From AI and Semiconductors to Green Hydrogen: Building Global Leadership for a Sustainable Future

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CEO, Global Sustainable Fuel Alliance

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Currently serving as:

- **Deputy Director, Taiwan Hydrogen Cluster & Hydrogen Research Center, National Central University**
- **Vice President, Business Development, Winbro Group Technologies**
- **CEO, Global Sustainable Fuel Alliance (GSFA)**
- **Honorary Advisor, Taiwan Legislative Association for Hydrogen and Clean Energies**
- **Independent Director, The Great Taipei Gas Corporation**

In the past:

- **Deputy Director, Taiwan Institute of Economic Research, Research Division I**
- **CEO, Taiwan Hydrogen and Fuel Cell Partnership**

Education :

- Visiting Scholar/ Researcher in JTSI Group Energy and Materials, University of St Andrews (UK)
- Ph.D. in Environmental Engineering, National Taiwan University, Taiwan
- Bachelor of Science (B.Sc.) in Public Health, Taipei Medical University in Taiwan.

Specialties : Environmental projects and Emerging technology industrialization (Hydrogen & Fuel Cell / Green Energy / Smart City / Electric Vehicles / Drones / SiC& GaN industry)/ International Businesses Models and Platforms

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GSFA: A Fit-for-Purpose Platform for International Sustainable Fuel Value Chain Integration

Main Missions

- Opportunity exchange & co-creation
- Regional & intercontinental supply-demand hubs
- Technology integration & value chain development
- Certification & standards implementation
- Investment facilitation & cross-border policy dialogue

Missions in Action



Hyvolution Paris 2026



Norway ONS 2026



Tokyo Energy Week 2026



Taiwan TSMC Supply Chain Forum 2026

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Taiwan Hydrogen Cluster

Government Agency

National Climate Change Committee
經濟部 Ministry of Economic Affairs
NSTC
環境部 Ministry of Environment
Ministry of Education

Academia

Academia Sinica
TAIPEI TECH



Research Institute

工業技術研究院 Industrial Technology Research Institute
國家中山科學研究院 National Chung-Shan Institute of Science & Technology
JÜLICH Forschungszentrum
NARI 國家原子能科技研究院 National Atomic Research Institute

Industry

DELTA
KAORI
wistron 緯創資通
CTCI
台灣中油
氫豐 Hydro
大同智能 TATUNG FOREVER ENERGY
MW MEAN WELL
HDRE 泓德能源
台灣電力公司 TAIWAN POWER COMPANY
HEPHAS energy
中華電信研究院
hiPOWER
Quaser Group
AHE
Winbro
SEETEL
TRUEWIN
U HYDROGEN
永餘智能股份有限公司

Policy & Society
Carbon Management and public engagement initiatives

Technology Deployment
Advanced R&D and pilot project deployment

Value Chain Integration
End-to-end hydrogen ecosystem development

International Outreach
Collaboration & Standardization (ISO, CBAM, RE100 etc)

Drive real-world demonstration and commercialization of hydrogen technologies in Taiwan and beyond

LEADERSHIP



Prof. **Chung-Jen TSENG**, PhD
- Member, National Climate Change Committee, Office of the President
- Director, Hydrogen Energy Research Center, NCU



Prof. **Wei-Hsuan HUNG**, PhD
- Technical Advisor, National Science and Technology Council
- Deputy Director, Hydrogen Energy Research Center, NCU



Prof. **Meg J. C. LIN**, PhD
- Honorary Advisor, Taiwan Legislative Association for Hydrogen and Clean Energies
- Deputy Director, Hydrogen Energy Research Center, NCU

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1st GSFA Technical Symposium

How can high-tech leverage hydrogen and sustainable fuels to meet their RE100/SBTi commitments?



Brussels, Belgium, 9 June 2026

KEY FINDINGS

01 Policy & Regulation

No pathway connects ISCC renewability to RE100 eligibility

02 Technology & Market

Cost, reliability, and energy security are the main drivers

03 East Asia's Constraint

Limited renewables + AI/semiconductor demand surge

04 Graduated Scale-Up

Capital commits to proven operations, not announced capacity

05 Pragmatic Entry

Bridge tech funds the transition green-only projects cannot yet sustain.

Reframe the Commercial Case -

Lead with cost, energy security, and supply-chain resilience

EU–Asia Collaboration -

Mutual recognition of RED · RE100 · SBTi is the essential infrastructure for cross-border supply chains

Key Participating Organisations

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I The Emerging Global Green Fuel Ecosystem – Where is the Off-taker?

Japan, South Korea, Taiwan -

Driven by Semiconductors manufacturing, Power, AI data centers, heavy industries etc

- **Japan:** **3 Mtpa**, **15 GW Japanese Electrolyzer** globally and **1,200 FC Buses** by 2030
- **South Korea**: **3.9 Mtpa** by 2030, aiming **18 GW stationary FC** by 2040
- **Taiwan:** **3.3 Mtpa** import by 2050, **100 MW FC** by 2029, **50 FC Buses** by 2035

US –

- $ 8 billions for **regional hydrogen center**; **$1/kg** production cost by 2030
- **10Mt clean hydrogen** produced by 2030, **50 Mt by 2050**

EU

- **20 Mtpa of renewable hydrogen** supply (10 Mt domestic + 10 Mt imported)
- RED III Mandates (2030): **2% RFNBO in industry** (60% by 2035) and **1% in transport**

Canada –

- Hydrogen to supply up to **30% of end-use energy**
- **Top 3 clean hydrogen producers** globally by 2050

Ireland

- **2 GW** of offshore wind by 2030 for **renewable hydrogen production**
- Hydrogen for **flexible power and long-duration storage**, aiming **Europe's green hydrogen export hub**

China –

- **35 Mt** H_2 demand by 2030; **60 Mt** by 2050
- **RMB 1.6B subsidy: <25 RMB/kg H2, 100,000 FCV** by 2030
- **Mtpa Green Methanol hubs** 1 (e.g., Shanghai) by 2030

India –

- **5 Mtpa** H_2 production by 2030; 3 designated Export Hubs
- **10%** of global **Green Ammonia** by 2030

Hydrogen Hubs that Encompass:

- ❖ Technology Value Chain Integration
- ❖ Standards and Certification proofing
- ❖ Carbon credits or RECs

Malaysia & Singapore –

- ML: **2 Mtpa** green H_2 production by 2030
- SG: **1 Mtpa Methanol bunkering** by 2030 ; H_2 for **50% Power supply** by 2050

UK –

- A Trading Nation—Realising Scotland's Hydrogen Potential: A Plan for **Exports**
- Scotland aims to achieve **5 GW of low-carbon hydrogen production capacity by 2030 and 25 GW by 2045.**

Australia –

- **AUD $2/kg tax incentive** for renewable H2 production ; **15Mtpa+** production by 2050
- **Methanol, SAF, Renewable Diesel** prioritized under **$250M** Made in Australia Innovation Fund

Chile –

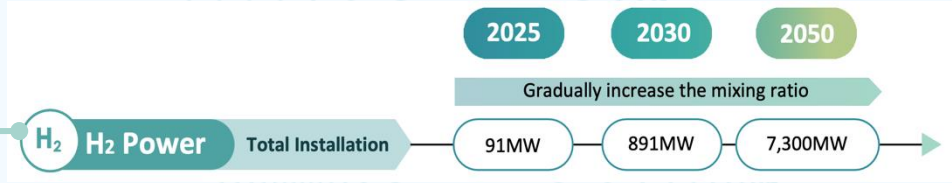
- **< $4/kg** green H_2 production cost by 2030
- **300-700 kt/y** Export Capacity by 2035
- **Ammonia, Methanol, E-fuels** recognized as key vectors

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II Taiwan's 2050 Net-Zero Emissions and Hydrogen Policy





Hydrogen Strategy

(2030 emission reduction target: 427–6,877 tonnes)

- 2050 hydrogen demand: **3.67 Mt/yr**; **imports ~3.3 Mt/yr** (~90%)
- Stationary fuel cells: **100 MW by 2029** → 800M kWh/yr
  (Primarily AI & semiconductor driven)
- Targeting **75 hydrogen fuel cell buses** deployed by 2035
- **Low-carbon hydrogen standards & guarantee-of-origin framework**: 2025 → implementation rules: 2026 → first certificate expected: 2027

《Renewable Energy Development Act》
Large Electricity User Clause 2.0

New/expanded connections ≥5 MW must install **self-generation** or storage capacity to improve **self-sufficiency** and reduce grid dependence *(incl. semiconductor & data centre industries)*

Source: Taiwan 2050 Net-Zero Pathway and Twelve Key Strategies

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III AI Expansion and Semiconductor Manufacturing: An Imminent Energy Infrastructure Challenge

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The ultimate bottleneck for AI and semiconductors may not be the production capacity. It may be securing the scalable low-carbon power.



Exploding Data Center Demand

Directly translating into structural electricity demand growth

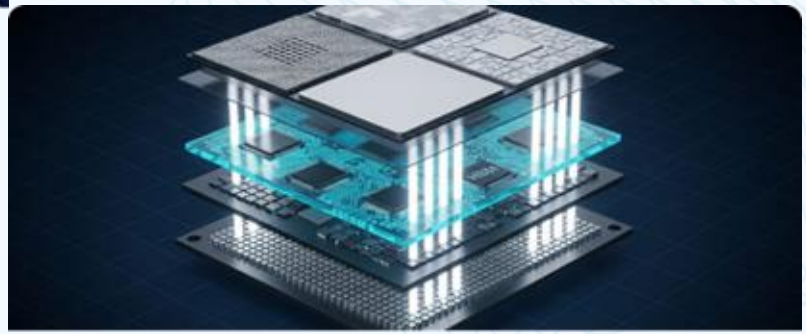
DATA CENTRE CONSUMPTION (2024)
415 TWh

PROJECTED DEMAND (2030)
> 945 TWh

Scaling production whilst achieving decarbonisation and ESG targets?

20% of national power demand, ~50 TWh in 2026
→ driven by semiconductor and AI growth, national demand to reach ~320 TWh by 2030

Semiconductor Power Pressure



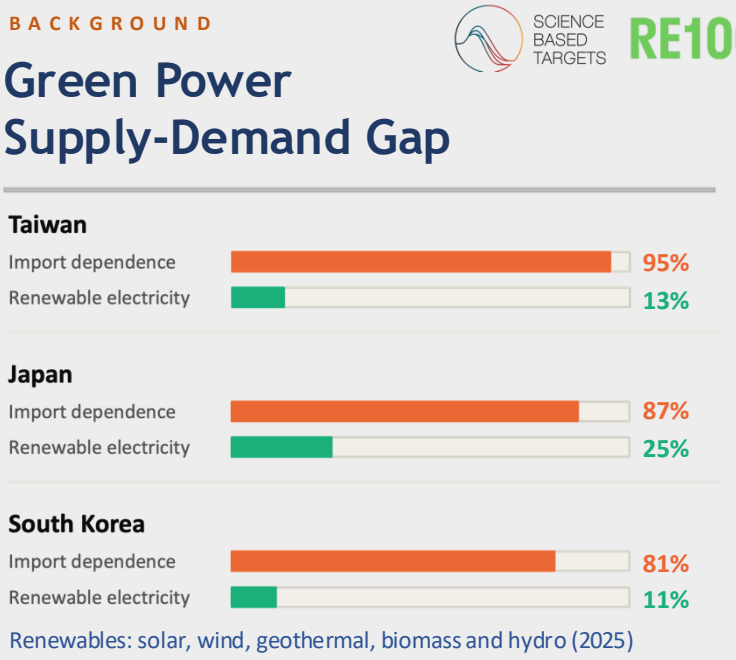
Sources: IEA, Energy and AI Special Report (2025), Taiwan Ministry of Economic Affairs — 2024 National Power Supply & Demand Report

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IV Closing the Green Power Gap in Resource-Limited Markets

BACKGROUND

Green Power Supply-Demand Gap



CONSTRAINT 01

Domestic Resource Development Bottleneck

The green power gap for AI and semiconductor industries continues to widen — domestic resources alone cannot close it.

CONSTRAINT 02

Insufficient Geographic Relevance of RECs

Cross-border RECs lack physical electricity linkage. RE100 2025 criteria require market-boundary relevance — pure certificate trades may not qualify.

CONSTRAINT 03

24/7 Supply Gap

RE100/SBTi commitments are shifting to hourly matching, but battery storage costs are high and duration too short for industrial-scale LDES.

Markets need to pioneer new cross-border low/zero-carbon energy pathways with a "physical basis"

Source: IEA, World Energy Investment 2025; Taiwan Ministry of Economic Affairs — Energy Supply 2025; Low Carbon Power

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V High Techs have committed to climate targets

RE100

RE100

100% Renewable Energy

440+ companies



SCIENCE BASED TARGETS

SBTi

Science Based Targets initiative

12,000+ companies



24/7 CARBON-FREE

24/7 CFE Alliance

Round-the-Clock, Hourly Carbon-Free Energy

Established in 2024



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VI Leveraging H_2 & Renewable Fuels for RE100 Compliance

RE100 Renewable Energy Framework

RE100

- Wind
- Solar
- Geothermal
- Marine (Wave/Tidal)
- Sustainably Sourced Biomass
- Sustainable Hydropower
- Hydrogen — Defined as energy carrier (RE100 TECHNICAL CRITERIA p.8)

Key Rules for H_2 Power Claims

1. **Hydrogen produced using renewable electricity qualifies.**
   ISCC EU as a recognised schemes for sustainability assurance
   (RE100 TECHNICAL CRITERIA p.8)
2. **Electricity generated by a fuel cell is only renewable if the fuel it consumes is renewable**
   (RE100 FAQs 16 p.5)
3. **Cross-Border Claims Require Physical Interconnection**
   (RE100 TECHNICAL CRITERIA p.27 ; FAQs 59 p.16)

Cross-border renewable hydrogen claims require proof of both renewability and physical supply

ISCC EU RFNBO - Renewable Proof of Hydrogen & Physical Delivery

Renewable Energy Sources	→	Electrolyser (H_2 Production)	→	Transport & Storage	→	Distributor / Processor	→	End User (Consumer)
wind, solar, geothermal energy, ambient energy, tide, wave and other ocean energy, and hydropower (ISCC 202-06 p.9)		GoO Cancellation +Sustainability Declaration (ISCC 202-06 p.11,25)		Chain of Custody Transfer Documents (ISCC 203 p.13)		Conversion Factors (ISCC 203 p.77)		Sustainability attributes and physical product can only be transferred altogether (ISCC 203 p.8)

Source: RE100 technical criteria (2025); RE100 FAQs (2025); ISCC EU 202-6 RFNBOs and RCF; ISCC EU 203 Traceability and Chain of Custody; ISCC EU 205-1 FNBO and RCF Greenhouse Gas Emissions

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VII Cross-Border Operating Framework

ISCC International Sustainability & Carbon Certification

RE100 ELIGIBLE

RE100 / ISCC EU RFNBO Eligible Renewables

Wind · Solar · Hydro
Geothermal · Ocean

EAC / GoO Issued

PRODUCTION

Power-to-X

Green Hydrogen · eMethanol
Ammonia · eSAF

EAC / GoO Cancelled

- Batch ID
- Conversion factor

TRANSIT

Maritime Carrier

- Bill of Lading
- Shipping records
- GHG data

Sustainability attributes and physical product transferred physically

RE100

Power Generation

Fuel Cell · X-to-Power Conversion

RE100 vintage & geographic market limits apply

POS Cancelled

3rd Party Verification

Renewable Energy Certificate (REC)

T-REC Issuance · RE100 Compliant Claim

ACTIVE NOW

2 MW for semiconductor supply chain

Under EU RED, Renewable electricity produced from RFNBOs will be counted towards the overall renewable energy target
(European Commission, RFNBO Guidance, C/2025/2983 p.7)

Integrated green hydrogen value chain, serving as replicable commercial template and validated policy and standards

Source: ISCC EU 202-6 RFNBOs and RCF; ISCC EU 203 Traceability and Chain of Custody; ISCC EU 205-1 FNBO and RCF Greenhouse Gas Emissions; European Commission, RFNBO Guidance, C/2025/2983

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VIII Renewable Attribute Conversion: An Evolving Legal Frameworks

Country	Regulatory Body	Certificate Process	Real-world Case
Hydrogen Renewable Attribute Certificates (Renewable Energy → Renewable Hydrogen / Fuel)			
AT AUSTRIA	**E-Control** Austrian Energy Regulatory Authority	Electricity HKN (Strom-HKN) registered with E-Control → Transferred into Umwandlungskonto (conversion account) → Conversion losses deducted → E-Control issues H_2-HKN	**RAG Austria × MEGGLE** September 2024: Austria's first H_2 GoO Certification body: TÜV SÜD
FI Finland	**Gasgrid Finland** Finnish gas and hydrogen GO registry administrator	Renewable electricity generated → Electricity GoO retired (prevent double counting) → Electrolysis → Gasgrid issues H_2 GoO	**P2X Solutions — Harjavalta** October 2025: Finland's first H_2 GoO Renewable electricity source：Fortum PPA
FI Finland	**ISCC System GmbH**	RFNBO eligibility criteria confirmed → Application submitted to ISCC-accredited audit body → Electricity GoO cancelled → Electrolysis (+eligible CO_2) → ISCC EU RFNBO certificate issued	**P2X Solutions — Harjavalta** November 2025: Finland's first ISCC EU RFNBO Scope: RFNBO green hydrogen + methane
Renewable Electricity Certificates (Renewable Fuel → Renewable Electricity)			
DE Germany	**Fuel： Bundesnetzagentur** **Electricity：UBA (German Federal Environment Agency)**	Biomethane GO → Biomethane GO retired in NABISY (prevent double counting) → CHP combusts biomethane to generate electricity → UBA issues electricity HKN	**RWE — biomethane CHP plant** Electricity HKN used by electricity suppliers to label power as green
US USA	**Fuel： FERC (Federal Energy Regulatory Commission)** **Electricity：NC-RETS（North Carolina Utilities Commission）**	Third-party biogas production (landfill / livestock waste) → Purchase Biogas Credits → Biogas Credits retired → Fuel cell generates electricity (natural gas is the actual fuel) → NC-RETS issues US-REC	**Apple × Bloom Energy** Maiden, North Carolina — 10 MW Biogas FC RE100 reported

Regulatory frameworks increasingly recognise renewable attributes conversion, but cross-border framework remains unresolved

Source： RAG Austria; P2X Solutions; RWE; UBA Umweltbundesamt; Apple Environmental Progress Report; RE100 Technical Criteria (2025); Gasgrid Finland; ISCC System GmbH

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IX X-to-Power Applications Scaling Up

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中興電工 Chung-Hsin Electric & Machinery Mfg. Corp.

Methanol Fuel Cells

- ✓ **Exported to 30 countries**
- ✓ **Over 3,000 units installed**
- ✓ **Integrated with microgrid technology**



South Africa: Hydrogen fuel cell microgrid system



Taichung and New Taipei: Community hydrogen microgrid



Japan and the Philippines: Hydrogen backup power for telecommunications base stations

DELTA X ceres

Solid Oxide Fuel Cells (SOFC)

- ✓ **SOFC + SOEC production**



Taiwan Power Company and display panel manufacturers: Baseload power supply



Taiwan: MW-scale test platform



UK and Europe: Off-grid power generation applications



Japan and Norway: Marine vessel applications

Bloomenergy

Solid Oxide Fuel Cells (SOFC)

Apple

US

14 MW



Unimicron 欣興電子

Taiwan

10 MW

(2023-2027)



Data centre contracts **> 3 GW**

ORACLE AMERICAN ELECTRIC POWER NEBIUS

Source: Chung-Hsin Electric; Delta Electronics; Bloom Energy

X Global Green Fuels Market Taking Shape

Cumulative offtake as of 2025 **> 7.5 Mtpa**

- **1 Mt/year (long-term)**
  Green methanol, from 2029, for use as chemical feedstock
- **770 kt/year (15y)**
  Blue ammonia from 2030, for co-firing with coal at thermal power plants
- **500 kt/year (long-term)**
  Green ammonia, from 2028, for industrial and energy applications
- **100 kt/year (10y)**
  Green methanol, from 2028–29, for use as chemical feedstock



2022 — **~ 85 tonnes**

Japan–Australia brown-coal hydrogen supply chain; cryogenic **liquid H_2** storage (−235 °C) and shipping.
(Kawasaki Heavy Industries; Iwatani Corporation)



2024 — **300 tonnes**

Singapore's Tuas Port: 1st simultaneous **bio-methanol bunkering** and cargo operations on a dual-fuel container vessel.
(MPA Singapore; Trafigura)



2026 — **3,750 tonnes**

China–South Korea: world's first cross-border **green ammonia** maritime supply chain.
(Envision Energy; Lotte Chemical)

XI Advanced Manufacturing for SOFC solution in Taiwan

DELTA X ceres



110 kW-MW SOFC manufacturing

- Peak generation efficiency **64%**
- Real-time monitoring of generation performance and system status
- Proven replicable and scalable energy asset model



Quaser Group
Winbro



Advanced Laser manufacturing

- Micron-level **laser precision processing** for SOFC fuel cell plates
- Smart automated mass production platform
- New energy key components supply chain



Bloomenergy > 2 GW globally

40% key component supply from Taiwanese firms

Kaori — Primary hotbox supplier

AcBel — Provider of power management systems

Porite — Interconnect plates manufacturing

Plus Metal Tech — Primary supplier of interconnect plate coatings

Source：DELTA Electronics ; Quaser Group, Winbro ; Bloomenergy

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Moving Forward: A Shared Agenda for Taiwan-Ireland Hydrogen Leadership

Green hydrogen turns RE100 compliance into industrial leadership — through Taiwan-Ireland partnership, from policy to deployment

Align 01

Policy & Certification

EU-Asia hydrogen policy dialogue

↕

Cross-border renewable fuel recognition & certification

Demonstrate 02

Flagship Demonstration Projects

Ireland
Smart Electrolyser testbeds

↕

Taiwan
Renewable fuel pilots +
AI & Semiconductor decarbonisation

Scale 03

Markets & Investment

Supply chain integration

↓

EU + Asia co-funding

↓

Commercial Deployment
Lower LCOH, bankable projects

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A NEW ERA FOR SUSTAINABLE FUELS

www.gsfa-platform.org

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Appendix

GSFA: A Fit-for-Purpose Platform for International Green Fuel Value Chain Integration

Centered on **commercial deployment** and **integrated value chain**, including green hydrogen/ammonia, eMethanol and other energy carriers.





Main Missions

- Trusted platform for opportunity exchange and co-creation
- Regional & Intercontinental supply-demand cooperation hubs
- Technology integration and value chain development
- Certification and standards implementation
- Supporting investment landing, cross-border policy dialogue

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Meet Our Team



Dr. Meg J. C. Lin

DIRECTOR & CEO

15+ years bridging industry, government & academia to drive net-zero transition through hydrogen, energy storage and semiconductor technologies.



Terence Lum

DIRECTOR · Singapore

Business leader driving sustainable solutions and innovation across built environment and clean energy sectors.



Jean-Christophe Chang

EXCECUTIVE SECRETARY

Policy & regulatory standard analysis and international project management

ADVISORS



Dr. Prof. Meng-Fan Luo

Policy Adviser · Taiwan

Former senior official. National net-zero policy formulation.



Dr. Ing. Ivo Stachiv

International Cooperation Adviser · EU

Expert in the EU energy transition. Driving commercialization of hydrogen and clean energy technologies.



Ts. Gladys Mak

Sustainable Finance Adviser · Malaysia

20+ years renewables policy, project finance & ASEAN energy transition. MBOT-certified.



Dr. Takuya Hasegawa

Technology Adviser · Japan

Ex-Chief Engineer Nissan FCEV. Co-founder Birdy Fuel Cells. Faculty Tokyo Tech.



Katerina Aleksoska

Investment & Trade Adviser · Australia

Hydrogen commercialization at Australian Hydrogen Council, Breakthrough Victoria & Invest Victoria.



Mikaa Glugeon-Mered

International Standards& Geopolitics Adviser · France

Chairs CertifHy, Europe's first RFNBO certification mechanism. Advises Hy24 and Hyvolution on standards and geopolitical risk. Green Hydrogen Ambassador, IAHE

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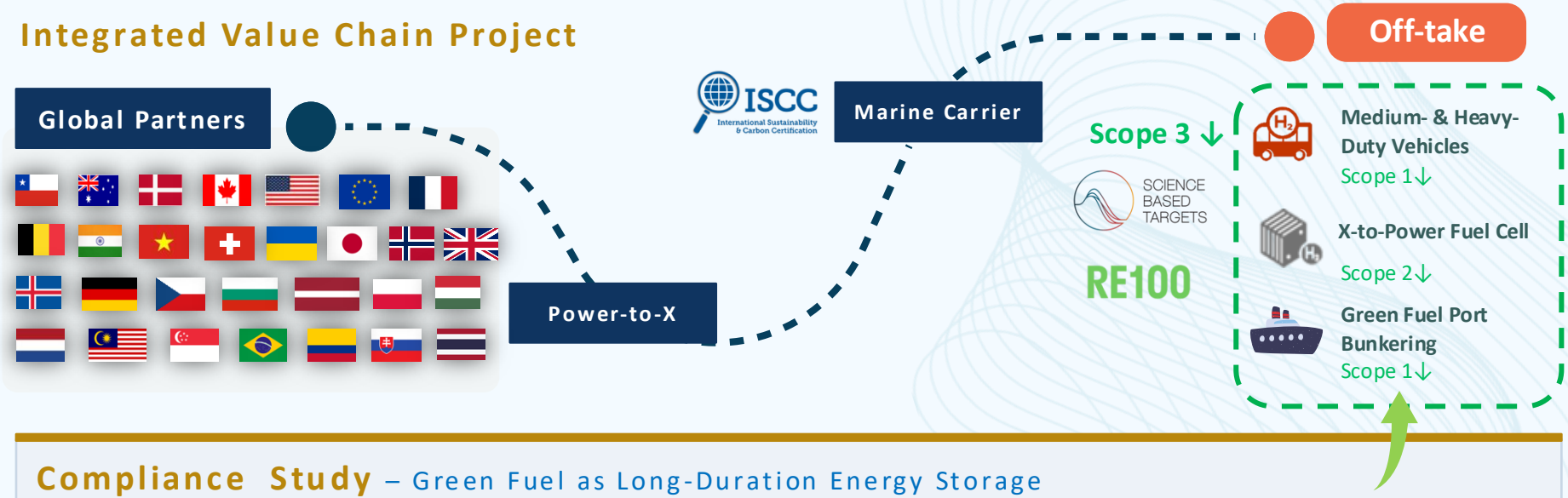
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How GSFA Architects Global Ecosystems

An integrated green hydrogen value chain, serving as replicable commercial template and validated policy and standards

Integrated Value Chain Project



Compliance Study – Green Fuel as Long-Duration Energy Storage

I Physical Linkage

- Molecular-Level Physical Delivery
- Verifiable physical flow, superior to pure certificate trading

II 15-Year Age Requirement

- Renewbale/Electrolyzer COD under 15 years
- 85% threshold, long-term contracts exempted

III EAC Exclusivity

- EAC retired at production site, no double counting
- T-REC "Electricity-to-Electricity" Extended Issuance

IV ISCC EU RFNBO

- Full Lifecycle GHG Decarbonization Verification
- Strict exclusion of coal co-firing (from 2027)

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