



Sustainability Trends in Business across Industries

Institute of Directors (IoD) Webinar

9th November 2023

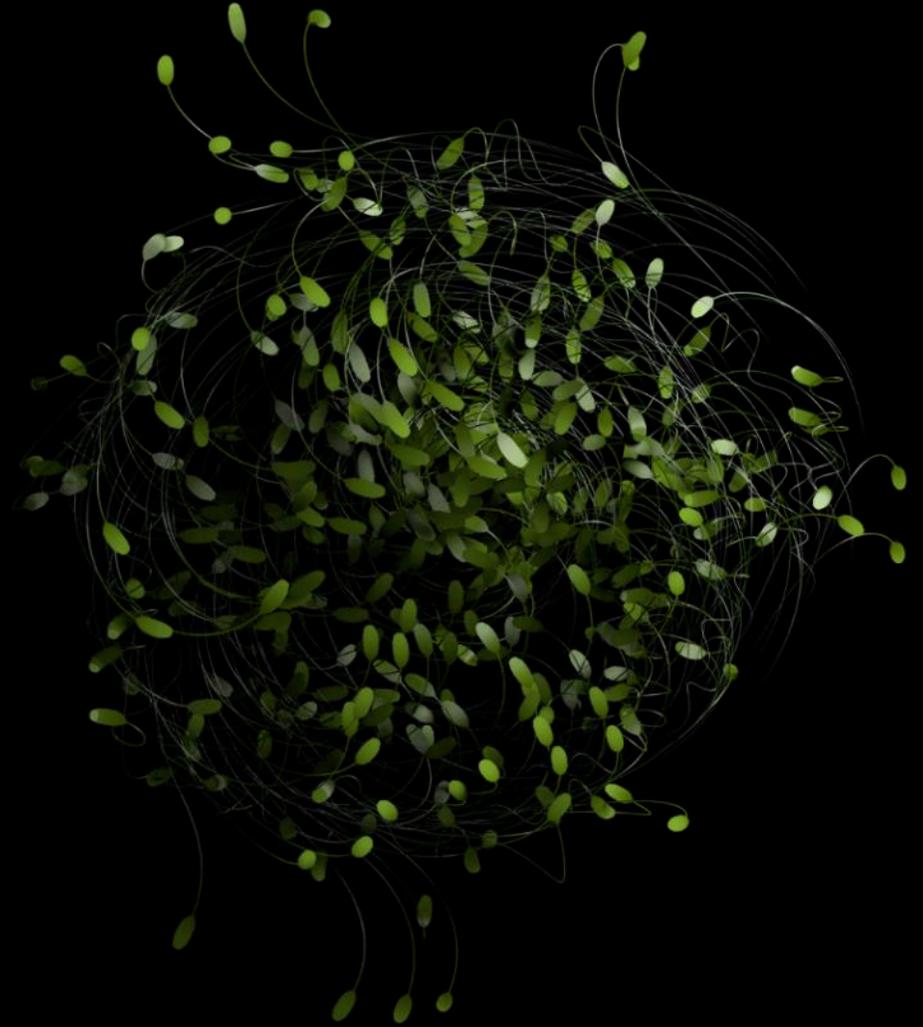


Dr. Bordin Vongvitayapirom

SEA Sustainability & Climate Centre of Excellence (S&C COE) Leader

Deloitte Touche Tohmatsu Jaiyos Co., Ltd.

bvongvitayapirom@deloitte.com



Sustainability trends in business across industries

Institute of Directors (IoD) Webinar | 9th November 2023

Agenda

Time	mins	Topic
17:30 – 17:40	10	Opening remarks by Khun Kulvech, IOD President
17:40 – 17:50	10	1. Global context
		2. Sustainability trends in business across industries
17:50 – 18:00	10	 Energy
18:00 – 18:10	10	 Steels and Chemicals
18:10 – 18:20	10	 Transportation, Logistics and Automotive
18:20 – 18:30	10	 Food & Beverage
18:30 – 18:40	10	 Healthcare Services
18:40 – 18:50	10	 Financial services
18:50 – 18:55	5	3. Key takeaways
18:55 – 19:10	15	Q&A



1. Global Context

Latest sustainability developments
across major economies



“ The responsibility rests squarely with all of us – there's safety and power in numbers. It's no longer a few visionaries – **it's all of us, and We Can. We Will.** ”

Helen Clarkson, Climate Group CEO at Climate Week NYC



Major leap forward: Sustainability Report

Climate Week NYC¹, WEF^{2,3}

The IFRS's new ISSB standards will encourage **uniform disclosure** and establish a **global baseline** for reporting on climate and sustainability information. Companies **that fail to comply** will lose in the global market.



Global Consensus on Climate Act Acceleration

Climate Week NYC⁴, COP28⁵, WEF⁶

COP28 sets new paradigm to fast-track **Climate Finance** (\$17 bn gap in 2020),⁷ ensuring alignment with **1.5°C** climate targets. **Local implications** must be integrated in subnational climate acceleration. Public-private sector must prioritize **people, livelihood**, and **gender equity** for a sustainable future



Green Economy is The Economy

Climate Week NYC⁸, COP28⁹, WEF¹⁰

In alignment with TCFD, ISSB, and Kunming-Montreal Targets, **TNFD** established a global standard for organizations to disclose and incorporate **nature** risks and opportunities. Cross-sectors are required to construct **net-zero roadmaps** through **nature-based** solutions.

Sources: 1. Climate Week (2023). [Climate Week NYC](#), 2. IFRS (2023). [WEF&ISSB on sustainability reporting](#), 3. WEF (2023). [What companies need to know about ISSB](#), 4. Climate Group (2023). [COP28 Announcement for LCAS](#), 5. Rath (2023). [World Risks: wrong focus at COP28](#), 6. Deloitte(2023). [Deloitte at WEF SDIM 2023](#), 7. LSE (2022). [Finance for Climate Action](#), 8. TNFD Global (2023). [Global launch of the TNFD](#), 9. COP28 (N.D.). [COP28: Presidency and Leadership](#), 10. WEF (2023). [Biodiversity Loss threatens Global Economy](#)

Major climate announcements in 2023 following COP28



Biden-Harris \$7 bn For America's First Clean Hydrogen Hubs

Hydrogen's End-to-End Supply Chain

- Production, Consumption, Transmission Infrastructures, Storage

U.S.'s economic and environmental benefits

- Drive private sector investments in clean hydrogen's decarbonizing technologies

Major Pilot Sites

- California Hydrogen Hub (California)
- Gulf Coast Hydrogen Hub (Texas)



Double Down, Triple Up: Renewables Now

Transformative Impact to Achieve 1.5°C

- **Tripling** global renewable power capacity to at least 11,000 GW by 2030² (Total 3,382 GW in 2022).³
- **Doubling** overall energy efficiency improvement rates by 2023.⁴

Call for Action

- Endorsed by 250 organizations, an **open letter** calls for a target at COP28.

Key Enablers to Successful Transition

- Infrastructure & System Operation
- Sustainable Supply Chain
- Public-Private Finance
- Policy & Regulation



COP28 UAE: Climate Action & Net-Zero Transition Plan

COP28 First Local Climate Action Summit

- **Localized Climate Act** pathways based on each country's prerequisites.⁵
- **Empowering** based on Four Pillars:
 - Finance
 - Global Climate Act
 - Energy Transition
 - Local Resilience and Adaptation

COP28 Net Zero Transition Charter:

- Encourage **uncommitted** private sectors to net-zero pledges & credible transition plans.⁶
 - TPT Disclosure Framework⁷



Global Stocktake : First Reporting Conclusion at COP28

The role of course correction mechanisms

- **Transparent** re-evaluation and urgent reflection of each nation's
 - Net-Zero roadmaps and performances⁸
- **Thailand** is obliged to update sector-specific transition plan in alignment with NDCs⁹ by 2025 after COP28.

Global Stocktake's Output Presumption

- Fossil-Fuel Phase-Out : Mitigation and Adaptation Pathways
- Scale up Finance & Financial Support.¹⁰



Sources: 1. DOE (2023). [\\$7 bn for America's first clean hydrogen hubs](#), 2. GRA (2023). [Tripling Renewable Power](#), 3. WEF (2023). [Renewable capacity up 10% in 2022](#), 4. IEA (2023). [Double efficiency progress](#), 5. COP 28 (2023). [Local Climate Action Summit \(LCAS\)](#), 6. COP28 (2023). [Net-Zero Transition Charter](#), 7. Deloitte (2023). [Transition Plan Taskforce Disclosure](#), 8. UNFCCC (2023). [Global Stocktake](#), 9. UNFCCC (2023). [Nationally Determined Contributions \(NDCs\)](#), 10. UNFCCC (2023). [Consideration of Global Stocktake Output](#)

2. Sustainability trends in business across industries

Major drivers, key trends, and takeaways





 Energy

Key Drivers: What is driving sustainability in the Energy sector?



Energy Security

- **War:** The Russo-Ukrainian War has weakened global reliance on Russia’s oil exports.¹ Many initiatives have been announced on reducing dependency of energy supply (e.g., EU Fit for 55 and German Renewable Energy Act 2023).
- **Renewables:** Energy security is one of the main drivers to **renewable growth**. The **triple up** concept to increase global renewable energy capacity to **11,000 GW in 2030** is expected to see commitments at COP28^{2,3}.

Carbon pricing mechanism

- Carbon pricing mechanism is key in **accelerating** the **clean energy** adoption – the Global Stocktake⁴ highlighted how the green transition of energy sector is **vital** to the global landscape as all sectors need clean energy to **reduce their emissions**.
- **CBAM** will be fully implemented in 2026 while **emission allowance** for each sector will be completely **phased out** in 10 years.^{5,6} Carbon price in EU auction market has significantly increased in 2023. Organizations will have to adopt innovative ways to reduce emission and cross border tax.

Government support schemes

- In 2022, the US approved **\$370bn** in investments for **climate-friendly technologies** including tax credits for EVs made in the US.^{7,8} This includes \$60bn to encourage **domestic manufacturing** of renewables’ devices and \$27bn for green **banks** to help get clean tech projects off the ground.⁹

Adoption of Green Taxonomy

- Taxonomy is always included energy sector in the 1st phase of implementation as one of the highest emitter including in Thailand. Therefore, all energy companies must consider their long-term strategy to be taxonomy-aligned by 2040 (sunset date)¹⁰.

Sources: 1. WEF (2023). [What's the global energy outlook for 2023?](#), 2. GRA (2023). [Tripling Renewable Power](#), 3. WEF (2023). [Renewable capacity up 10% in 2022](#), 4. Reuters (2023). [China warns against 'empty slogans' at COP28](#), 5 CER (2022). [EU Emissions Trading System after energy price spikes](#), 6. European Parliament (2022) [Deal on a more ambitious Emissions Trading System](#), 7. BBC (2023). [Germany is no longer reliant on Russian energy](#), 8. Bloomberg (2022). [Democrats' \\$370 Billion Climate Spending Deal](#), 9. Financial Times (2022). [\\$370bn reasons to invest in technological solutions](#). 10. Bank of Thailand (2023). [Thailand Taxonomy Phase 1](#).

Emerging sustainability trends in Energy sector

Macro-perspectives on how the sector views sustainability & ESG issues

Global Perspectives



Rising Government Supporting Schemes

- Country-specific investments and Supporting Schemes
- Consortium Projects



Decarbonization

- Ramp up renewable energy
- Deployment of CCUS
- Hydrogen in power generation



Decentralization

- Grid infrastructure to support increase of EV charger
- Local hydrogen production



Digitization

- AI and machine learning to optimize energy demand-supply
- EV data platform sharing to improve the grid

Rising government supporting schemes and consortiums

Major economies announced funding schemes for their countries, while public-private partnerships form consortiums

IRA & H₂Hubs: Clean Energy Transition

\$ 400 bn Funding Scheme: Mobilize National's Climate Act Targets

- IRA strategy aims to **maintain tax and commodity price** of clean energy manufacturing¹.
- As part of Biden's **Investing in America Agenda**, \$7 bn investment in **H₂Hubs**² will be new foundation to nation's clean energy transition.

CCS Infrastructure Fund (CIF)

\$ 1.2 bn Investment in CCUS Clusters with T&S networks: Funding Schemes

- Diverse CCUS sectors have **distinct** business model and funding mechanisms.³
 - Direct and Co-fundings.
 - Additional Funding from DPA⁴ and NZHF⁵
- UK Govt.⁶ announced **Acorn and Viking T&S**⁷ to establish T&S infrastructures for four CCUS Cluster by 2030.
 - Shortlisted project currently under negotiation.

Hydrogen Import Strategy (NHS)

H₂Global: First International Trading Platform of Green Hydrogen

- **Double Auction Mechanisms:** Federal Grant to offset commodity price.
- Strategy expects to **accelerate Hydrogen Imports** from EU's RE-generative regions.
- Establish **Sustainable Transportation Routes:** Ship & Pipeline Corridors.⁸

International Consortiums

-  **East Coast Cluster (CCUS):** UK Govt. & Bilateral Partners⁹
 - **Net Zero Teesside**¹⁰: CO₂ compression & onshore pipeline
 - **Zero Carbon Humber:** Pipeline & Offshore Storage
-  **Northern Lights:** Norwegian Public-Private partnerships
 - CO₂ transported by Ship¹¹
-  **Porthos:** Dutch Public-Private Partnerships.
 - CO₂ T&S by Offshore pipeline¹²



Sources: 1. The White House(2023).[Inflation Reduction Act](#), 2. DOE (2023). [America's Regional Hydrogen Hubs](#), 3. GOV.UK (2023). [CCUS Funding Streams and Support Mechanism](#), 4. DPA: Dispatchable Power Agreement, 5. NZHF: Net Zero Hydrogen Funds, 6. GOV.UK (2023). [Conclusion of CCUS:Track-2](#), 7. IFRF (2023).[Viking and Acorn CCUS project](#), 8. NHS (2023). [NHS Update](#), 9. NEP (n.d.). [East Coast Cluster](#), 10. Net Zero Teesside (n.d.). [NZE Power Projects](#), 11. Northern Lights (n.d.). [Northern Lights](#), 12. Porthos (N.D.). [Porthos](#)

Deep dive on sustainability trends in the Energy sector (1/2)

Financially support the acceleration of renewable adoption and tech breakthroughs to achieve economies of scale

Trend Overview⁴



Decarbonization

SHORT TERM (2020s)

- Increase and accelerate **renewable capacity and adoption** in each country to recover 1.5 °C progress (Triple effort)
- Many countries are starting to **adopt low carbon fuels** in their **national strategy** with regulatory supported for governance and investment
- **H₂ and Green Derivatives** begin to enter the market with supported from government to address **first mover difficulty**

MEDIUM TERM (2030s)

- H₂ and green derivatives fuel market will begin to be **stabilized with minimum government supported** as end user market and demand are developed and sustained
- **Scaling up** low carbon fuels market not only for power generation but also for end users will require **supported infrastructure in place** e.g., transportation pipeline/network and refueling station

LONG TERM (2050s)

- **H₂** are expected to account for 14% in final energy consumption and 94.5% would be Green H₂ by 2050¹.
- It is expected to have **significant cost & technology breakthrough** for H₂, low carbon fuels and electricity production to support national energy security and net zero.

Best practices



bp's combined 1.5GW from H₂Teesside (**blue H₂**) and HyGreen (**green H₂**) projects would help the UK achieve its target of producing 10GW of low-carbon hydrogen by 2030⁵.

bp evaluating feasibility of building new **hydrogen hub** in Germany providing up to 130 KTPA of **low-carbon H₂ from Green NH₃** from 2028².



Announced plan to develop **Bluebonnet CCS Hub in Texas**, 1.2 bn TPA CO₂, **supporting two industrial corridors**, to store off-site captured CO₂ in saline formations³.



China's largest, 2.2GW, solar PV farm, part of its plan to become **carbon neutral by 2060**, demonstrates its leadership in clean energy.

Sources: 1. IRENA (2023). [World Energy Transitions Outlook 2023: 1.5°C Pathway](#), 2. bp (2023). [bp reveals plans to evaluate expansion of Germany's green energy port with a new hydrogen hub](#), 3. The CCUS Hub (2023). [1PointFive announces a new CCUS hub in Texas](#), 4. Deloitte Analysis. 5. bp (2023). [Spotlight on bp's Teesside projects](#)

Deep dive on sustainability trends in the Energy sector (2/2)

With rising EV adoption, a resilient grid is essential; AI aids in balancing supply and demand.

Trend Overview



Decentralization

- Decentralization brings energy generation **closer to consumers**, cutting **distribution costs**, curbing **transmission losses**, and optimizing renewables with local storage and hydrogen conversion.^{1,2,4}
- **Increasing grid load from EV adoption¹ & electrification** drives the need for more resilient grids to handle fluctuating demand, minimizing impacts on centralized systems.
- **Local renewable energy sources** are potentially utilized for local demand, using excess to produce **green hydrogen** and reduce transportation costs of hydrogen.^{3,4}



Digitization

- **Smart grids** are essential for **real-time demand-supply alignment**, enhancing the efficiency of renewable energy utilization.
- Digitization enables **predictive maintenance** for energy infrastructure, minimizing downtime and maximizing longevity.
- AI & machine learning **streamline** power control rooms, optimizing **real-time** demand and supply management with milliseconds decision-making.
- Digitization could enhance possibility of delivering **Energy as a Service (EaaS)** to optimize demand-supply management.

Best practices



EVgo purchases certified renewable energy credits (RECs) to qualify the electricity distributed through their **charging stations** as **100% renewable energy**.⁵



Fuegy develops **virtual energy networks** using **AI-powered** systems, enabling simultaneous energy balance & automation in residential/B2B sectors, including malfunction detection and billing.⁷

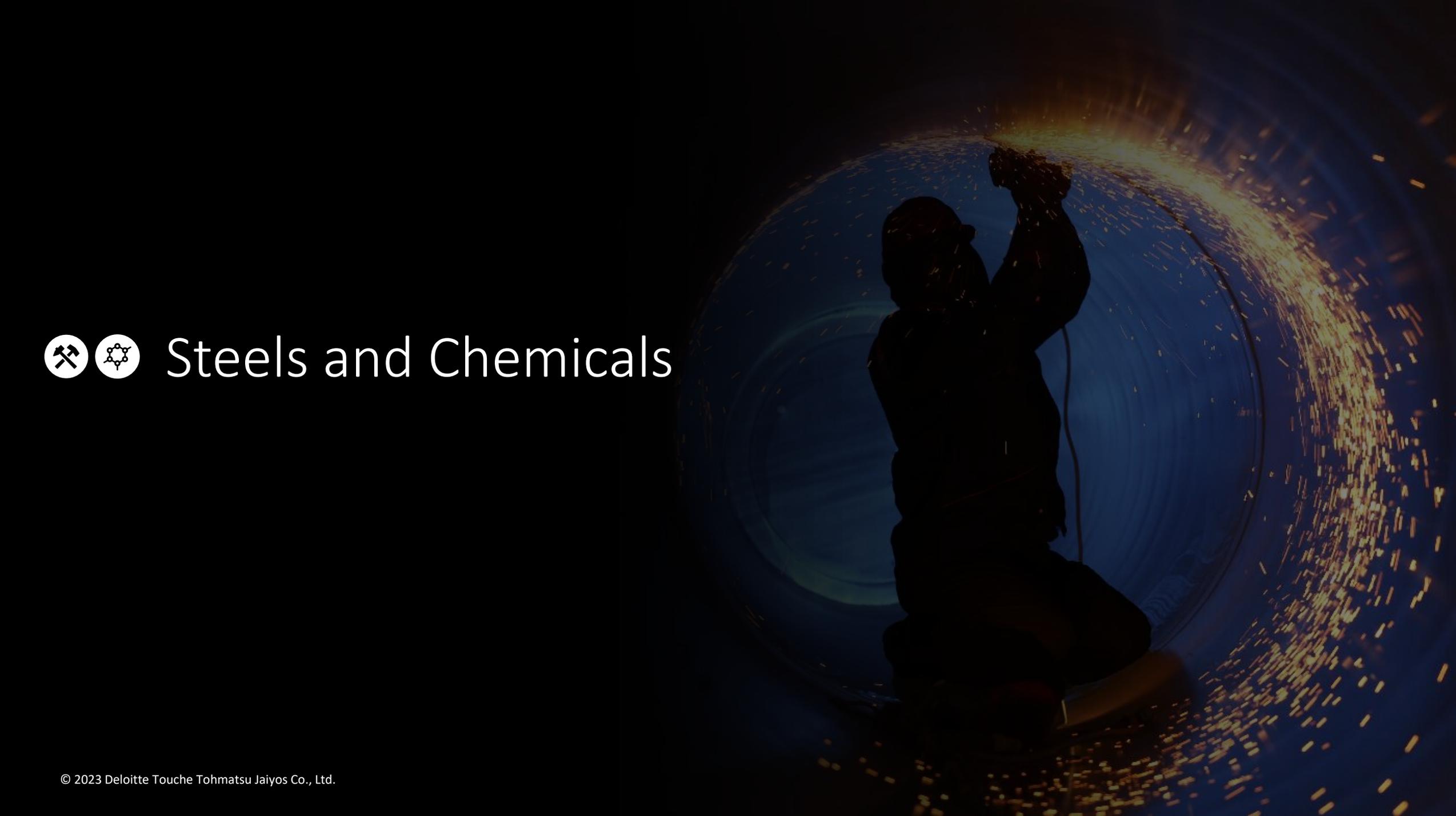


Shell will build **Holland Hydrogen**, to be operational in 2025, set to produce 60,000-80,000 kg renewable hydrogen daily, using power from an **offshore wind farm** partly owned by Shell.⁶



AMP's charging software enables **rapid EV charging** for both AC and DC **vehicle-to-grid (V2G)** functions, allowing the battery to charge and supply power to the grid as an energy storage unit **during peak hours** or emergencies.^{8,9}

Sources: 1. Utility Analytics (2021). [Energy Decentralization](#), 2. Modassar Chaudry et. al. (2023). [Great Britain: integrated energy system model](#), 3. Clean Technica (2020). [Hydrogen Distribution is Lossy and Expensive](#), 4. Reiner Lemoine (2022). [Advantages of decentralized electrolyzers](#), 5. Morgan Lewis (2022). [The Importance of Renewable for EV Charging](#), 6. Shell (2023). [Netherlands: Holland Hydrogen](#), 7. Fuegy. [Fuegy](#), 8. AMP (2023). [Why Amp Charging software for EV?](#), 9. Energy Your Way (2023). [Case for Decentralized EV Charging](#)



  Steels and Chemicals

Key Drivers: What is driving sustainability in the Steels & Chemicals sectors?



Regulations & policies

- **EU ETS and CBAM regulations** are driving the acceleration of green production; with **incentives**, provided by government, bridging green steels and chemicals market gaps.
- **Green steel certifications** and the adoption of **low-carbon Taxonomy** are currently unclear (especially in Southeast Asia).

Supply & Infrastructure

- With surging reliance on renewable energy, **manufacturing locations** are preferred to be countries with **geographic advantages**, policy and ecosystem support.
- **Renewable & Green H₂ supported Infrastructure** should be key consideration in future investments, as **H₂ regasification & transportation** will increase the cost

Funding & investments

- **Governments** and **international funds** play a crucial role in securing the necessary funding for **substantial industrial investments** (e.g., an estimated \$70-100 billion is needed for the EU steel industry¹).
- During the transition to a greener economy, downstream companies and customers may face an **initial increase in product costs** due to cost pass-through.

Raw material availability

- Currently, only **one-third of global iron ore supply is high quality**, creating limited supply for Direct Reduced Iron (**DRI**) production. Therefore, DRI is required for H₂ DRI-Electric Arc Furnace (EAF) making decarbonize steel industry are rely on high quality raw materials.

End-consumer trends

- Higher-carbon steel demand remain high during transition period (e.g., China's **ongoing industrialization** and the **recent global economic downturn**).
- **The chemical components make up the end-use products.**
 - An **aging population** and the **rise in chronic diseases** could lead to **50% increase in the demand for medical devices** from 2021 to 2029.
 - **Low-carbon chemicals**, a **crucial component in EVs batteries**, is expected to rise 8x from **3 - 27.5 million between 2020 and 2030**².

Application industries

- **Over 75%** of the chemical industry's emissions fall under **scope 3** and are **pass-through consumers**. Efforts are being made to **secure green energy sources** such as **H₂ & NH₃**.
- **Offtakers** are showing **confidence in sustainable commitment** to steel & chemical products, prompting producers to transition to greener sources.

Drivers for Sustainability in the Steels & Chemicals sectors

Emerging sustainability trends in the Steels & Chemicals sectors

Macro-perspectives on how the sectors view sustainability issues



Steels Perspectives

Chemicals Perspectives



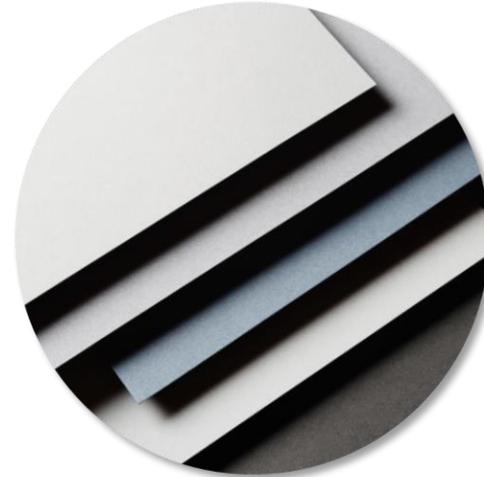
Supply chain model

- Geo-Spilt model



Production decarbonization

- Enabling green raw materials & technologies



Advanced materials

- Supporting the energy transition
- Improving functional properties



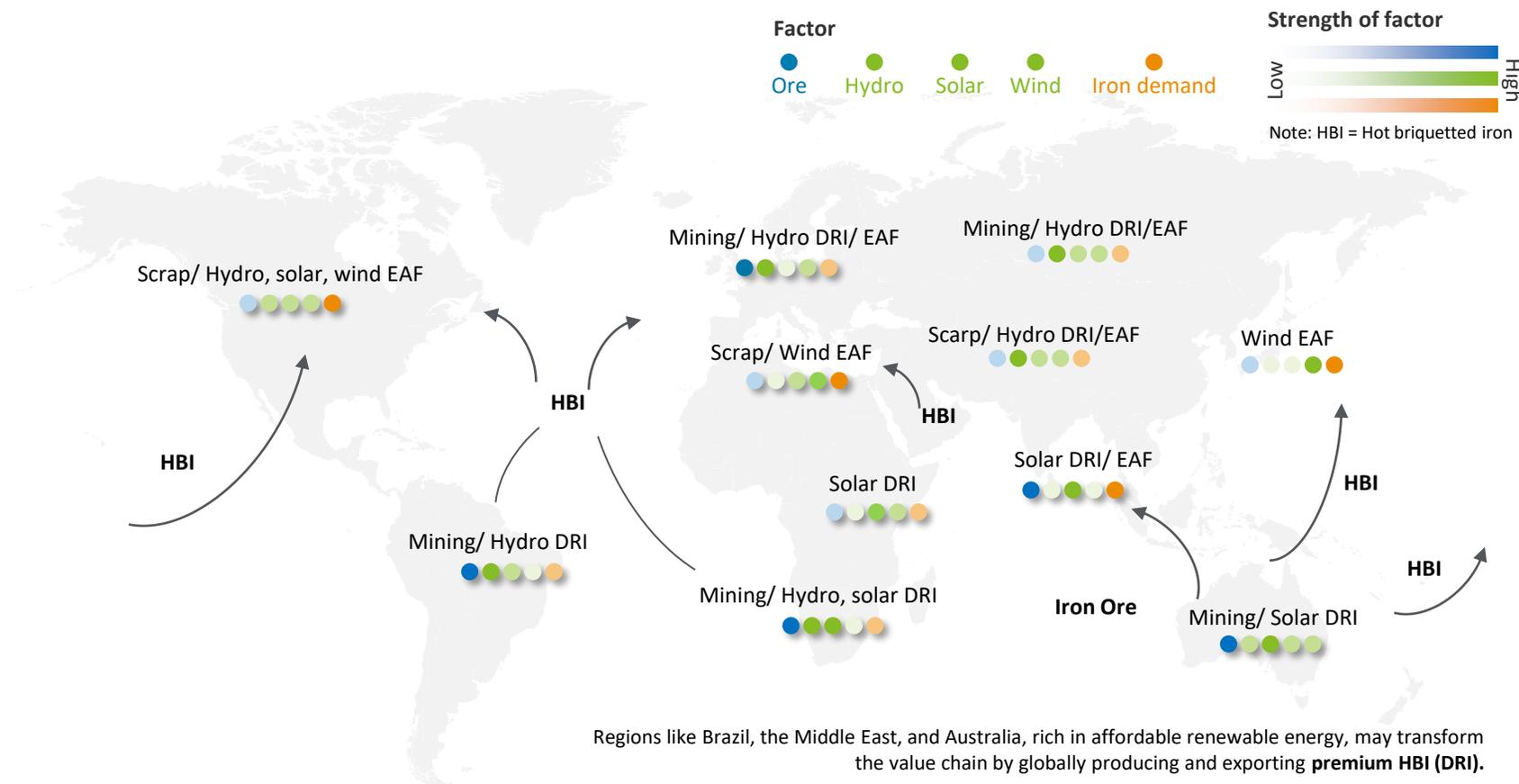
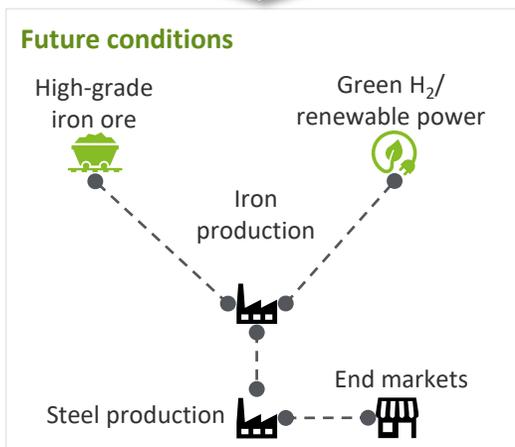
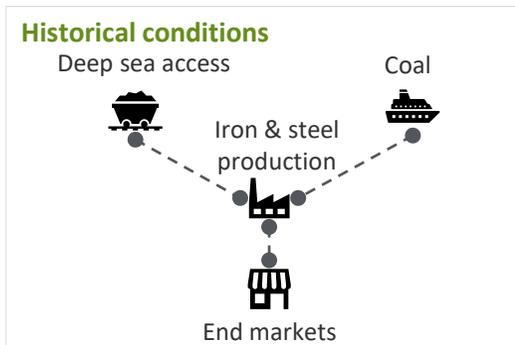
Enabling technologies

- Synthetic biology

Geo-Spilt model: a future iron (ore) shipping in the steels value chain by 2050

The potential for reducing production cost by locating plants near renewable sources

Key factors influencing the decarbonization²



Key highlights

The critical production factors will include proximity to abundant **low-cost renewable power, green H₂, and high-quality iron ore.**

As energy demand shifts towards **green H₂ & renewable electricity**, the traditional location patterns may become less relevant and are likely to change.

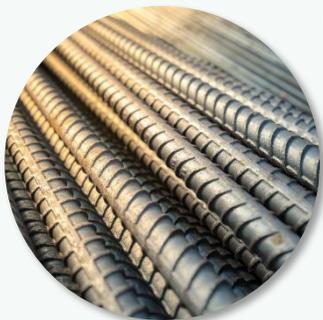
Iron ore mines in **renewable energy-rich regions** offer an **opportunity to optimize production by decentralizing operations** for cost efficiency.

Sources: 1. Deloitte (2023). [Pathways to decarbonization | Steel](#), 2. Shell & Deloitte (2022). [Decarbonizing-steel](#)

Deep dive on sustainability trends in the Steels sector

Green H₂ & renewable energy support the acceleration of steel production

Trend Overview



Steel

- Traditional Steel is made with **Blast Furnace (BF)** using coal/coke as the heat generation. Transition to **greener alternatives** help to reduce environmental harms.
- BF production is turning **waste gases** as an **alternative fuel source** in place of traditional fossil fuels. Gases are also being purified and catalyzed to **produce chemicals** e.g., NH₃ and CH₃OH, **cutting the steel industry's carbon footprint**.
- Low carbon emissions aim to substantially decrease the environmental impact of conventional steel production processes e.g., by **waste heat recovery**.



Green Steel

- **Green Steel** involves innovative aimed at reducing the industry's reliance on fossil fuels.
- **Capturing CO₂ emissions** or using them in other industrial processes e.g., CO₂ is reacted with a chemical solvent.
- Using **green H₂ from renewable sources** in the plants, especially DRI-EAF, is a significant step toward green steel production.
- Replacing coal with **torrefied biomass (bio-coal)** that transforms biomass into coal-like material with enhanced energy density and grindability.

Best practices

LanzaTech  The **conversion in BF** production^{2,3} repurposes **waste gases** i.e., CO₂ as a fuel source. The **gases** are **transformed into syngas, replacing fossil fuels** (coal).

Kawasaki  **Top-pressure recovery turbines (TRTs)**^{*4} harness waste heat from BFs to **generate extra electricity**.
*Fuel savings: 50 kWh/t-pig iron, CO₂ Reduction: 45.0 kg-CO₂/t-pig iron⁷



The adoption of **DRI/HBI** technology using natural gas as the reductant to convert iron ore will boost efficiency, while **decreasing reliance on coal & coke**. The reduction in **emissions could range from 10-50% by 2030**⁵.

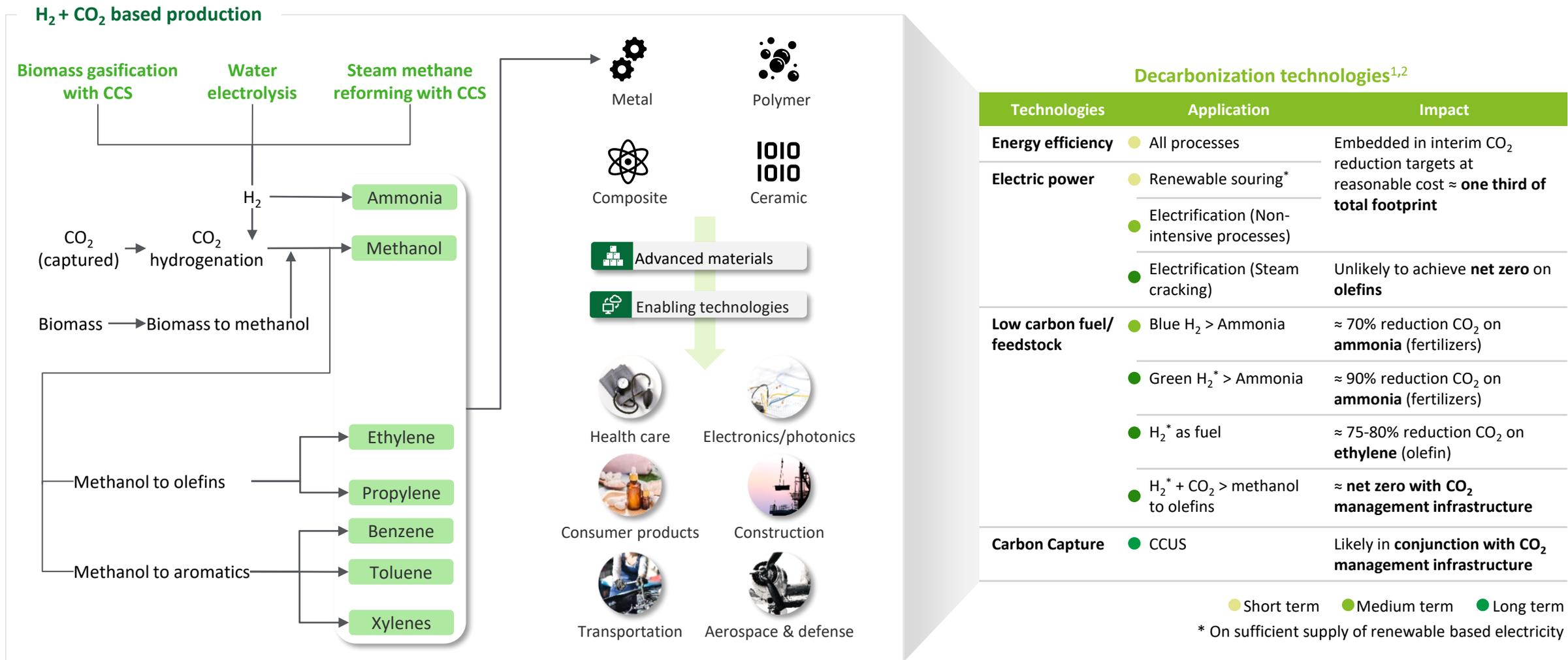


ArcelorMittal⁶ is undertaking an innovation for the 1st industrial scale production and use of **DRI using 100% H₂** as the reductant, with an annual steel production of 100,000 tones.

Sources: 1. Deloitte (2023). [Pathways to decarbonization | Steel](#), 2. Shougang Group (2023). [Environmental Protection](#), 3. LanzaTech (2023). [LanzaTech](#), 4. Kawasaki Heavy Industries (2023). [TRTs](#), 5. USS (2023). [Sustainability - Roadmap to 2050](#), 6. ArcelorMittal (2023). [Hydrogen-based steelmaking to begin in Hamburg](#), 7. CTCN (2023). [Top Pressure Recovery Turbine \(TRT\) | Climate Technology Centre & Network](#)

H₂ & CO₂- based production can play a vital role in chemicals sector decarbonization

The chemical industry is exploring a spectrum of decarbonization solutions, from immediate energy efficiency measures to ambitious long-term changes in feedstocks and fuels



Sources: 1. Deloitte (2023). [The future of materials](#), 2. S&P Global (2023). [Decarbonizing Chemicals Part One: Sector wide Challenges Will Intensify Beyond 2030](#)

Deep dive on sustainability trends in the Chemicals sector (1/2)

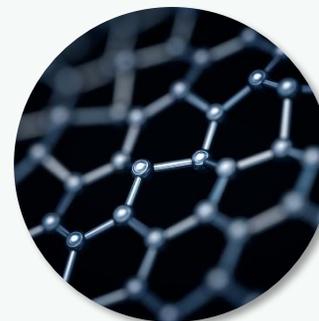
Chemicals can drive the sustainability agenda through supporting the energy transition and improving their properties

Trend Overview



Supporting the energy transition

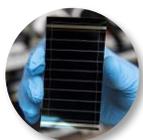
- **Advanced composites** and coatings are used in Wind turbine blades, with energy and carbon-payback period are 5%–13% lower than market incumbents¹.
- **Solar panels** are being made more cost-effective, efficient, and easier to produce.
- **Insulation materials** are improving to block the rate of heat transfer in building.
- **Advanced batteries & energy storages** are also being developed to improve energy density, safety, and lifetime².



Improving functional properties

- **Lightweight materials** are being developed to boost strength, thereby saving energy consumption and increasing lifespan.
- **Graphene, carbon nanotubes** enhance electrical and thermal conductivity. They, along with nanowires and **quantum dots**, improve electronic device performance and reducing power consumption.
- **Self-healing materials** with mimicking capabilities can autonomously recover from damage, reducing the need for material replacement.

Best practices



Perovskite solar cells using **CdTe*** have shown high performance and low production costs. Their efficiency has increased from under 3% to **over 25%** recently. It can be deposited on a flexible base³.



Metal-organic frameworks⁴ are under development for **H₂ storage**, expected to offer high volumetric and gravimetric H₂ densities, targeting **onboard hydrogen storage systems**.



The U.S. Department of Energy is working on automotive to replace traditional cast iron and steel with **lightweight** e.g., **Mg alloys, Al alloys, carbon fiber, and polymer composites**. Reducing the weight by 10% can lead to a significant **6%-8% improvement in fuel economy**⁵.



Chemicals are also **essential components in technology** products. **Silicon nanowires**^{6,7} are used in **hardware** e.g., **graphic processing units** for powering **emerging AI applications** like **large language models**.

*CdTe = Cadmium Telluride

Sources: 1. Hanwei Teng et al., MDPI (2023). [Carbon Fiber Composites for Large-Scale Wind Turbine Blades \(China\)](#), 2. Srikanth Ponnada et al., ACS (2022). [Lithium-Free Batteries: Needs and Challenges](#), 3. U.S. DOE (2023). [Perovskite Solar Cells](#), 4. Rasidi Sule et al., Wiley (2021). [Consolidation of MOFs as absorbents for hydrogen storage](#), 5. U.S. DOE (2023). [Lightweight Materials for Cars and Trucks](#), 6. Srinivasan Raman et al., IPO (2023). [Silicon nanowire applications in energy generation, storage, sensing, and electronics](#), Advanced silicon group (2023). [Technology](#)

Deep dive on sustainability trends in the Chemicals sector (2/2)

A chemical synthetic biology is needed for a more resilient future

Trend Overview



Synthetic biology

- **Synthetic biology**, which combines biology with engineering, drives **scientific innovation** to address pressing global challenges.
- It differs from traditional biology by **designing and constructing modular components** (enzyme parts, genetic circuits, metabolic pathways, etc.) that can be customized, understood, and integrated into larger systems to solve specific problems.
- **Bioinformatics** and **bioprocessing** support synthetic biology in **creating advanced materials** by analyzing biological data and developing large-scale production methods for **biological products**.
- Its applications span across:
 - Drug development (enabling yeast cells to produce artemisinin, a plant-derived antimalarial drug)⁵
 - Bioremediation (using biological organisms to clean up or mitigate pollution)
 - Renewable energy production
 - The creation of novel biomaterials e.g., insulation

Best practices



Bio-based raw material¹ is used in **polyurethane rigid** and spray foams systems **for production insulation** in the **construction industry**.



Introduction a **new synthetic biology** material with the aim of **replacing fossil fuel-based chemical** from **microbial fermentation** to **produce the target molecule**³.



Bio-polymer (e.g., DNA synthesis, assembly, and protein engineering) is developed an enzyme capable of **breaking down PET plastic** into its **monomers**².



Neste⁴ has collaborated with **Suntory, ENEOS, and Mitsubishi Corporation** to produce **PET resin sourcing from biomaterials** (Bio-Paraxylene).

Sources: 1. BASF (2022). [Making Insulation More Sustainable. New Elastopor, Elastopir® and Elastospray® Systems Containing Recycled Plastics](#), 2. UT News (2022). [Plastic-eating Enzyme Could Eliminate Billions of Tons of Landfill Waste](#), 3. Sumitomo Chemical (2023). [Ginkgo Bioworks and Sumitomo Chemical To Develop Functional Chemicals with Synthetic Biology](#), 4. Neste (2023). [ET bottles produced with bio-based materials](#), 5. Le Zhao et al., MDPI (2022). [From Plant to Yeast: Advances in Biosynthesis of Artemisinin](#)



Transportation, Logistics and Automotive



Key Drivers: What is driving sustainability in Transportation, Logistics and Automotive sector?

Regulations & Policy movements

- **Global regulatory**, e. g. Fit for 55, are driving the transition towards zero-emission mobility across the entire value chain. However, different **incentive policies and cross border tax** will have an impact on operator competitiveness.
- **ICAO**¹ and **IMO**² provide recommendation for aviation and maritime to reduce their emission and reach net zero which emphasize on improvement of energy efficiency for their operation.

Government Support

- To completely supply **100% renewable energy** for logistics and transportation facilities required government to incorporate future demand for **new renewable bid/auction rounds announcement**.
- EV adoption in each country according to NDC will **require governments to lookback at their infrastructure** e.g., charging station, grid load distribution, and peak time. Future investment from public/private sectors are necessary to accelerate the transition.

Resource Competition

- The IEA's Net Zero roadmap forecasts a need for **2 billion EV by 2050** to meet its goals³. Therefore, automotive industry should look for long-term **lithium purchase agreements, electronic parts and chips** to prevent disruption to business operations.
- Many technology and start up companies are exploring innovative ways to develop **lithium substitute technology**⁴.

Industry transformation

- As of 2022, 27 countries signed MoU on **Zero-Emission Medium- and Heavy-Duty Vehicles** which aim for **100% zero-emission new truck and bus sales by 2040**⁵.
- To reach zero-emission goal, automobile manufacturer must accelerate **their production with right technology partnership** such as **H₂ Fuel Cell and Battery** to remain competitiveness in the market.



Drivers for Sustainability in Logistics, Transportation & Automotive

Emerging sustainability trends in Transportation, Logistics and Automotive sector

Macro-perspectives on how the sectors views sustainability & ESG issues

Global Perspectives



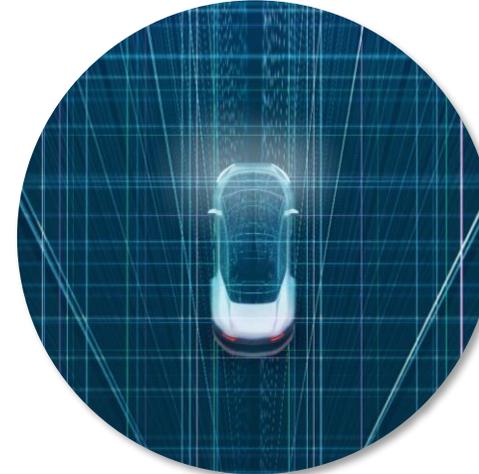
Fleet Decarbonization

- Operation Efficiency
- Energy Efficiency
- Fleet Retrofit/Replacement



Supply Chain resilience & Circular Economy

- Producer & Manufacturer Transition Resilience
- Battery Recycle



Emerging technologies & initiatives

- Carbon Capture Utilization Storage (CCUS)
- Autonomous Vehicles

Emerging sustainability trends in Transportation, Logistics and Automotive sector (1/2)

SHORT TERM TRENDS

LONG TERM TRENDS



Land

Business can decarbonize their scope 1 and scope 2 GHG emissions by improving:

- **Operation efficiency** – use AI to optimize transportation route and load carried.
- **Energy Efficiency** – ensure regular maintenance and promote the use of biofuel.



FedEx³ has **improved vehicle fleet efficiency by 40%** through route optimization.

- **Electrification of Commercial fleet** operators as supported by government policies and incentives
- **Hydrogen powered** will become crucial for **heavy-duty vehicles**, enabling efficient transportation for heavy loads, long driving ranges, shorter refueling times.

V O L V O

Volvo⁶ is testing **hydrogen-powered trucks** on public roads and plan to production of **fuel-cell trucks** by 2028.



Marine

- In response to IMO 2023, ship owners are switching fuel to **LNG or biofuels such as FAME, BT and HVO/HDRD⁴**, with significant growth compared to the testing stage last year.



MSC⁴ launched **first dual-fuel LNG capable vessels** in service in 2022.

Emerging e-fuel vessel engine to lower emission;

- **Green methanol:** produced from green hydrogen and captured CO₂ – a potential alternative to traditional bunker fuels¹⁰.
- **Green ammonia:** remain in pilot phase which is expected to be commercialize in long term



Maersk⁷ secures green methanol for maiden voyage of the **world's first methanol-enabled container vessel**.



Aviation

- In consistent with ICAO, Aviation enterprises worldwide are shifting from traditional jet fuels to **sustainable aviation fuels (SAF)**.
- **SAF certificates** under book and claim system are used to supply SAF across regions.



The world's **first 100% SAF travel flight** set to take off on 28 November 2023⁵.

- **Hydrogen-powered aircrafts** are still in the **development stage for commercial use** but have made significant progresses in the small to mid-size passenger aircrafts.

ZEROAVIA

ZeroAvia⁸ becomes **the world's largest hydrogen powered aircraft** with seating for 19 passengers, aimed for 80 in 2027.



Logistics Facilities

- Facilities owner should secure **PPA***, switch to **electric equipment**, and adopt Green / Energy efficiency **Building certifications** such as LEED and BREEAM.
- **Usage of AI** enhances efficiency in managing vessel & routes; improving turnaround time.



MSC⁴ promotes technology use in **port management** e.g., just-in-time arrival, port clearance and flow of goods.

- As a zero-emission fuel, the **adoption of hydrogen technologies** in various automotive applications aboard port vehicles (Yard Tractors, Reach Stackers, forklifts, etc.) could offer **economic advantages** within the port environment.

TiL

TiL⁹ is testing **Hydrogen Fuel Cell ReachStacker** at the Port of Valencia, Spain, one of the largest container terminals in Europe.

* PPA = Power Purchase Agreement

Sources: 1. DNV (2023). [Biofuel key to maritime decarbonization](#), 2. Airbus (2023). [Sustainable aviation fuel](#), 3. FedEx (2023). [FedEx 2023 ESG Report](#), 4. MSC (2023). [2022 Sustainability Report](#), 5. BP p.l.c. (2023). [First SAF Transatlantic flight](#), 6. Volvo (2023). [Volvo tests hydrogen-powered electric trucks](#), 7. Maersk (2023). [Maersk secure green methanol](#), 8. Electrek (2023). [ZeroAvia completes financing round](#), 9. Maritime logistic professional (2023). [Hydrogen Fuel Cell ReachStacker](#), 10. WEF (2023). [Is the world forgetting Green Methanol?](#)

Emerging sustainability trends in Transportation, Logistics and Automotive sector (2/2)

Logistics, Transportation, Automotive transformation require more sustainable material and cutting-edge technology

Trend Overview



Supply Chain resilience & Circular Economy

- Automotive manufacturer and shipyard are pressured to adopt new technologies in response to emerging demands and become resilience e.g., transitioning to **electric mobility** and **sustainable material sourcing**.
- Green steel/aluminum** are essential to reduce **scope 3 emissions** in purchased goods and services for mining industry and promote **circular economy**.
- EV** and **battery recycling facilities** will be necessary in future as EV battery life cycle is approximately 10 – 20 years.



New Technology & Initiatives

- Autonomous vehicle** can generate additional value for logistics, **reducing fuel consumption** by as much as 44% for passenger vehicles and 18% for trucks¹.
- Sodium-ion batteries** are alternatives to lithium-ion which could reduce costs and provide greater accessibility.
- CCUS model** provides a promising alternative to **decarbonize maritime** transportation.

Best practices

VOLVO

Volvo Group revealed the **world's first** vehicle made of **fossil-free steel**².



BYD expected to launch **sodium-ion batteries** in 2nd quarter 2023⁵.



HDKSOE is developing the **world's first NH₃ marine carrier powered by carbon-free NH₃**³.



Maersk and Kodiak Robotics launched the **First Commercial Autonomous Trucking in USA**⁶.

JAGUAR

Jaguar created a **portable EV charger** from recycled SUV I-Pace batteries⁴.



MSC actively testing onboard carbon capture and storage systems, with the first onboard **carbon capture system retrofit vessel** in 2024⁷.

Sources: 1. Forbes (2023). [Big fuels savings from Autonomous vehicles](#), 2. Volvo Group (2022). [Annual and Sustainability report 2021](#), 3. HD HYUNDAI (2023). [2022 Integrated Report](#), 4. Jaguar (2022). [Second Life: Jaguar I-pace Batteries Power Zero-emission Energy Storage Unit](#), 5. Electrive (2023). [CATL and BYD to use sodium-ion batteries in EVs this year](#), 6. Maersk (2023). [First Commercial Autonomous Trucking Lane](#), 7. MSC (2023). [MSC Sustainability Report 2022](#)

An aerial photograph of a tea plantation, showing neat, winding rows of tea bushes. A person in a red shirt is walking through the rows in the lower right quadrant. The lighting is dramatic, with deep shadows and bright highlights on the tea leaves.

④ Food & Beverage (F&B)

Key Drivers: What is driving sustainability in the F&B sector?



Drivers for Sustainability in the F&B Industry

Regulations & international alliances movements

- Regulators and international alliances are **pressuring** F&B companies to adapt. Commitment without concrete **action** may lead to unfavorable **consequences** of **greenwashing claims**.
- **Plastic regulations** are gaining **momentum** in various jurisdictions, such as the ban of certain single-use plastics in the EU and the plan to lift a ban on recycled PET in Thailand. This is encouraging **innovation** and **adoption** from F&B companies regarding packaging.

Need for supply chain resilience

- Impact of **climate change** on food systems emphasize the need for a more **resilient model** such as **regenerative agriculture**.
- New initiatives such as the **Good Food Investing Framework**⁶ will help facilitate **finance** into sustainable and equitable food systems.
- The EU's **Farm to Fork** Strategy aims to transform food systems with **farmers** through the adoption of **climate-smart agriculture** by 2030¹¹.

Standard-setting & reporting

- Launch of the **TNFD**, with **F&B as one of its focus sectors**, means that companies will need to start **implementing** the framework.
- The new **ISSB standards** also apply to the sector, with **Scope 3** being incorporated and consideration of additional standard-setting projects such as **“Alternative Products”**³. New frameworks for the **alternative protein industry** has also been launched by **FAIRR** and **GFI**⁵.

Investor Pressure

- **Activist investors** are tackling **ESG issues** through acquiring shares and uniting buying power to **influence** their corporate governance⁹.
- Sustainability investor groups such as **FAIRR** are aiming to influence food companies to set time-based goals to eliminate **deforestation** and other ESG issues¹⁰.

Consumer Pressure

- More than **1/3** of **consumers** are **willing to pay** more for sustainable products with **“green certifications”** – e.g., Fairtrade, Rainforest Alliance, Bonsucro & RSPO.
- **40% of Thai consumers**⁴ say they are **highly conscious about environmental friendliness** when purchasing edible products and look for eco-friendly or products with less packaging from **companies with records of environmental protection**.

Sources: 1. MSCI (2022). [ESG & Climate Trends to Watch 2023](#), 2. EUR-Lex (2022). [Single-use plastics – fighting the impact on the environment](#), 3. SASB (2023). [Alternative Products in Food & Beverage – SASB](#), 4. Deloitte (2022). [The Thailand Consumer Survey](#), 5. GFI (2022). [ESG frameworks for the alternative protein industry](#), 6. GFFN (n.d.). [Good Food Investing Framework](#), 7. Food Navigator (2021). [Global investor group steps up pressure on industry over climate goals](#), 8. Packaging Gateway (2023). [First Food-grade rPET bottles in Thailand](#), 9. City to Sea (n.d.). [Shareholder Activism-Tackling Plastic Pollution](#), 10. FoodDive (2022). [Investors pressure food companies to set concrete deforestation plans](#), 11. WEF (2022). [Transforming Food System with Farmer](#)

Emerging sustainability trends in the F&B sector

Macro-perspectives on how the sector views sustainability & ESG issues

Global Perspectives

Organization Perspectives



Biodiversity & Food System Transformation

- Nature and biodiversity
- Global and regional initiatives
- Economic and climate adaptation for farmers



Food Security

- Regenerative agriculture
- Rethinking the food system
- Supply chain resilience



Supply Chain Decarbonization

- Low carbon energy
- Low carbon fertilizers
- Green innovation



Circular Economy

- Food waste and waste management
- Packaging solutions

Deep dive on sustainability trends in the F&B sector (1/2)

A food systems transformation is needed for a more resilient future

Trend Overview



Biodiversity & Food System Transformation

The world's **food systems** and its affect on ecosystems has led to **pressing concerns** on **nature & biodiversity**.

- Urgency to restore the **carbon sink** potential (42–78 GT more carbon⁶) of **agricultural land** can be seen through initiatives such as **peatland restoration** and **agroforestry** adoption.
- **Corporates** are working together to drive the food system transformation, pushing for a **regenerative transition**.
- The backbone of the economy, **adaptation support** for **farmers** is vital in ensuring **food security**.



Food security

- **Rethinking the food system**, including **redesigning** business' food product portfolios (e.g., **alternative protein**), can help address food insecurity & **consumers'** health and environmental concerns.
- **Regenerative agriculture** can help reduce agriculture's **footprint** and tackle **climate change**⁹.
- Companies are working with **farmers** to achieve this by 1) raising **awareness & capacity building**; 2) incorporation of climate-smart **technologies**; and 3) supporting **finance** and **investments** towards sustainable agriculture.

Best practices



EU-funded project⁷ that aims to overcome the barriers to wider **agroforestry adoption** in Europe⁸



Nestlé² aims to source **50%** of key ingredients through **regenerative agriculture** methods by **2030**



Industry-first **global regenerative agriculture framework** by the SAI Platform¹ – **Regenerating Together**



Launch of Cargill's own **alternative protein** house brand '**Crave House**'³ whilst also investing in **cultivated meat**⁴

Sources: 1. SAI Platform (2023). [Regenerating Together](#), 2. Nestle (2021). [Regenerative Agriculture](#), 3. Cargill (n.d.). [Cargill's New Crave House Brand](#), 4. Cargill (n.d.). [Technology Aids Meat Sustainability](#), 5. ASEAN (n.d.). [The Sustainable Use of Peatlands and Haze Mitigation in ASEAN](#), 6. WEF (2020). [How carbon-smart farming can feed us and fight climate change](#), 7. REFOREST (n.d.). [Reforest project](#), 8. EU (2022). [Agroforestry:farming sustainability in EU](#), 9. WEF (2021). [Regenerative Farming Benefits](#)

Deep dive on sustainability trends in the F&B sector (2/2)

F&B can drive the sustainability agenda through decarbonization and circular economy initiatives

Trend Overview



Supply Chain Decarbonization

F&B companies can decarbonize their **end-to-end operations** through commitment to **Scope 3 reduction** by sourcing green **upstream** products and adopting various initiatives such as:

- Low-carbon **energy** use (green hydrogen for power generation or transportation)
- Low-carbon **fertilizers** (using green hydrogen and green ammonia)
- Low-carbon **product innovation** (utilizing recycled CO₂).



Circular economy

Attempting to move towards a circular economy in the F&B industry requires for **innovation**.

- There continues to be many innovations to tackle **food waste** (i.e., **insect bioconversion**).
- A shift towards **mono-material** packaging can be seen, but packaging that can be recycled and maintain quality & shelf life remains a **challenge**.
 - Companies are looking into this through **innovative packaging solutions** such as 1) **special coating**; 2) **modified atmosphere packaging (MAP)**; and 3) **new materials**.

Best practices



PepsiCo **low carbon fertilizer** alliance³ with Fertiberia to **reduce emissions** in potato cultivation



Coca Cola HBC Switzerland has delivered the first beverage containing **air-captured CO₂**⁴



Algae-based **biodegradable** edible film that can prolong **product shelf life**²



Start-up that is working to replace **pallet wrap** with a **plastic-free alternative** made from **food waste**⁶



Discovery of a **new method** to produce **sustainable PET** bottles from **captured carbon**⁵

Sources: 1. EPA (2015). [Reducing Wasted Food & Packaging: A Guide for Food Services and Restaurants](#), 2. EU (2023). [Replacing single-use plastic film with algae-based biodegradable edible film](#), 3. Fertiberia (2023). [Alliance for the use of green hydrogen-based fertilisers](#), 4. Coca Cola (2019). [VALSER AND CLIMEWORKS IN THE SPOTLIGHT](#), 5. LanzaTech (2022). [LanzaTech, with the support of Danone, Discovers Method to Produce Sustainable PET Bottles from Captured Carbon](#), 6. Great Wrap (n.d.), [Great Wrap](#)



 Healthcare Services

Key Drivers: What is driving sustainability in the Healthcare sector?

Drivers for Sustainability in the Healthcare sector

Climate change impact to public health

- The risk of infectious diseases causes deadly mold-related lung and brain infections and emerges lethal diseases from animal migration to new areas¹.
- **Air pollution**² & **vector-borne diseases**³ significantly contribute to global disease and impact to vulnerable population e.g., WHO stringently provide guidelines to alleviate these issues.

COP's commitment

- COP26 Health Program's⁴ initiatives: 1. "**Climate Resilient Health Systems Initiative**" promotes government assessments of climate's health impact, national adaptation plans, and climate finance for health, 2. "**Low Carbon Sustainable Health System**," drives healthcare's ambition to net-zero targets.
- **NHS in England** have to respond for Health and Care Act 2022⁵, aligning their missions with COP26 towards to the UK's net zero emissions targets and **Health & Human Services (HHS) in the U.S.** launched voluntary pledge initiative to mobilize health care sector to reduce emissions

Technological advancement and patient preferences

- Post-pandemic, an **unprecedented demand for telehealth** expecting to be more personalized and patient-centered treatments⁷.
- In 2021, \$44 billion was raised globally in **health innovation**⁸, and **medical device** global venture investment reached \$2.7 billion⁹ to expanded beyond **healthcare accessibility** and improve **healthcare productivity**.

Workforce & wellbeing challenges during pandemic/crisis

- A staggering 57% of workers are considering leaving their jobs due to work-related stress¹⁰, and potentially causing an additional cost \$170 billion by 2027¹¹.
- The European Observatory on Health System and Policies has initiated "**the Global Health Workforce responses to address the COVID-19 pandemic**" to tackle workforce development issues and retain skilled workforce¹².

Supply chain diversification

- Natural disasters and pandemics trigger a surge in **workers demand** and cause **shortages in medical supplies**, with a 38% decrease in annual earnings.
- Health-related businesses are **reducing offshore dependencies** and diversify supply chains to ensure healthcare systems are resilient and reliable for all countries.

Sources: 1. CDC (2022). [Risk for infectious diseases because of climate change](#), 2. WHO (2021). [Global Air Quality Guidelines](#), 3. WHO (2020). [Vector-borne diseases](#), 4. WHO (2020). [COP26 Health Program](#), 5. NHS (2022). [Delivering a net zero national health service](#), 6. HHS (2022). [HHS Launches Pledge Initiative to Mobilize Health Care Sector to Reduce Emissions](#), 7. Deloitte (2020). [The future of virtual health](#), 8. WEF (2022). [Health prediction 2022](#), 9. Galen data (2022). [Medical Device Startup Funding Landscape 2022](#), 10. Deloitte (2022). [The C-suite and workplace wellness](#), 11. AHA (2021). [Health Care Workforce Challenges Threaten Hospitals' Ability](#), 12. EU Observatory (2023). [Global Health Workforce responses](#), 13. Deloitte (2021). [Reshoring supply chain](#)

Emerging sustainability trends in Healthcare sector

Macro-perspectives on how the sector views sustainability & ESG issues

Global Perspectives



Digital Healthcare Transformation

- Electronic Health Record (EHR)
- Cloud-based healthcare system



Hospital at home model

- Expansion of telehealth and its ecosystem



Clinical Innovation

- Early Warning, Alert and Response System (EWARS)¹
- Preventive care



Decarbonization Technology

- Circular economy
- Low carbon medicine

Source: 1. WHO (2023). [Early Warning, Alert and Response System \(EWARS\)](#)



Deep dive on sustainability trends in Healthcare sector (1/2)

Healthcare system is transforming towards digital offering alternative care for patients.

Trend Overview



Digital Healthcare Transformation

- Centralization of patient data in **Electronic Health Records (EHR)**¹ enhances care, ensuring consistent and informed treatment decisions.
 - Reduce paper, x-ray film, and eliminates travel, **3 million gallons of gasoline annually**².
- Cloud computing is essential for transition to **Digital Care**, reducing costs and **streamlining care collaboration**.

* primary care = general practitioner, pharmacy, dentist, optician services



Hospital at home model

- Deloitte reported **40% of patients strongly desire telehealth**⁵ post-pandemic, accelerating the shift towards **home model** especially for aging population, recovering and concerned patients.
- Home model requires **collaboration among different stakeholders**, e.g., nurses for physical visits, telehealth doctors, pharmacies, insurers, and tech provider for 24/7 monitoring devices⁵.
 - **Health insurers** drive the model by **joining other services** e.g., telemedicine & self-help tools⁶.

Best practices



KU Anam Hospital implemented a **cloud-based hospital information system**³, achieving 60% of reduction in diagnostic errors, and cost savings.



Hurley Medical Center adopted the **Healthcare Information & Management Systems Society**, to enhance processes and **strengthen data security**⁴.



Mayo Clinic & Kaiser Permanente jointly invested \$110 million to increase home model capacity, while collaboration with **ambulatory surgery** centers performed outside hospital⁷.



NavigateNOW, a virtual-first health plan offers member's choices for virtual or in-person including urgent, primary care*, and health visits, along with 24/7 chat⁸.

Sources: 1. HealthIT.gov (2019). [What is an EHR](#), 2. Medicalrecords (2020). [Going Green With EHR](#), 3. HealthcareITNews (2022). [KU Anam Hospital](#), 4. Google Workspace (2019). [How Hurley Medical Center uses G Suite to cut IT costs](#), 5. Deloitte (2023). [2023 Global Health Care Outlook](#), 6. Emerald Insight (2022). [Health insurers: evolving into ecosystem-based service companies](#), 7. HealthIntelligence (2022). [Mayo, Kaiser invest in medical home](#), 8. UnitedHealth Group (2021). [UnitedHealthcare to Launch New Virtual-First Health Plan](#)

Deep dive on sustainability trends in Healthcare sector (2/2)

Capture the potential of AIs to enable disease prediction and preventive care

Trend Overview



Clinical Innovation

- **Innovation** allows for better management of **extensive databases** and ensuring **precise diagnostics**, fostering protection, prevention, and **minimally invasive techniques**¹.
 - AI harnesses **big data** (e.g., climate pattern & patient treatment) for swift **outbreak prediction** and EWARS for disease.
 - **Innovative diagnostics and treatments**, like voice biomarkers and liquid biopsies¹, enable **early disease detection**.

*EGFR = epidermal growth factor receptors, **NSCLC = non-small cell lung cancer



Decarbonization Technology

- **71% of GHG emissions** in this sector comes from **Scope 3**, posing a challenge to promote **eco-friendly medication & equipment**⁴.
 - Applying the **circular economy** concepts e.g., reduced single-use equipment/devices and in-house hazardous waste management⁵.
 - **Low-carbon medicine** prioritizes improving efficiency, energy savings, and effective waste management.

Best practices



BlueDot partnered with the Chicago Department of Public Health identifying **future global infections** by **Data-to-Action framework**, **early detection** made right diseases management on the community³.



“Liquid biopsies could be a game-changer in cancer testing”
Roche's launch can detect EGFR* gene mutations, will help doctors to choose the right treatment for the right patient at the right time².



Pedro Hispano Hospital⁶ collaborates with Baxter-ZeoSys to implement a **gas capture system** that **traps 99% of anesthetic gas** that could be reused in future treatment.



Amgen improved **manufacturing process to enable a greener synthesis** for a medicine, recycle a substance and reducing waste upto 31.7 million pounds/year⁷.



Smart bandages⁸ use UV light-emitting LEDs to prevent bacterial growth, eliminating the need for antibiotics.

Sources: 1. WEF (2023). [Scaling Smart Solutions with AI in Health](#), 2. Roche (2023). [Lung cancer: the world's deadliest cancer](#), 3. BlueDot (2023). [Case Study: City of Chicago](#), 4. Noharm Global (2019). [Health Cares Climate Footprint](#), 5. Health Care Without Harm (2021). [On the road to circular healthcare - reusing medical devices](#), 6. Midicalxpress (2021). [Making anesthesia more eco-friendly](#), 7. Kendallsquare (2023). [Amgen's Path to Net Zero](#), 8. University of Glasgow (2023). [Wirelessly-powered 'smart bandage'](#)



Financial Services



Key Drivers: What is driving sustainability in the Financial sector?



Real-sector financing needs for decarbonization

- **Critical financing gap:** As developed countries fall short of the annual \$100 billion finance commitment for 2020 pledged by successive COPs¹, global economies, particularly emerging markets, now demand **at least \$1 trillion annually** for climate finance, with **only a quarter currently met**².
- This creates opportunities for the financial sector, which plays a pivotal role in **facilitating the transition** to a low-carbon economy through the **financing** of sustainable businesses and projects at scale.

Regulators stepping up on climate policies and management expectations

- In response to the supervisory expectations set out by financial regulators such as the BCBS and the NGFS, **central banks worldwide** are adopting **climate policies** to promote comprehensive climate risk management practices in the financial industry
- While this requires FIs to **better assess and manage climate risks**, it also allows them to discover **climate-related opportunities**, enhance business & investment strategies, and innovate new products & services to meet the evolving needs of clients.

Standardization of product framework & disclosure standards

- Standard setters such as the ICMA and LMA are developing **product frameworks** to accommodate the growing demand for sustainable finance products. Meanwhile, FIs in various geographies develop **new products and financing solutions** specific to the business needs of their clients.
- In addition, new **disclosure standards** emerge to foster trust and transparency among investors. Notable standards include the IFRS S2 (climate disclosure), TNFD final framework (nature-related issues), and the CSRD & SFDR (sustainability disclosure for European markets).

Industry commitments towards Net Zero

- As of 2023, over **130+ banks** from 44 countries have joined the NZBA, committing to Net Zero by 2050, representing **>40% of global banking assets**³.
- To make their Net Zero commitments a reality, FIs are developing **transition plans** and sectoral pathways based on **financed emissions** in their portfolio, guided by industry-led initiatives such as the TCFD, GFANZ, PCAF and the latest framework from the TPT (Transition Plan Taskforce).

Sources: 1. IHLEG (2022). [Scaling up investment for climate and development](#), 2. World Economic Forum (2022). [How national-level blended finance can catalyse the climate transition in emerging markets](#), 3. NZBA. [Our Members](#)

Global Perspectives



Strengthening climate risk management

- Climate risk management practices



Unlocking Net Zero opportunities

- Net Zero transition plan for FIs
- Industry collaborations towards low-carbon economy



Innovating sustainable finance solutions

- Sustainability-linked Derivatives
- Green Securitization
- Other emerging instruments



Enabling climate transition through blended finance

- Public-private partnerships for scaling climate finance

Deep-dive on sustainability trends in the Financial sector (1/2)

FIs are leveraging their enhanced climate risk management in exploring new business opportunities

Trend Overview



Strengthening climate risk management

Climate risks poses significant **financial impacts** to FIs. Therefore, beyond regulatory compliance, FIs must:

- Elevate climate risks as part of **broader ERM** framework
- Establish clear **governance**: dedicated roles & responsibilities across teams
- Employ **advanced analytics** for climate risk assessments and predictive models / technologies
- Embed **mitigation** efforts: develop sector-specific / exclusion policies; **divesting** or phasing out from high-emitting sectors



Unlocking Net Zero opportunities

FIs are shifting their portfolios to Net Zero by 2050 & developing **transition plan**, in which they:

- Understand baselines of their **financed emissions**
- Develop **sectoral pathways** and **science-based** targets
- Embed goals/targets within organization-wide **strategy**

FIs can also discover new **business opportunities** in executing transition plans. They can:

- Explore low-carbon business to **diversify investments**
- Form **partnerships** with green technology providers
- Offer **specialized financial products** tailored to businesses

Best practices



ING has stopped financing new **coal-fired power plants & thermal coal** mines since 2015¹. HSBC will phase out coal businesses in the EU by 2030, and in other markets by 2040².



Munich Re's, global reinsurance company, developed a **Location Risk Intelligence** software to assist clients in calculating risks from **natural hazards** in their assets³.



CIP, world's largest fund management firm for renewables, recently led the investments for Amnah consortium, **Oman's first green hydrogen block construction**, totaling \$6 billion⁴.



Leading European commercial banks⁵ provided debt financing support for H2 Green Steel for its **construction of green steel plant** in Sweden, totaling €3.3 billion⁶.

Sources: 1. ING (2017). [ING further sharpens coal policy](#), 2. HSBC (2021). [We're phasing out coal financing](#), 3. Munich Re (2023). [Location Risk Intelligence Solution Overview](#). 4. Construction week (2023). [Hydrom awards first green hydrogen projects](#), 5. Including BNP Paribas, ING, UniCredit, Societe Generale and KfW IPEX-Bank, 6. H₂ Green Steel (2022). [Leading European financial institutions support H2 Green Steel's debt financing](#).

Deep-dive on sustainability trends in the Financial sector (2/2)

FIs are innovating finance solutions as well as introducing blended finance in enabling climate transition

Trend Overview



Innovating sustainable finance solutions

In addition to loans and bonds, FIs can support sustainable finance markets through new instruments:

Sustainability-linked Derivatives (SLDs) such as:

- **Option contracts:** the holder have the right to buy or sell **carbon credits** at a specified price.
- **ESG KPI-linked swaps:** one party agrees to pay a certain amount of money if specific ESG KPIs are not met.

Green Securitization: bundling sustainable assets e.g., green mortgages, EV leases, solar assets into securities (ABS / MBS¹).

Sustainable Insurance Products: such as ESG investment funds, climate risk or environmental liability insurance.



Enabling climate transition through blended finance

Development banks and governments are driving public-private or **blended finance** through grants & funds to support developing countries in their climate transition.

- **Global Innovation Lab for Climate Finance:** Public-private partnership for financing innovative climate solutions
- **ASEAN Catalytic Green Finance Facility:** Fund supporting green infrastructure projects for SEA governments

There are also collaborations where FIs act as the lead investor, e.g., the **Pentagreen Capital** (HSBC & Temasek JV, Sustainable infrastructure) or the **Gaia Project**

Best practices



Tianfeng Securities issued China's first **EV-leasing-backed ABS** worth of \$50 million for BYD, backed by 24 EV leases²



The Lab has mobilized **\$3.5 billion** investments for **climate solutions**⁵, including energy efficiency, renewables, urban infrastructure, climate-smart agriculture, and nature solutions⁶



HSBC issued **ESG-linked currency swap** (\$100 million) to Hana Investment, linking discounts to ESG ratings,³ while KTB issued Thailand's first **carbon-credit linked derivatives** for PTT⁴



The Gaia Project, formed by MUFG & UN bodies, proposed **\$1.5 billion climate blended finance platform**, supporting climate mitigation/adaptation investments for 25 developing countries⁷

Note: 1. ABS: Asset-backed securities, MBS: Mortgage-backed securities, sources: 2. CBI (202). [China green securitisation report 2020](#), 3. HSBC (2021). [HSBC launches an innovative derivative to facilitate ESG market growth](#), 4. PTT (2023). [Krungthai and PTT engaged in Thailand's first carbon credit linked derivatives](#), 5. Climate Finance Lab (2023). [The Lab launches six new climate finance solutions](#), 6. UNFCCC. [Global Innovation Lab for Climate Finance](#), 7. MUFG (2023). [GAIA gains momentum for a New Global Financing Pact](#)

3. Key Takeaways

Major next steps for directors



Key takeaways

Unlocking Success in the Low-Carbon Economy



SUSTAINABILITY AT ITS CORE

Seize **untapped potentials** by incorporating sustainability trends into **strategic planning**



IMPACT BEYOND VALUE CHAIN

Think ahead: Innovate your business, form strategic alliances & partnership, and manage your **value chain emissions**



LEVERAGING INDUSTRY RESOURCES

Stay informed of **government incentives** and **industry initiatives** to accelerate your transition journey



ELEVATE DATA & TRANSPARENCY

Gear up for reporting and disclosure as it can potentially **becomes compulsory**



AI OPTIMIZATION

Be agile to **tackle generative AI** and seamlessly integrate its potential into your pathways to decarbonize



GREENING THE WORKFORCE

Equip **green skills** to your workforce as one of the core pillar to boost business opportunities.

Q&A





Sustainability & Climate Centre of Excellence (S&C CoE)



Dr. Bordin Vongvitayapirom

Leader of SEA S&C CoE

bvongvitayapirom@deloitte.com

| Who we are

Our excellence delivery team

- We are a team of **subject matter experts** equipped with a set of experiences across an integrated **ESG spectrum**
- We work as **Deloitte Green Dot** where we integrate elements of sustainability and climate across Deloitte's service offerings
- We are based in **Bangkok, Thailand** with our S&C services span across **Southeast Asia (SEA)**

| What we do

Areas of services we provide

Our key service areas include:

- **Strategic Intelligence & Eminence** – Provide insights and perspectives for clients through eminence and thought leaderships
- **S&C Upskilling** – Train and upskill clients through CoE labs, workshops & events
- **Subject Matter Experts for S&C Services** – Assist service teams as subject matter experts in our fields of specialized practices

| Where we stand

Our specialization span across the following practices:

- **Net-zero** Operationalization and Measurement
- **Sustainable Finance** Operationalization
- **Sustainable Supply Chain** Management
- **Sustainable Infrastructure** and Urban Resiliency
- **ESG Reporting** and Disclosures
- **Natural Capital** and Biodiversity



Deloitte refers to one or more of Deloitte Touche Tohmatsu Limited (“DTTL”), its global network of member firms, and their related entities (collectively, the “Deloitte organization”). DTTL (also referred to as “Deloitte Global”) and each of its member firms and related entities are legally separate and independent entities, which cannot obligate or bind each other in respect of third parties. DTTL and each DTTL member firm and related entity is liable only for its own acts and omissions, and not those of each other. DTTL does not provide services to clients. Please see www.deloitte.com/about to learn more.

Deloitte Asia Pacific Limited is a company limited by guarantee and a member firm of DTTL. Members of Deloitte Asia Pacific Limited and their related entities, each of which is a separate and independent legal entity, provide services from more than 100 cities across the region, including Auckland, Bangkok, Beijing, Bengaluru, Hanoi, Hong Kong, Jakarta, Kuala Lumpur, Manila, Melbourne, Mumbai, New Delhi, Osaka, Seoul, Shanghai, Singapore, Sydney, Taipei and Tokyo.

About Deloitte Thailand

In Thailand, services are provided by Deloitte Touche Tohmatsu Jaiyos Co., Ltd. and its subsidiaries and affiliates.

This communication contains general information only, and none of DTTL, its global network of member firms or their related entities is, by means of this communication, rendering professional advice or services. Before making any decision or taking any action that may affect your finances or your business, you should consult a qualified professional adviser.

No representations, warranties or undertakings (express or implied) are given as to the accuracy or completeness of the information in this communication, and none of DTTL, its member firms, related entities, employees or agents shall be liable or responsible for any loss or damage whatsoever arising directly or indirectly in connection with any person relying on this communication.