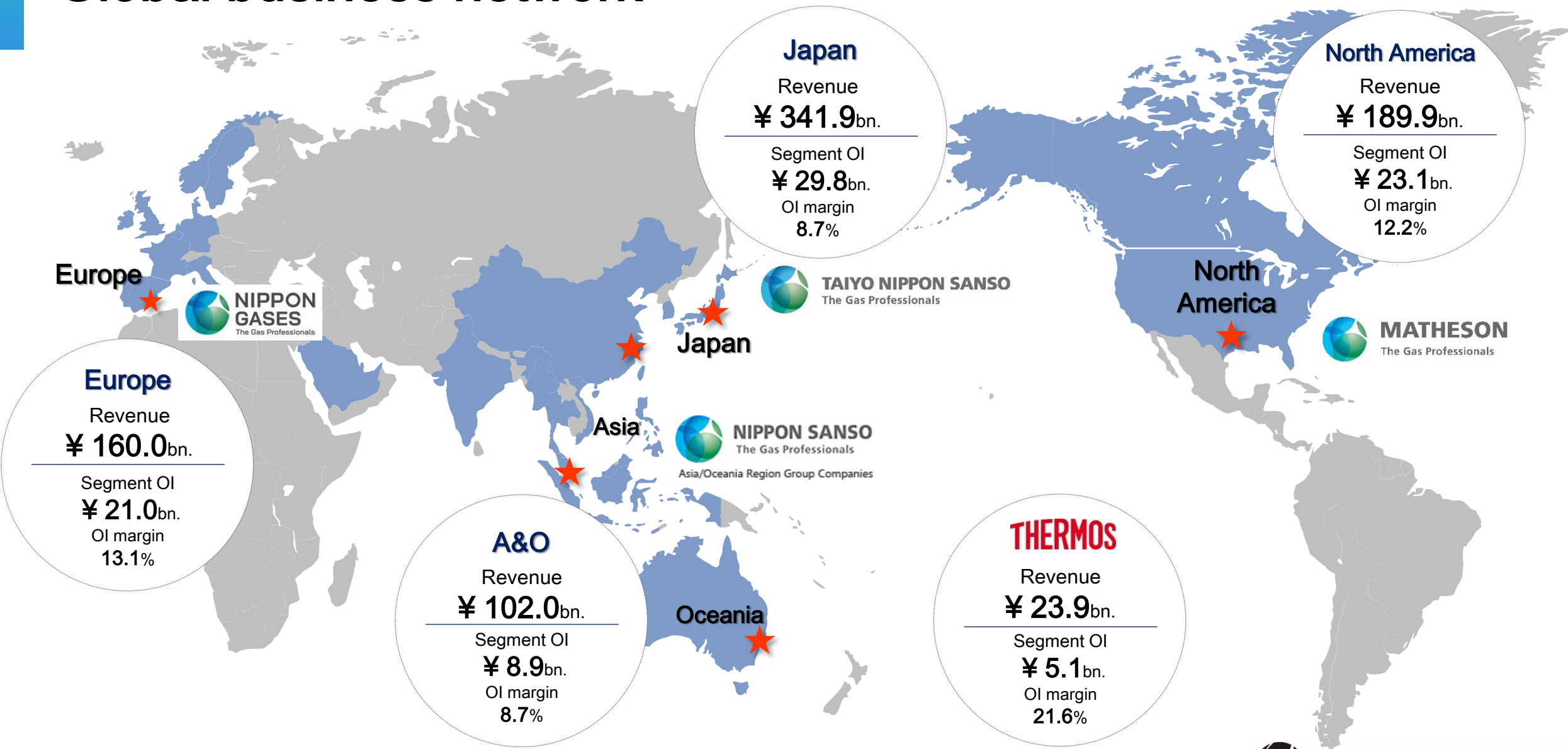
Company name	Nippon Sanso Holdings Corporation (NSHD)
Ticker (Tokyo Stock Exchange)	4091.T
Established	October 30, 1910
Head office	1-3-26 Koyama, Shinagawa-ku Tokyo, Japan
President CEO	Toshihiko Hamada
Employees [As of March 31, 2021]	19,357
Revenue (¥ bn.) [FYE2021]	818.2
Operating income (¥ bn.) [FYE2021]	88.8
OI margin [FYE2021]	10.9%
Contries Served	29 Countries and Areas

NSHD's Group operating structure



Global business network

As a result of the reclassification of segment classifications in FYE2022, figure for FYE2021 has been restated based on the new segment classifications.



Our key businesses

Industrial Gases



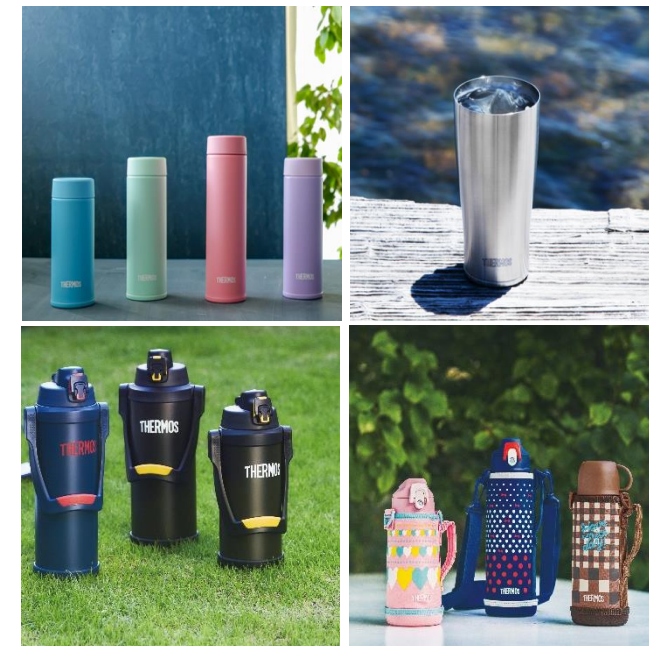
- Main Products
- Oxygen
 - Nitrogen
 - Argon
 - Hydrogen, CO and syngas
 - Carbon dioxide
 - Helium

Electronics



- Main Products
- AsH_3
 - B_2H_6
 - CH_3F
 - HCL
 - PH_3
 - SiH_4

Thermos



- Main Products
- Bottle
 - Mug
 - Tumbler
 - Frying-pan
 - Pan
 - Dish

Global HyCO



- Premier operational safety performance
- Structured leadership for global Hydrogen and Syngas (HyCO)
- Responsibilities from technology and product development through strategy and alliances to business development and operations
- Best-in-class design, operations, and HyCO supply solutions
- Leadership has over 200 years HyCO experience
- Life to date supply reliability > 99.5%
- Global heritage and experience

HyCO/Hydrogen Production – Primary Technologies

Historically, there have been a large number of routes used for industrial hydrogen production

- Hydrocarbon-based Technology Options
 - Reforming Technologies
 - Steam Reforming of Hydrocarbons (1835+): Steam Methane Reforming (SMR) and Steam-Naphtha Reforming (SNR)
 - Autothermal Reforming (ATR)
 - Secondary Reforming, Pre-Reforming, Gas Heated Reforming, Combined Reforming
 - Gasification (1765/1870 +)
 - Partial Oxidation (POx) of gas feedstock
 - Heavies, waste gasification
- Electrolysis (1800/1888+)
 - Alkaline Electrolysis
 - Proton Exchange Membrane (PEM) based Electrolysis
 - Solid-oxide Electrolysis
- Other categories of Hydrogen/HyCO production include
 - By-product/co-product hydrogen from various industrial processes
 - Some of these such as gas crackers and caustic chlorine can be very significant sources
 - Novel/emerging technologies for hydrogen production including various forms of pyrolysis

HyCO/Hydrogen – An “Owner-Operator” Perspective

Evolving Considerations

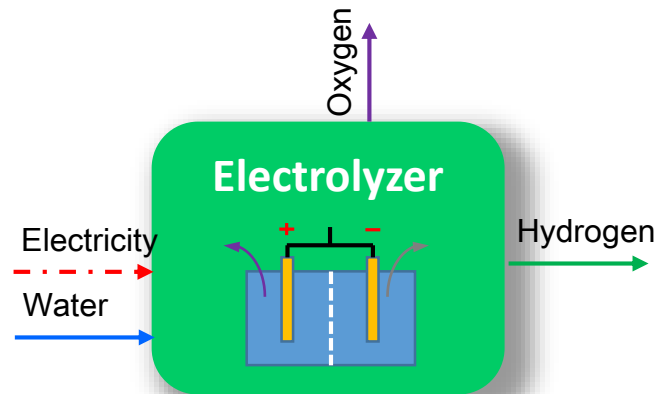
Evolving Technologies

Achieving Optimal Balance



Hydrogen Production – Electrolysis and Hydrocarbon-based

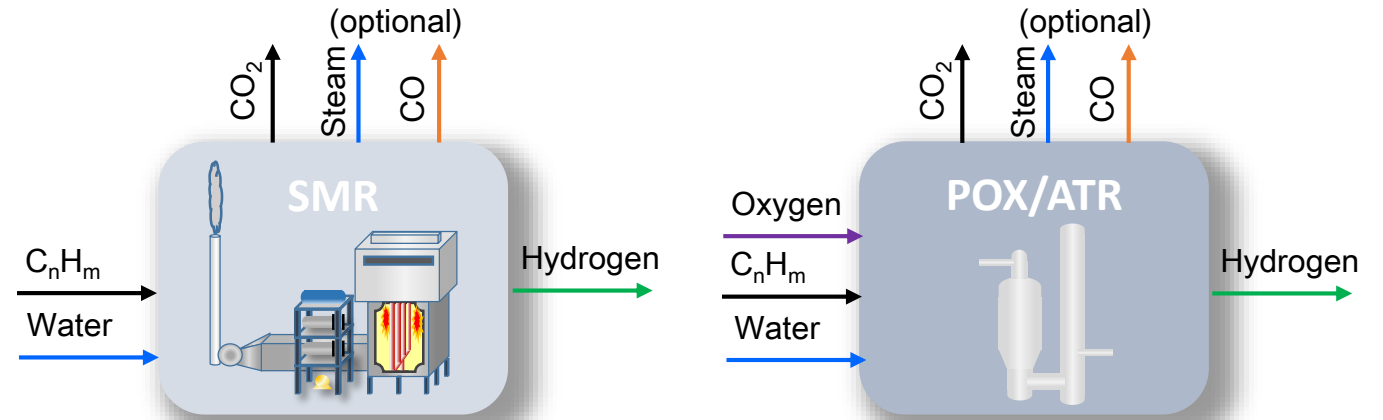
Electrolysis Based



Key Considerations:

- Electricity Consumption ~50-70 kwh/kg H₂
- Power Source (cost, carbon intensity, availability)
- Water availability
- Potential co-product utilization (Oxygen)
- Related CO₂ emission depends on carbon intensity of power source (from Zero to worse than SMR)

Hydrocarbon Based

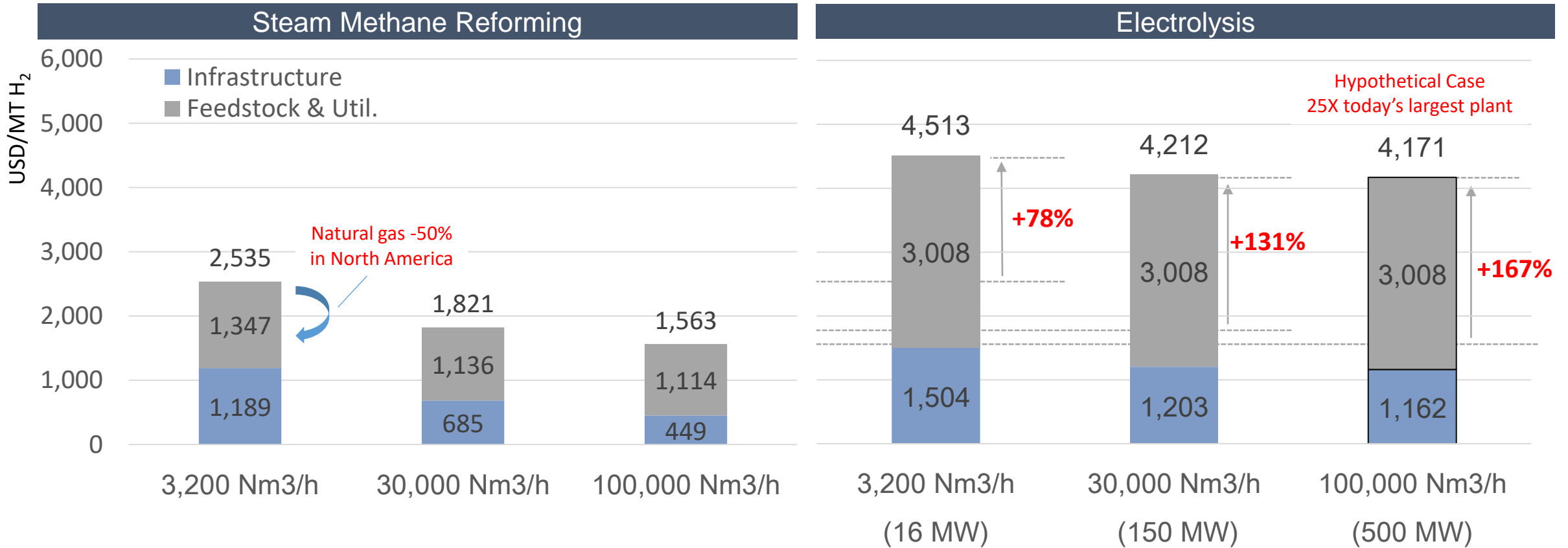


- Hydro Carbon Energy Consumption*
SMR 51-60 kwh/kg H₂ POX/ATR 48-58 kwh/kg H₂
- Feed Source (cost, carbon intensity, availability)
- Oxygen Source (for POX and ATR)
- Potential co-product utilization (CO, Syngas, Steam)
- Potential CO₂ utilization (CCS, CCU)
- CO₂ emission**
SMR 9.2-11.2 kg/kg H₂ POX/ATR 8.8-11 kg/kg H₂

* Doesn't include credit from steam export (5-10 kwh/kg H₂ reduction)

** Doesn't include associated CO₂ from electricity consumption or avoided CO₂ from steam export

Hydrogen Production – Key Technologies & Benchmarking



CO₂ Emissions
MT CO₂/MT H₂

9.3

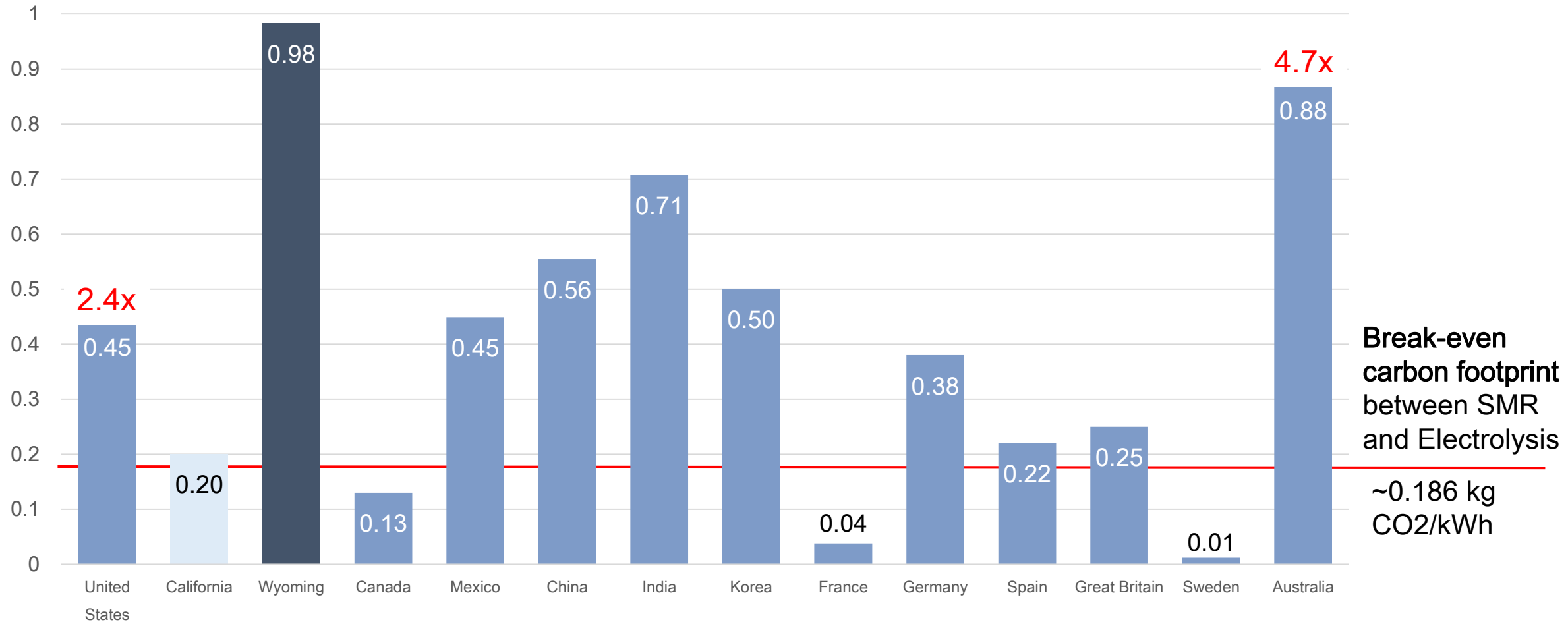
**Break Even at
>200 USD/MT "Carbon Tax"**

**USA 25.0 / 16.7 Europe Grid
zero if 100% renewable**

Nat gas: \$20/MWh (\$6/mmbtu), **Power: \$50 \$/MWh**, Grid Carbon intensity: USA 0.45, Europe 0.30 kg CO₂e/kWh

Hydrogen Production Benchmarking– Key Considerations (Contd.)

kg CO2/kWh

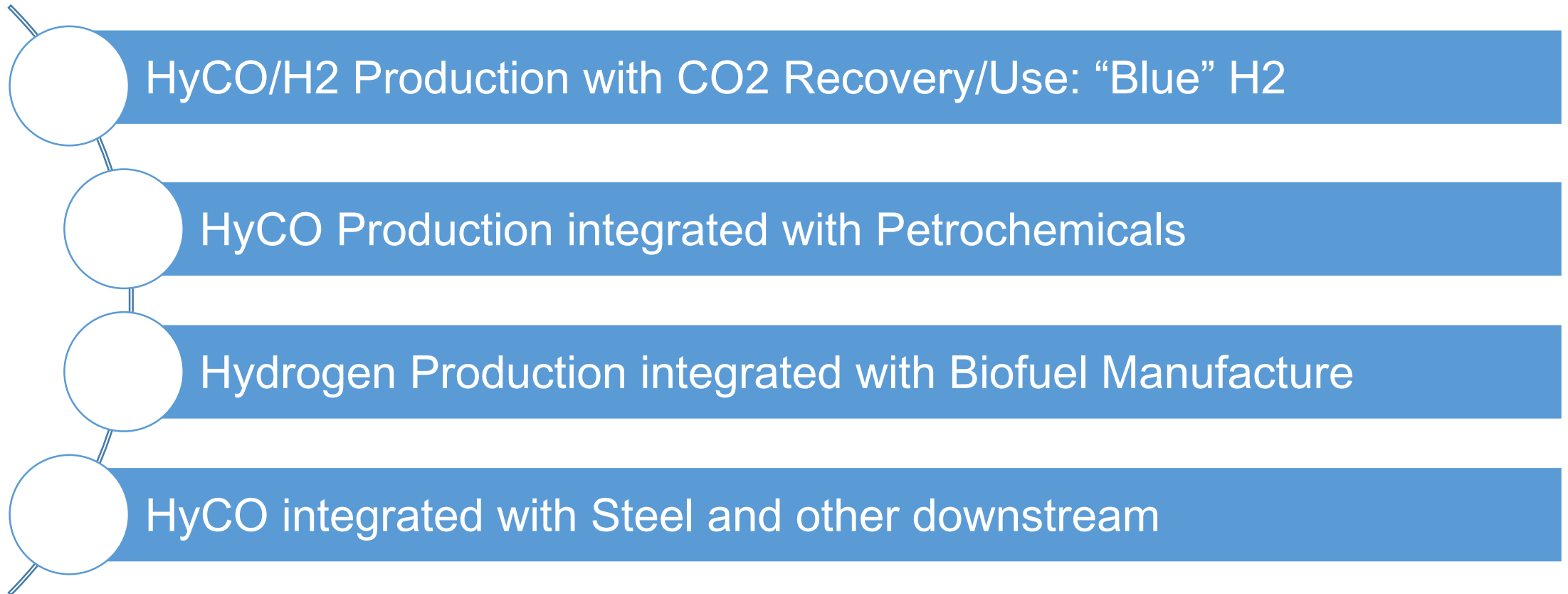


- **Minimization of coal/heavy oil-based power and “cleaner” grids are the critical factor for HyCO production carbon footprint management and cost-effective power to the economics**

Grid data source: carbonfootprint.com

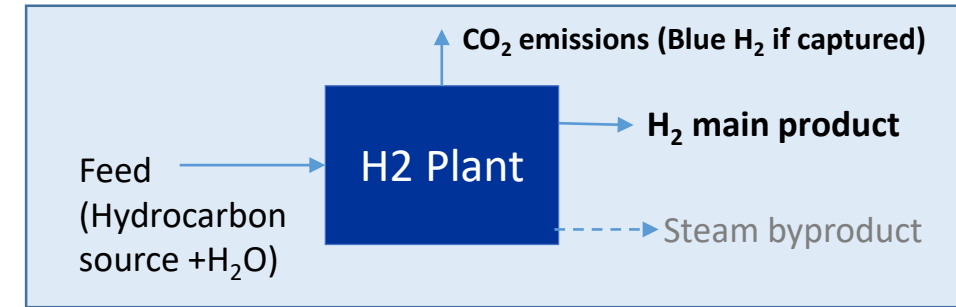
HyCO/Hydrogen Production Integrated with Utilization

- Traditional, highly-proven HyCO production technologies can be integrated with downstream to substantially reduce GHG

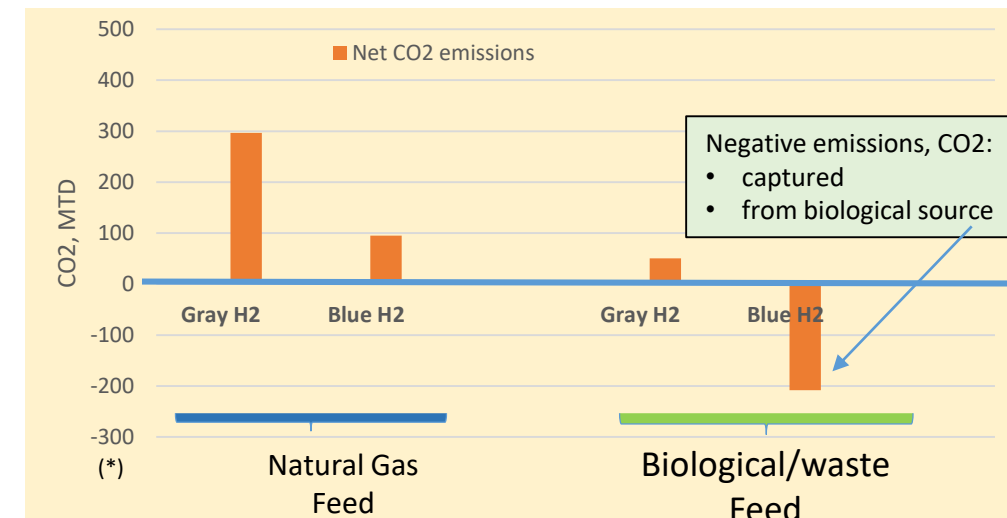


“Blue” Hydrogen Production with Carbon-Dioxide Recovery

- **Blue H2:** bridge between (low cost, high emissions) gray H2 and (high cost, scale limited, zero emissions) green H2.
- CO2 can be recovered and reused, e.g., Enhanced Oil Recovery (EOR), use to make chemicals; or permanently sequestered (geological or deep sea).
- Blue H2 production entails higher capex and variable costs for CO2, capture, compression, storage, transportation and sequestration, although this can, for many cases represent the most balanced solution for the medium and even long term
- Carbon credits, availability of CO2 sequestration sites and processing costs are essential for commercially viable deployment of blue H2 and governments and collaborative efforts have a critical role.



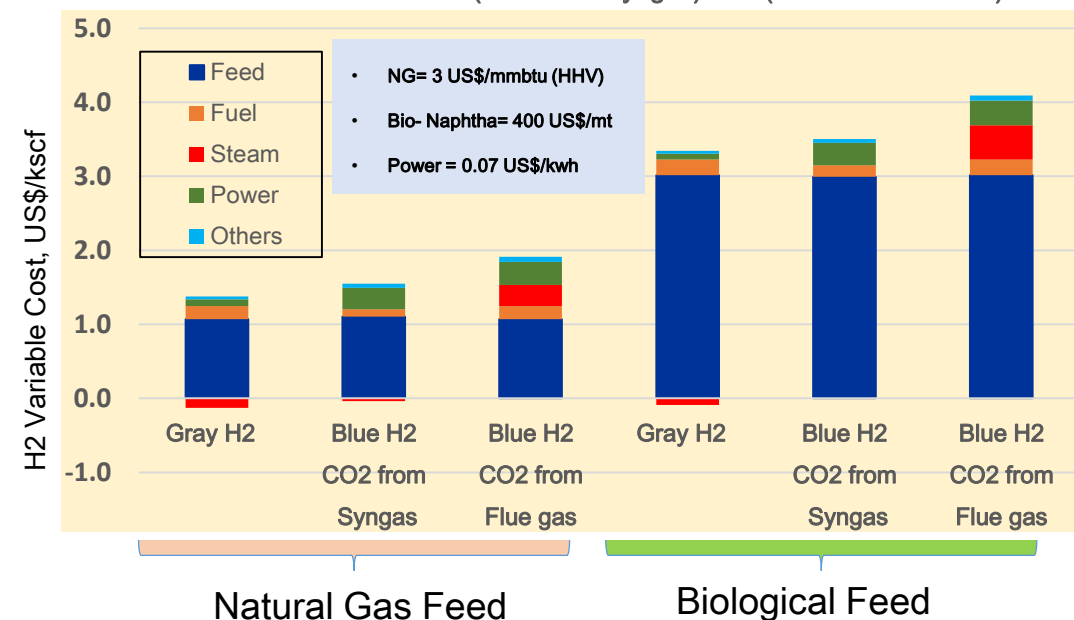
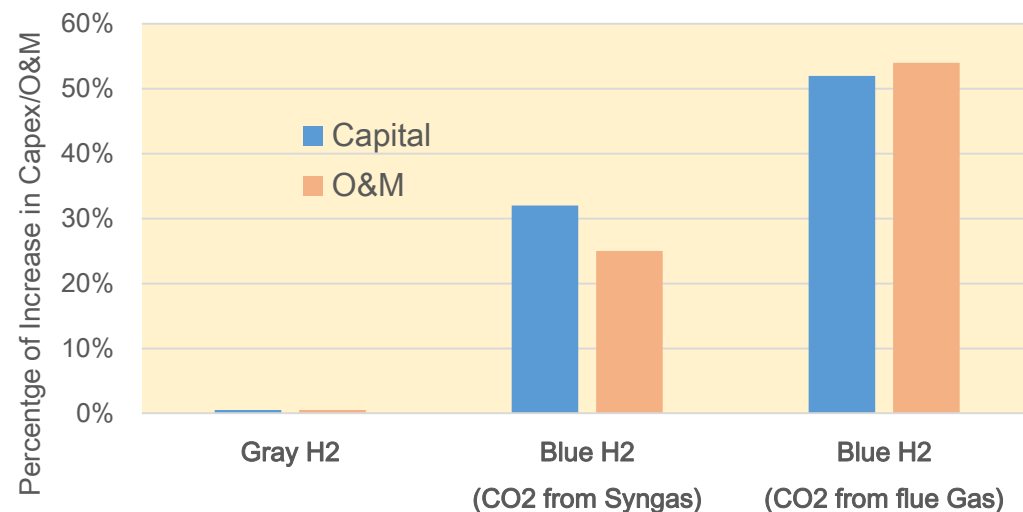
Gray H2	Blue H2	Green H2
- From fossil fuels	+/- Fossil fuel w CO2 capture/sequestered	+ Renewable source
+ Limitless production	+ Limitless production	- Limited production
+ Low Cost	+/- Moderate cost	- Expensive
- Emissions	+ less emissions	+ No/little emissions
		- 24/7 limitations
		- Credits dependent



(*) Referential scale (actual number depends on plant size, and other factors)

“Blue” Hydrogen Production – Illustrative Economic Impacts

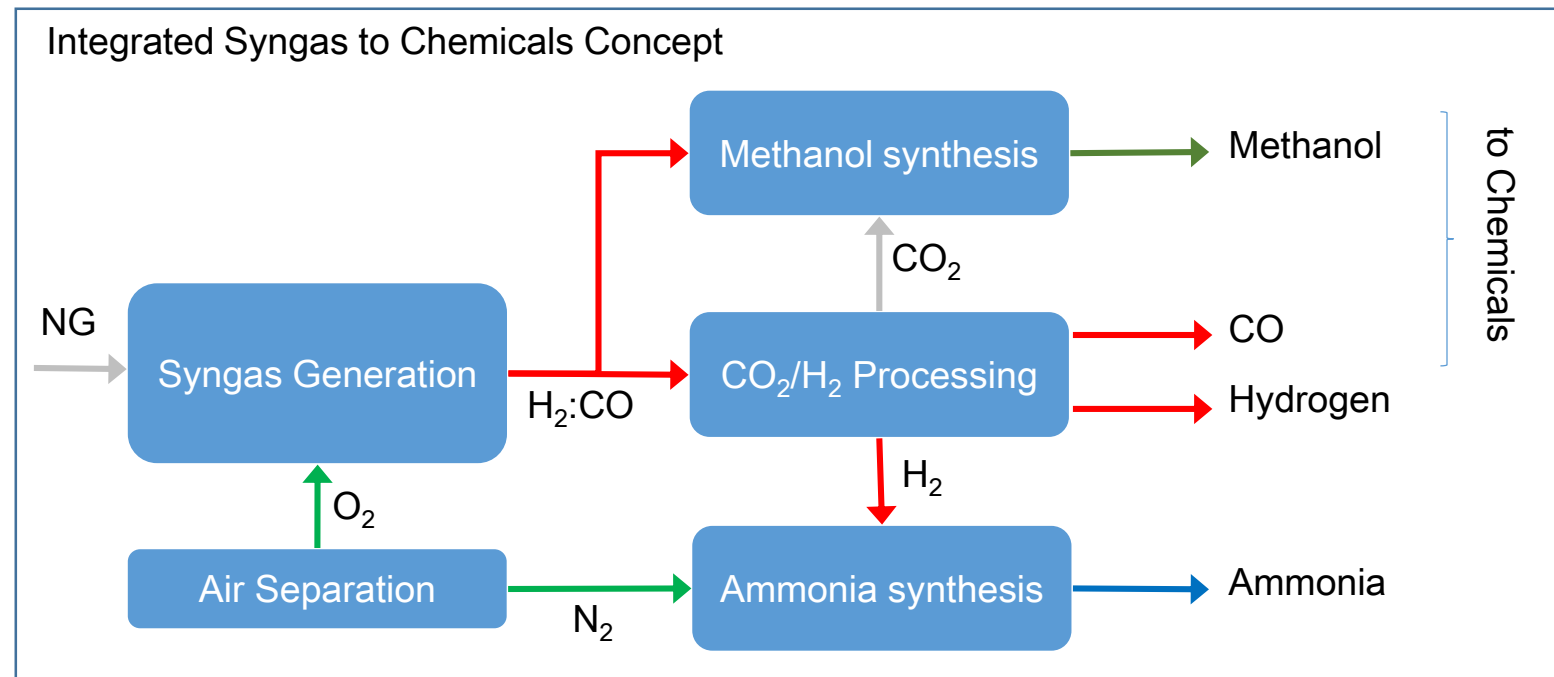
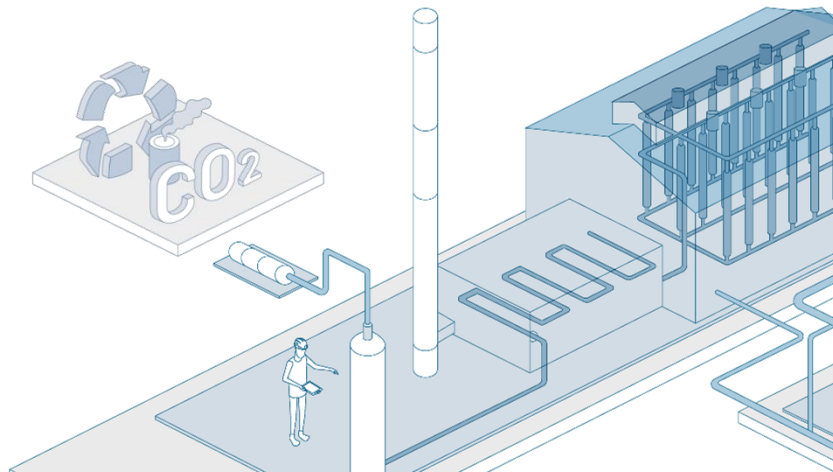
- Green diesel production of 150-180 Million Gallons/yr
- Mid-sized H2 plant (25-30 mmscfd)
- Evaluation of “gray” H2 vs (two options) “blue” H2
- Higher capex and opex (equipment, chemicals, labor, etc.)
- Variable cost difference (“blue” vs “gray” H2): ~ 0.25 to 0.65 US\$/kscf H2 higher cost for blue H2
- CO2 handling after recovery excluded from the economics (compression, storage, transportation, sequestration)
- Carbon credits (typically >50 \$/tm CO2) required to makeup the price difference (depend on multiple factors, e.g., feedstock & utility costs, CO2 sink source, geopolitics, etc.); EOR with ultimate sequestration can have major benefits as applicable



HyCO/Hydrogen Production Integrated with Petrochemicals

Integrated HyCO facilities provide opportunities for decarbonization in the chemicals sector:

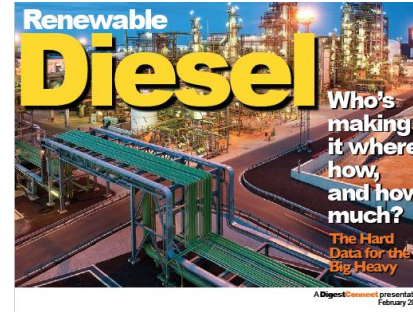
- Product balance and integration to maximize economies of scale, synergies and carbon sinks (e.g. Methanol, Acetic Acid, Formaldehyde, Oxo-alcohols & derivatives)
- CO₂ Capture and recycling via dry reforming, CO₂ electrolysis and other technologies



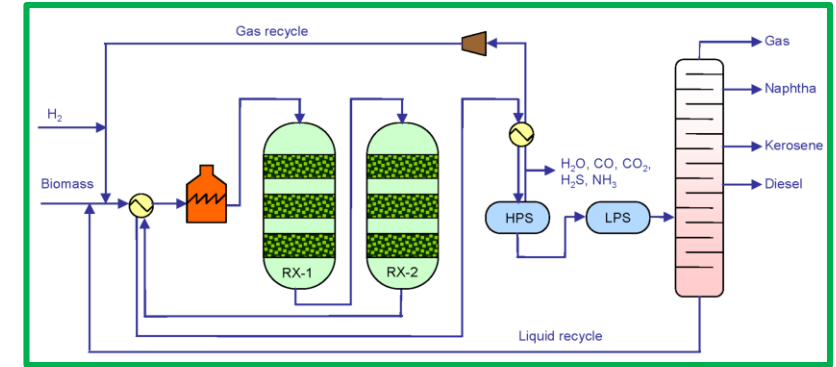
Hydrogen Production Integrated with Biofuels

FATS, OILS, GREASES, BIOWASTE CONVERTED TO RENEWABLE DIESEL, NAPHTHA, JET FUELS

- >50 green diesel/jet fuel projects developed/planned (operating, expansion, in planning, announced, under construction)... and more are announced almost daily
- Lucrative business - monetization of very low cost feed
- Nearly 10 billion gallons/yr of green fuels; with full market allocation
- H2 need: ~1 to 2 billion scf/day (1.1-2.2 million Nm³/hr)
- H2 plants are typically 10-50 mmscfd (11-56 KNm³/hr)
- Renewable fuel byproducts can be smartly integrated with traditional hydrogen plants to substantially reduce overall carbon emission and economics.
 - Matheson/NSHD have developed conceptual designs and completed, firm lifecycle costs for multiple cases
 - Unlike many others, option can be economic with limited subsidies
- CO₂ recovery options (syngas, flue gas) can be additionally incorporated depending on site conditions, economics.

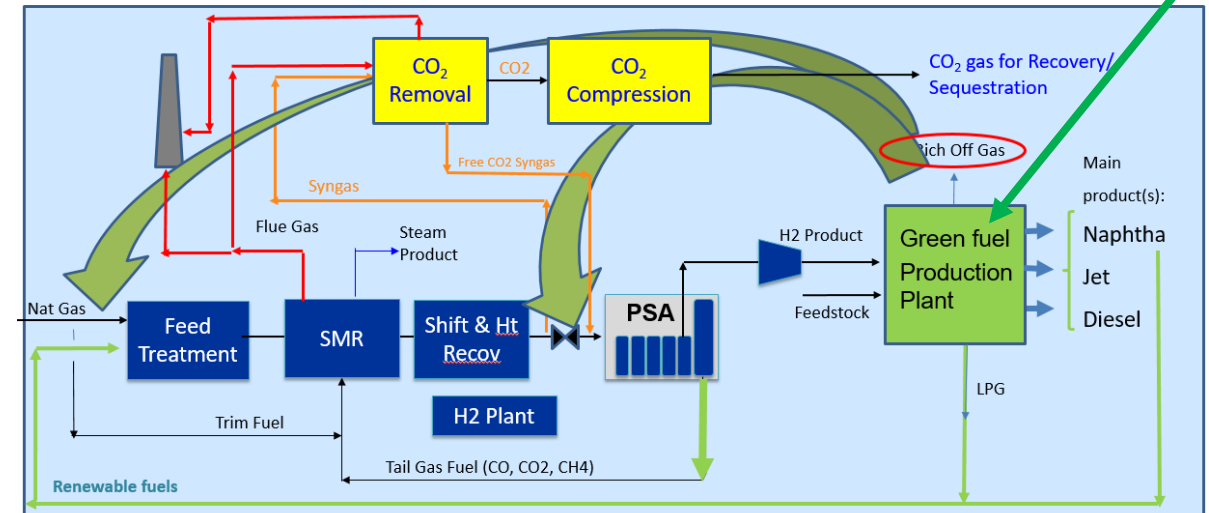


Source: **DigestConnect** presentation February 2021



Green Fuel Production Plant

Hydrogen is needed to make green fuels



Summary

- Production and utilization of Hydrogen and co-products is a rapidly evolving arena
 - Technology and process optimization needs are accelerated by the combination of strong environmental (GHG) drivers and increasing economic pressures
 - Traditional production options are continuously evolving and new/ novel technologies are emerging and necessary
- Optimal solutions will continue to vary on a case-by-case basis, especially for medium-sized and large hydrogen/HyCO needs
 - Comparisons of alternate options must consider feedstock source(power, hydrocarbons) GHG to avoid environmental degradation and economic impact caused by premature commercialization
 - Minimization of coal/heavies based power generation, or carbon capture from the same, is necessary to obtain widespread environmental benefits from power dependent HyCO production
 - Integration across processes can enable economically effective carbon-mitigated solutions
- Significant evolution across the renewables supply chain (power, bio-feedstock etc), pragmatic governmental support, and fundamental advances in blue/green hydrogen technologies are required to help moderate economic impacts & harness environmental benefits in the HyCO production arena versus the utilization of approaches that involve widespread commercial implementation of inefficient technologies and process schemes

For further information, please contact:

Investor Relations for investors

Investor Relations, Group Finance & Accounting Office

Tel: +81 (0)3-5788-8512

E-mail : Nshd.ir@nipponsanso-hd.co.jp

Upcoming IR events

Q1 FYE2022 Earnings Call

July 30, 2021

www.nipponsanso-hd.co.jp/en/

NIPPON SANSO Holdings Corporation (Ticker:4091.T)

Headquarters : 1-3-26 Koyama Shinagawa-ku, Tokyo 142-0062, Japan



NIPPON SANZO HOLDINGS

The Gas Professionals

© 2021 NIPPON SANZO Holdings Corporation All rights reserved