

Van waardeketen naar ecosysteem— wat verandert er voor strategie & performance?

Dr. Monalisa Goswami, Business Manager,
Power-to-X, TNO



Vision: Power-2-X implementation at world scale

Vision & Mission



Vision

Hydrogen and platform molecules will be produced using Power-2-X technology for use in energy storage (hydrogen), materials, mobility and food

Mission

- **Leading to control points** for Dutch high-tech equipment, chemical and material companies in the international supply chain of hydrogen and platform chemicals
- **Having enabled investments** of at least 1 billion euro in these high-tech Power-2-X value chains.

Ambition 2030



Top-3 player in Europe in the delivery of Green Hydrogen and Power-2-X knowledge, technology and consultancy services towards industrial stakeholders and the equipment supply value chain.

Specific targets for 2030:

- High-tech **circular water electrolyser demonstrated at TRL-7** with minimum CRM use materials.
- First **industrial scale integrated CO2 electrolyser demonstrated at TRL-6** in the field.
- Industrial pilot of **plasma and photochemical conversion system delivered at TRL-6** producing hydrogen and/or synthetic chemicals.

Ecosystem impact goal



A world leading electrolyser supply chain is established in 2030.



World's first plant produces plastics and fuels from waste gases & air through Power-2-X in 2040.



Martijn de Graaff



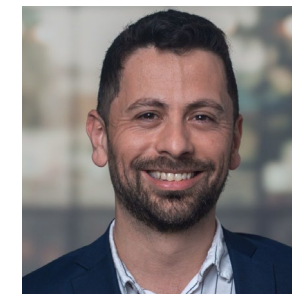
Mark Breed



Tara van Abkoude



Ties van Maaren



Eduardo de Rosa Silva



Iyad Sarhid

VoltaChem | Hét Business Platform voor het heel waardeketen in de Power-to-X domein

The community in a nutshell

Accelerate innovation and implementation of electrochemical processes in the Power-2-X domain for Sustainable chemicals & fuels production

What we do?

-  Unites all relevant stakeholders in the value chain
-  Organizing expert-driven sessions and a year event
-  Facilitate cross sector and cross border collaboration

How we do it?

-  Creating a trusted international network
-  Give members early access to innovation opportunities
-  Acting like a spider in the web to foster partnerships

For whom?

- Entire Value-Chain across electrochemical technologies for sustainable Fuels and Chemicals
- Equipment Manufacturers
- Systems integration
- Intermediate and end-product users
- Brands



1) Van waarde keten naar ecosysteem



2) “Van waardemaximalisatie naar complementariteiten” – wat is er echt anders?

Waarde keten denken

Interne | Sequentiële

Ecosysteem denken

Extern | Multilateral

Complementariteit

Risico's veranderen

Wat is jouw rol in het ecosysteem?

Keystone (platform orkestratie)?

Dominators?

Niche players?

strategie = je rol kiezen en gezond houden

Het ecosysteem-perspectief is niet zomaar een metafoor, maar een eigen strategische lens. Het verlegt de focus van interne activiteiten naar externe complementariteit

—met een andere risicomatrix en andere knoppen om aan te draaien



3. “De businesscase: waarde creatie ≠ waarde captatie”

- Ecosystemen creëren vaak meer klantwaarde dan één firma alleen kan—maar wie vangt die waarde?
- ‘Value creation’ is inherent coöperatief, ‘value capture’ competitief;
 - IP-regimes en distributie expliciet ontwerpen. Zonder die alignment verdampt waarde ---- > geen tractie



Waardeketen ecosysteem evolutie in Groene Waterstof industrie

H₂: Geen Swiss Army Knife van klimaat oplossingen



Image credits: Grist | Why the 'Swiss Army knife' of climate solutions is so controversial

Groene waterstof uitrol

Global investments

8X Compared to 2021

Electrolyser capacity

9X Growth since 2021

Production

60% Growth since 2021

Patents filed

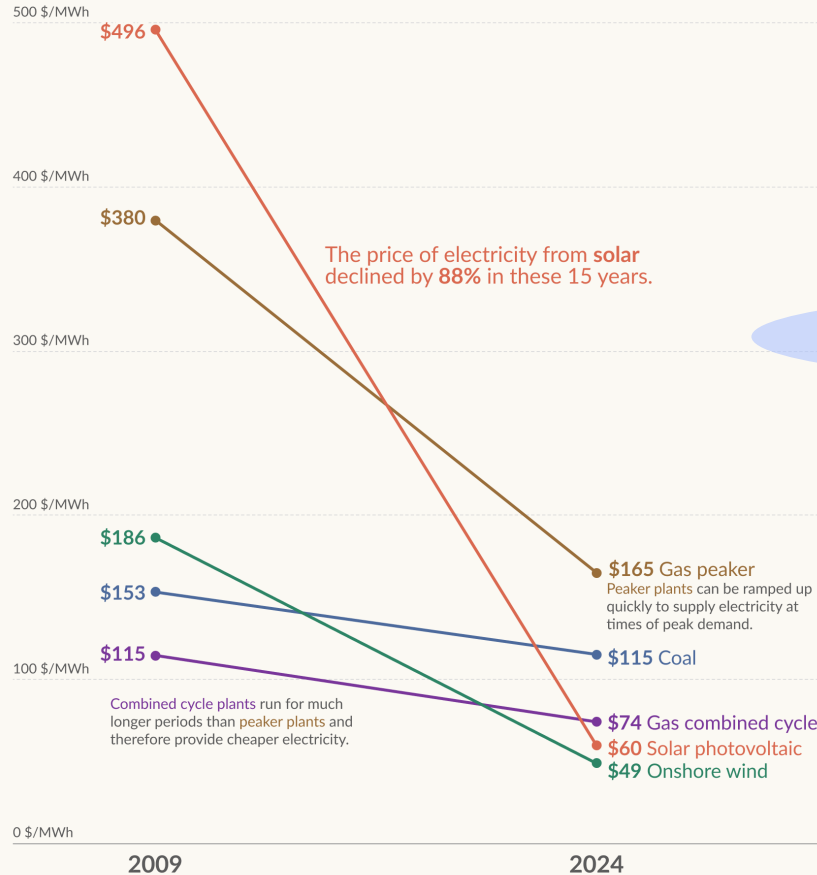
3X Increase since 2020



How did the price of electricity from new power plants change over the last 15 years?

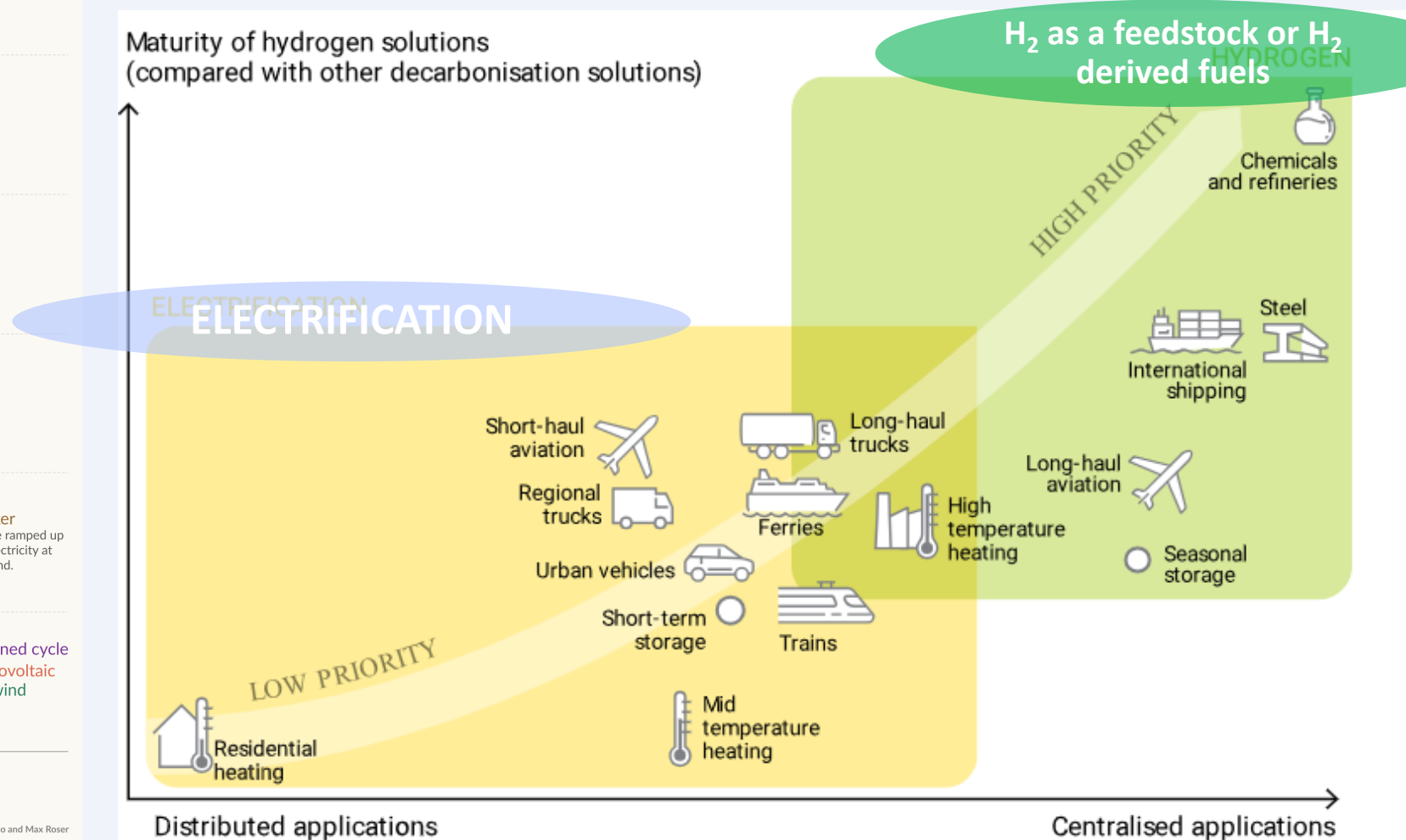
Our World in Data

Electricity prices are expressed in 'levelized costs of energy' (LCOE). LCOE captures the cost of building the power plant itself as well as the ongoing costs for fuel and operating the power plant over its lifetime.

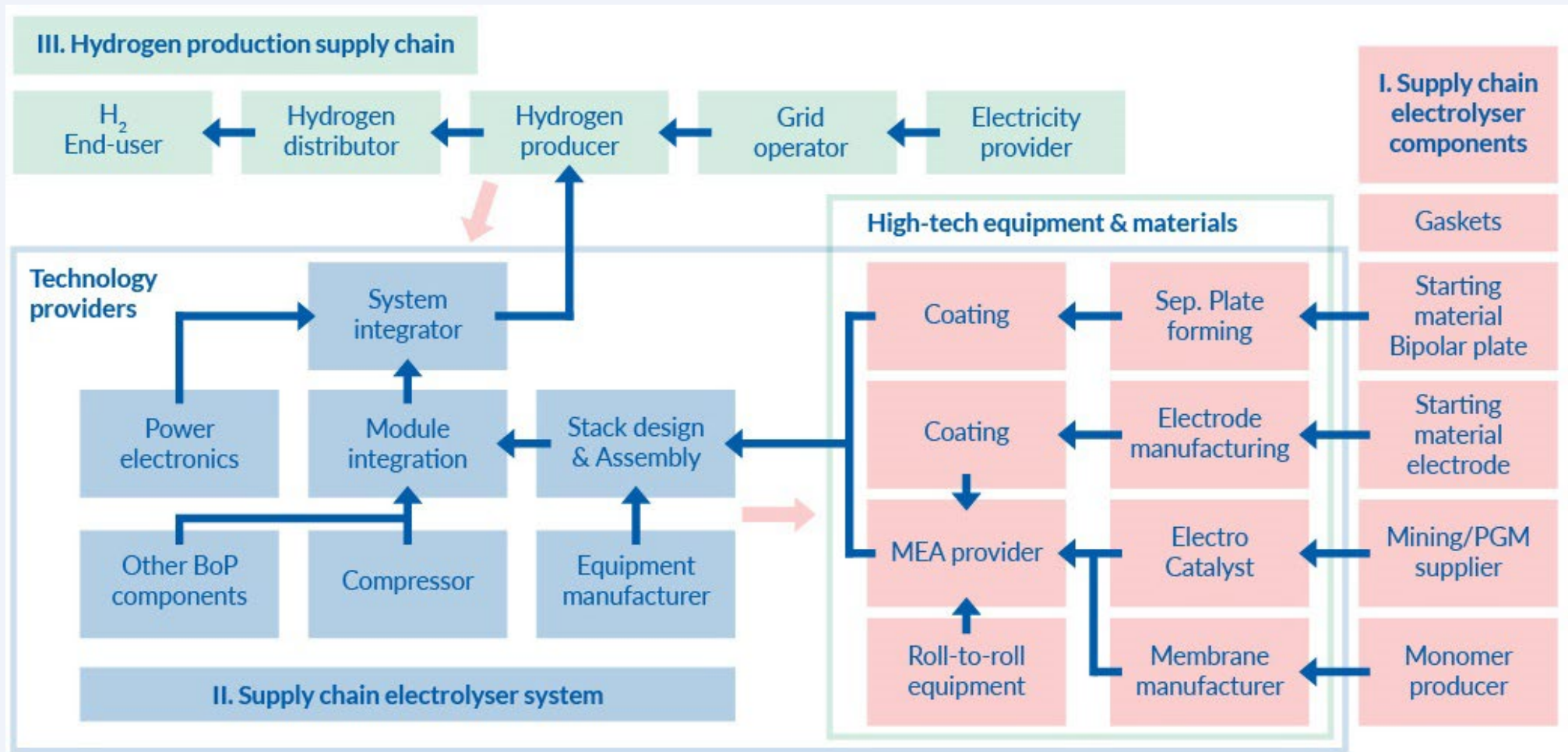


Note: Data reflects unsubsidized costs, expressed in constant 2023 US\$. This means costs are adjusted for inflation.
 Data source: Lazard – Levelized Cost of Energy+ (2024); World Bank and OECD (2025)
 OurWorldinData.org – Research and data to make progress against the world's largest problems. Licensed under CC-BY by the authors Pablo Rosado and Max Roser

Maturity of hydrogen solutions (compared with other decarbonisation solutions)

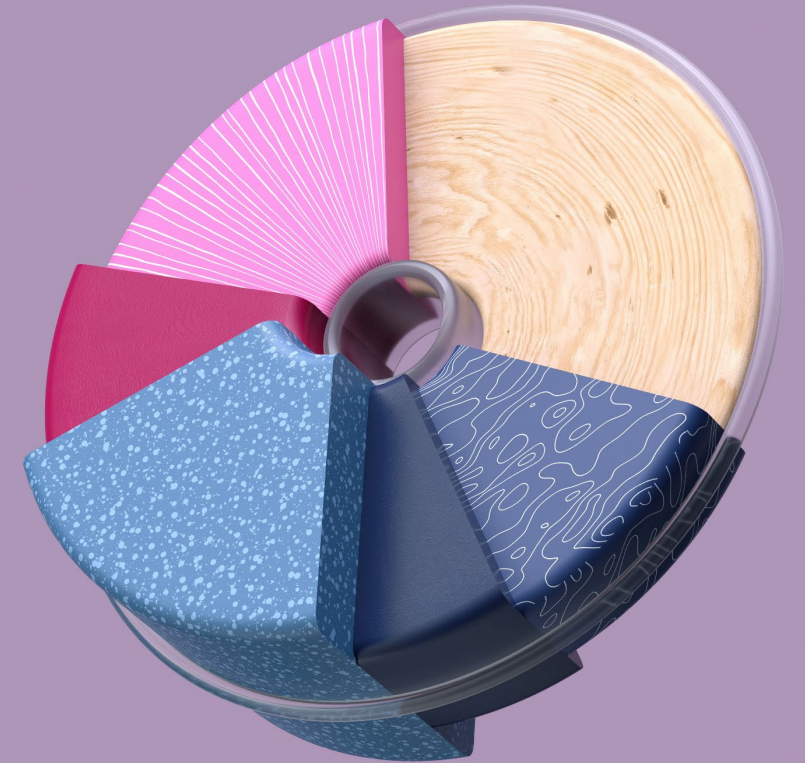
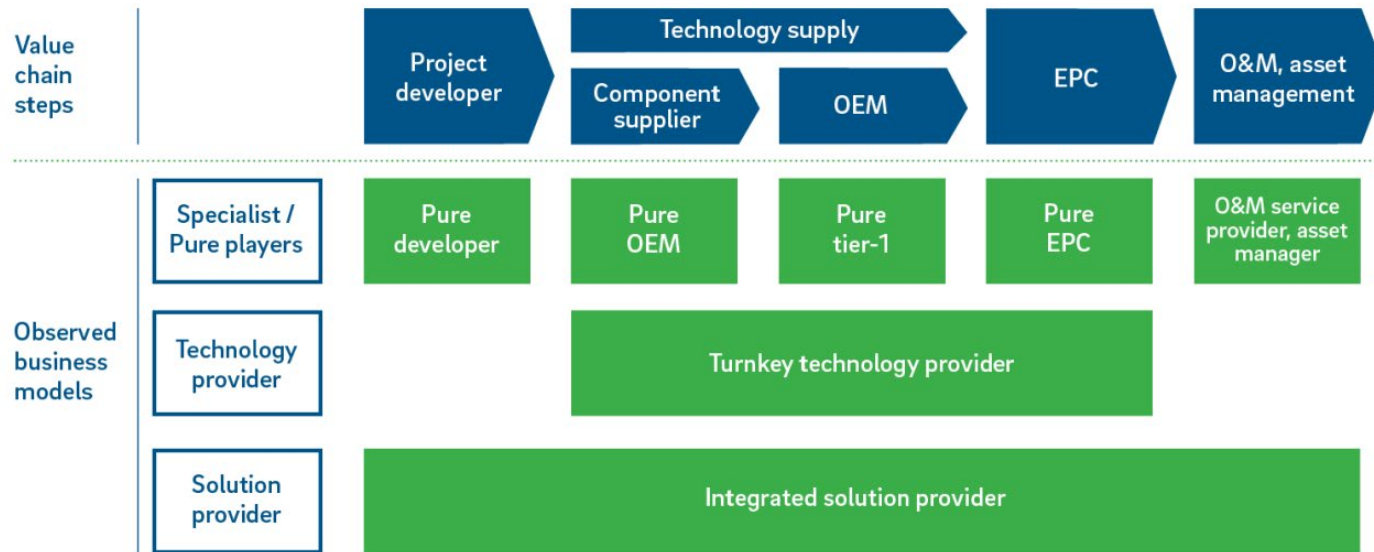


Industrieel waardeketen Groene Waterstof- PEM



Huidige Business Modellen in de Groene Waterstof markt

Who's doing what?



Voorbeelden van partnering binnen de waterstof sector

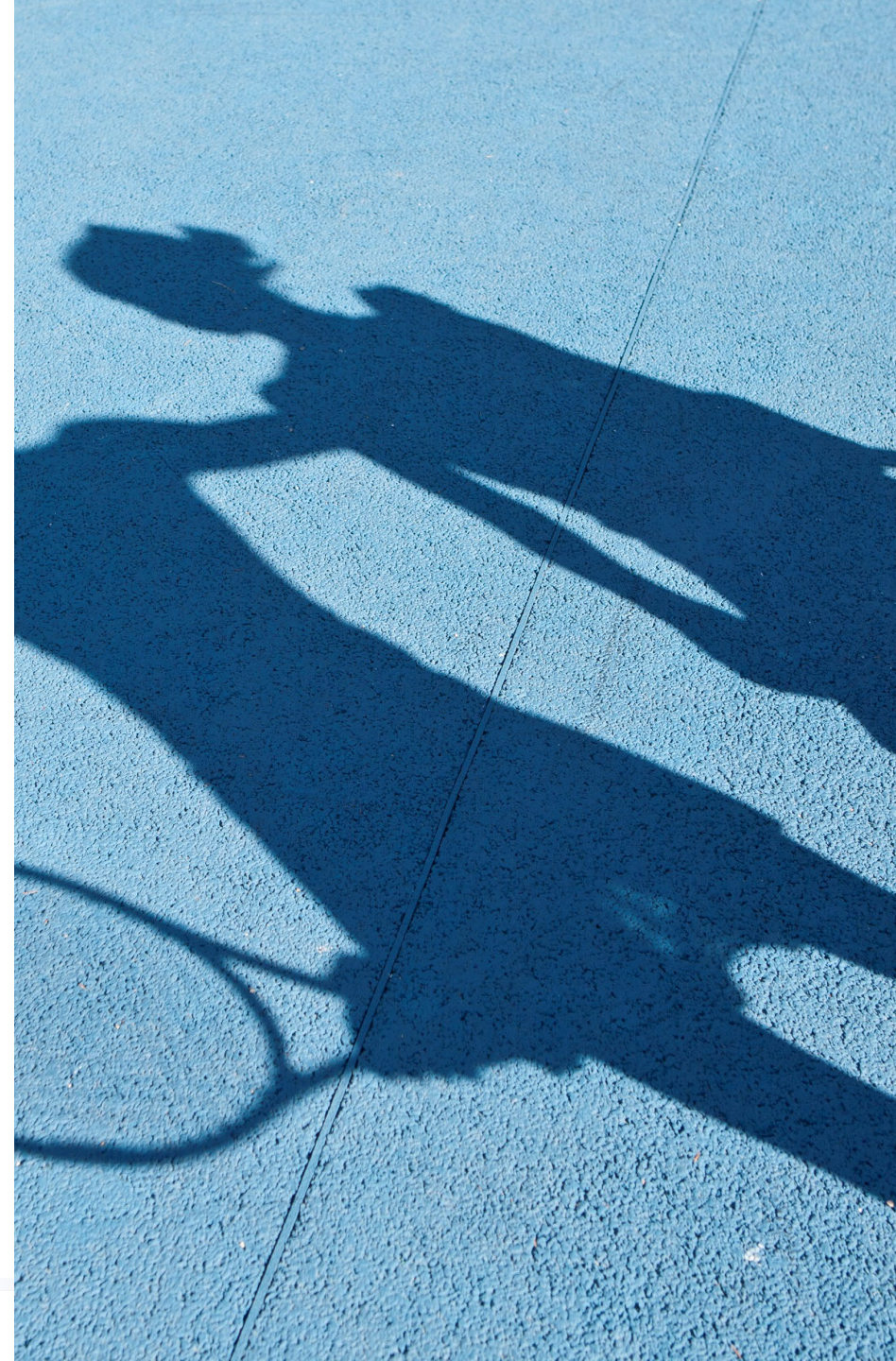
Scaling-up en standardisatie als sleutel strategieën --- > lager per-unit overheads.

Thyssenkrupp Nucera en ITM Power commercialiseren skid-mounted oftewel containerised units (*Turnkey Technology provider*)

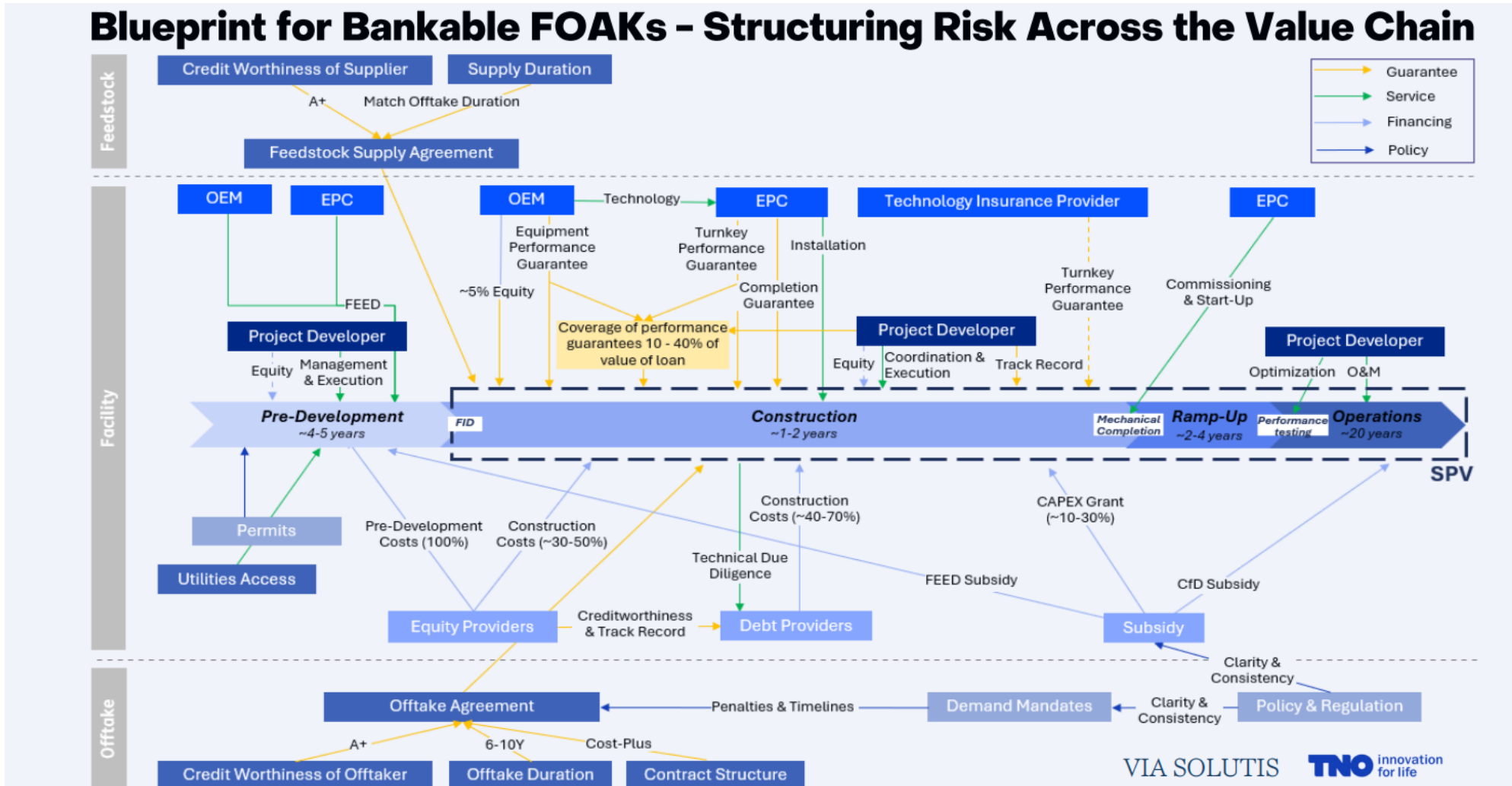


OEMs maken partnerships met EPC's om geïntegreerd, standaard, plant designs te leveren -- > *Integrated Solution provider*

nel • + SAMSUNG E&A



Waardeketen Financiering: nog ingewikkelder



Allianties om e-SAF projecten tot de FID finish

A GROUNDBREAKING ALLIANCE TO HELP DRIVE END-TO-END PRODUCTION OF SAF FROM BIOMASS

SOLUTION CAN REDUCE TIME FROM FEASIBILITY STUDY TO FACILITY STARTUP BY MORE THAN 15%, AND RESULT IN A 5-10% CAPITAL COST SAVINGS^[1]

GIDARA ENERGY

- GIDARA's HTW[®] Gasification Technology delivers a proven, reliable, and high-conversion solution for transforming waste-based feedstocks into syngas at commercial scale.
- Enables customers to access a flexible, scalable pathway for realizing the potential of waste in the production of sustainable fuels and chemicals.

JM Johnson Matthey

- JM FT CANS[™] technology, codeveloped with bp, offers a scalable solution to convert syngas into FT crude and provides up to a 50% reduction^[5] in CAPEX and a three-fold increase in production for the same size reactor.^[2]
- JM's cutting-edge reforming and HyCOgen[™] technologies can boost SAF production without increasing solid feedstock demand^[6].

Honeywell UOP

- Honeywell's FT Unicracking[™] process transforms FT crude from waste sources into fuel and can produce 3-5% more SAF^[3] and reduce costs by up to 20% compared to other commonly used FT-hydrocracking methods.^[4]
- Honeywell digital solutions help enhance operational efficiency and bankability, maximizing production uptime and minimizing risk for SAF producers.

SAMSUNG E&A

- Delivers end-to-end integrated solutions across a wide range of technologies, enhancing competitiveness, minimizing risks
- Serves as a single point of execution for customers

[1] Based on theoretical schedule and cost analysis when the modularization solution is applied in the EPC stage. Schedule analysis based on industry standard benchmarks for project schedule outcomes. Cost comparison is against an open TB and using standard industry practice outside technology integration.

[2] <https://matthey.com/products-and-markets/energy/sustainable-aviation-fuel-saf-technology/hyco-gen-technology>

[3] By utilizing proprietary SAF selective Honeywell UOP hydrocracking and hydro-isomerization catalysts.

[4] Based on internal UOP cost (Estimated Erected Cost) analysis that compares a typical configuration with the patent pending configuration.

[5] JM 50% CAPEX reduction. <https://technology.matthey.com/content/journals/10.1595/205651321X16143384043486>

[6] JM increasing SAF feedstock demand. <https://matthey.com/en/products-and-markets/energy/sustainable-aviation-fuels/hyco-gen>

Recap en Call-to-action

- Van waardeketen naar waardeketen ecosysteem: **Je rol kiezen en gezond houden**
- **Capabilities om te orkestreren** zijn cruciaal is voor groei én survival
- Wees bewust van **waar wordt waarde gecreëerd** en waar gebeurt **waarde captatie**

- **Ecosysteemkaart maken:** Complementair partners en non-obvious partners;
- **De kampionen vinden en coalities vormen.** Wordt bewust van spelers die vandaag nog geen incentive hebben om te bewegen
- *Don't fall for hypes* | Gezond verstand blijven gebruiken



Van waardeketen naar ecosysteem— wat verandert er voor strategie & performance?

Dr. Monalisa Goswami, Business Manager,
Power-to-X, TNO

