



Hydrogen @ Air Liquide



Key Milestones of ALFE 亞東發展歷史

1902 Est of Air Liquide	1907 Entering Asia/Japar	1913 IPO in France	1962 Start space adventure.	1985 Est of Electronics Business Unit	1987 Est of ALFE JV of AL & Far Eastern	~ Present Operate 17 plants 40+ sites	2020-2022 >15 bNTD CAPEX Investment
---	--	--	---	--	---	---	---



ABATEMENT OF CO2 EMISSIONS 降低二氧化碳排放目標並達成碳中和

液空集團
的承諾



Air Liquide

二氧化碳排放量的絕對值
開始減少

2025

與2015年相較，碳強
度**-30%**
(kg CO₂ /€ EBITDA^(a))

2035

減少**-33%**^(b)直接&間接
CO₂排放量的**絕對值**



在**2050年**
達到**碳中和**目標

2050

(a) 以2015年匯率計算，不包括FRS16的
直接和間接溫室氣體排放
(b) 從2020年開始，以市場為基礎的排放量為
3250萬噸二氧化碳量(直接+間接)

THE EMISSIONS OF AL's ASSET BASE 液空集團二氧化碳排放現況

SCOPE 1 (Direct Emissions)

15.3 MtCO₂eq



Hydrogen/CO^(a)
27%



Cogeneration
15%



Other direct emissions
5%



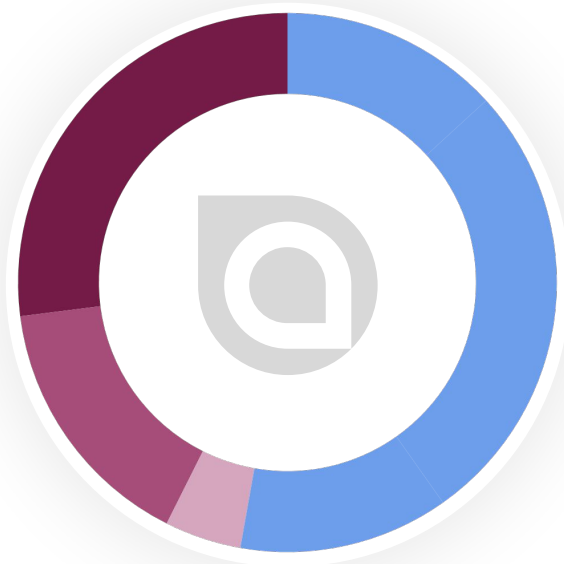
32.5^(b)
MtCO₂eq

SCOPE 2 (Indirect Emissions)

17.2 MtCO₂eq



Electricity & Steam
mostly for Air Gases^(c)
53%



(a) Includes all Hydrogen & Carbon Monoxide production assets (SMR, ATR, POx)

(b) Market based emissions

(c) Includes all Air Separation Units and Electronics Carrier gases production

SCOPE 1: DECARBONIZE OUR ASSETS

Capturing CO₂ 碳捕捉

- CO2 recycle on SMRs
- Partnerships



Using renewable feedstock 再生原料

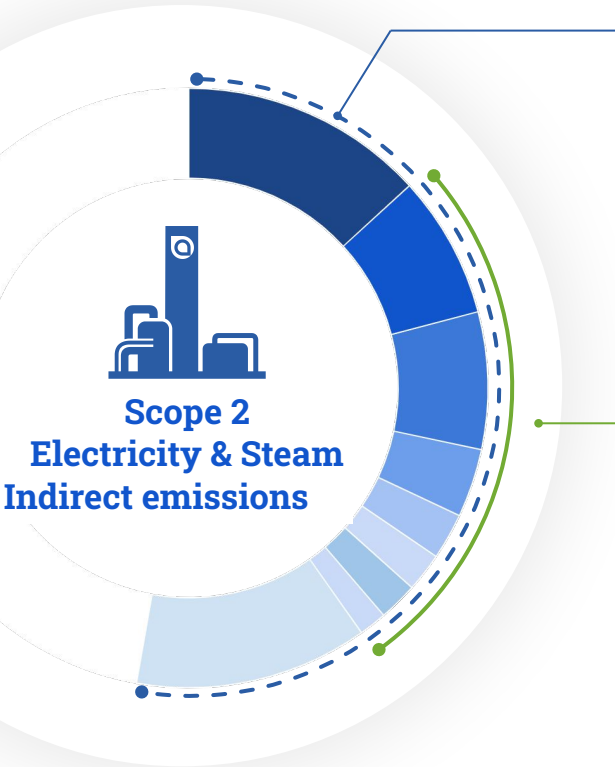
- ex: biogas

Electrolysis for the production of low carbon hydrogen 低碳氫氣/水電解

- Access to large low-carbon electricity sourcing



SCOPE 2: IMPROVING THE ENERGY EFFICIENCY OF OUR PLANTS AND INCREASE LOW CARBON ELECTRICITY CONSUMPTION



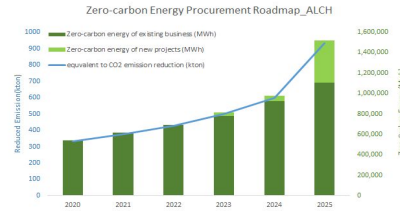
Consuming less energy 節能專案

- Upgrade the efficiency or replacement of the less performing ASU
- Further deployment of SIO* leveraging big Data & AI technology to further optimize energy consumption



Consuming cleaner energy 使用再生能源

- Large increase in low carbon electricity sourcing
- Integrates future energy needs for Electrolysis



*Assumption: Grid emission factor fixed at 2020 published factor.
*2020 RPA is under discussion with energy service group regarding quality criteria checklist released Feb. 2021.

*Smart Innovative Operations: centralized operation centers leveraging data analysis

氢能營業額將於2035年超過目前的三倍



投資



捕捉需求：

- 低碳 + 可再生氢能產品
- 新的氢能工業應用
- 碳捕捉服務
- 氢能運輸

透過減少客戶CO₂碳足跡，
並**獲取附加價值**

投資於：

- 碳捕捉
- 水電解設備
- 運輸供應鏈
- 收購

3
GW^(a)

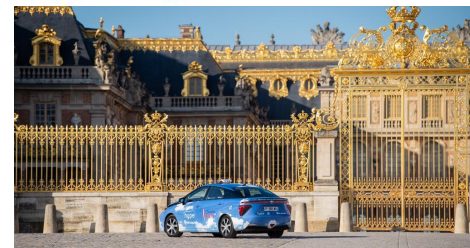
(a) 包括1GW已決定

(a) 包括已確切決定

An ever increasing momentum 氢能委員會

2017 to 2021: From 13 to 100+ companies in the H2 Council

Hydrogen Council



Davos, Jan 2017



Versailles, Jan 2021

100+



13

ENERGY COMPANIES



INDUSTRIAL GASES



EQUIPMENT SUPPLIERS



ENERGY-INTENSIVE INDUSTRIES



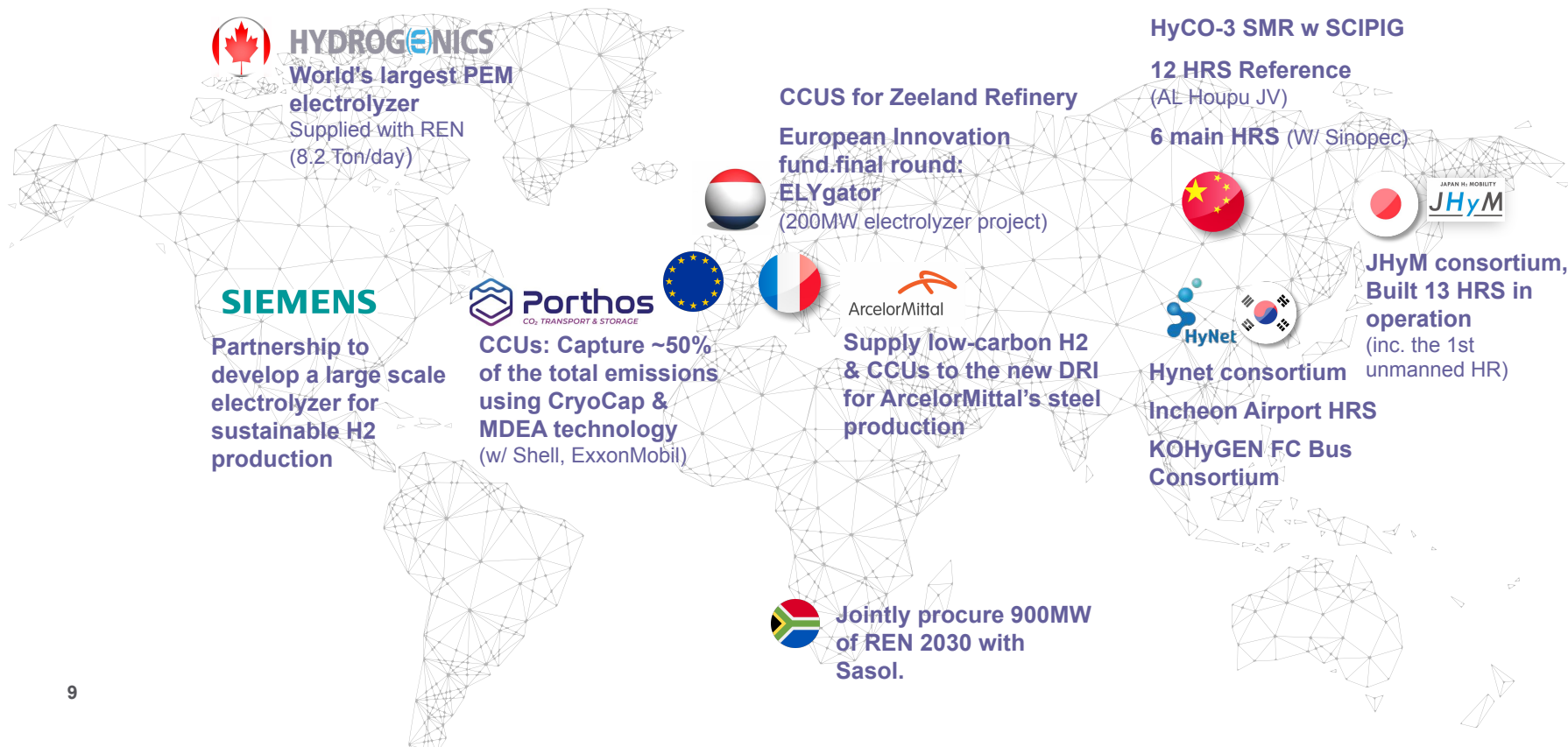
INVESTORS



MOBILITY



AL Progress in H2 & ET (2020 - 2021) 近期氢能與能源轉型進展



Air Liquide completed the Incheon International Airport hydrogen station for buses and starts its long term hydrogen supply

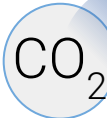
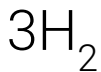
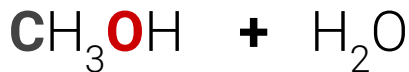
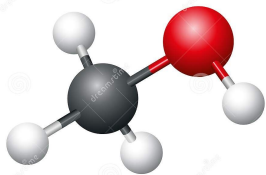
仁川機場氫能接駁巴士



Low-Carbon H₂ Generation in Taoyuan (1st in APAC) 低碳氫氣生產

7,000+ Tons CO₂ Per Year Recovered

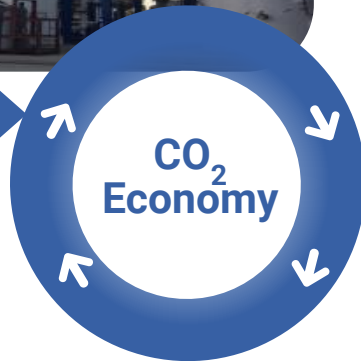
Methanol



Recover **>90%** CO₂
off-gas of H₂ plant



CO₂ capture



Low-Carbon H₂



Petrochemical
Customers



Electronic Customers
(High Purity)

High-Purity CO₂



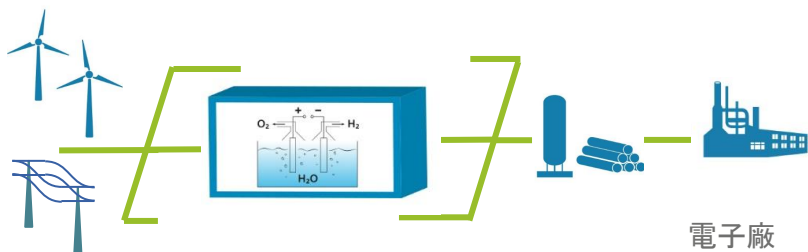
Food preservation,
Beverage



Electronic-grade CO₂
Applications

World 1st Ultra-high Purity Electrolyzer Plant 台南氢能水电解廠

- 全台首座超純低碳製氫設備 (25MW)
- 每年將減少超過3萬5000噸的二氧化碳(CO2)直接排放





THANK YOU