Insights from the 3rd Europe CCUS and Hydrogen Summit

Advancements in Carbon Capture, Utilization, Storage, and Hydrogen Technologies

Dalibor Mitrovski, Oct 2024

ERRA Gaseous Fuels Markets and Economic Regulation Committee (GF COM) Meeting
October 28-29, 2024 | 3rd Meeting | Physical in Tirana, Albania

Summit Presenters

Industry: TotalEnergies, Shell, Equinor, Schneider Electric, Fortum, ArcelorMittal Group, Vopak, Acies Bio, Mitsubishi Heavy Industries, Kelvion Thermal Solutions, Accelera by Cummins, ONTRAS

Consulting and Advisory Firms: ERM, Kent, Hinicio, AECOM, Poten & Partners, Arup, TechnologyCatalogue.com

Associations and Organizations: Carbon Capture & Storage Association, Offshore Energies UK, Eurogas, ERGaR (European Renewable Gas Registry), Gas Infrastructure Europe (GIE), Energy Industries Council (EIC), OPITO

Financial Institutions: European Investment Bank, Santander Corporate & Investment Banking, Lloyds Banking Group

Academic Institutions: Energy Safety Research Institute

Project Developers: Progressive Energy / HyNet Alliance, Port of Antwerp-Bruges

Hydrogen Market: Aurora Energy Research, TotalEnergies

UK Government pledges 22bn for Carbon Capture Projects

Introduction

Objective:

- Share key insights and developments from the summit

Focus Areas:

- Europe's Net Zero Strategy
- Progress in CCUS technologies
- Hydrogen production and infrastructure
- Investment and workforce considerations

Europe's Net Zero Strategy

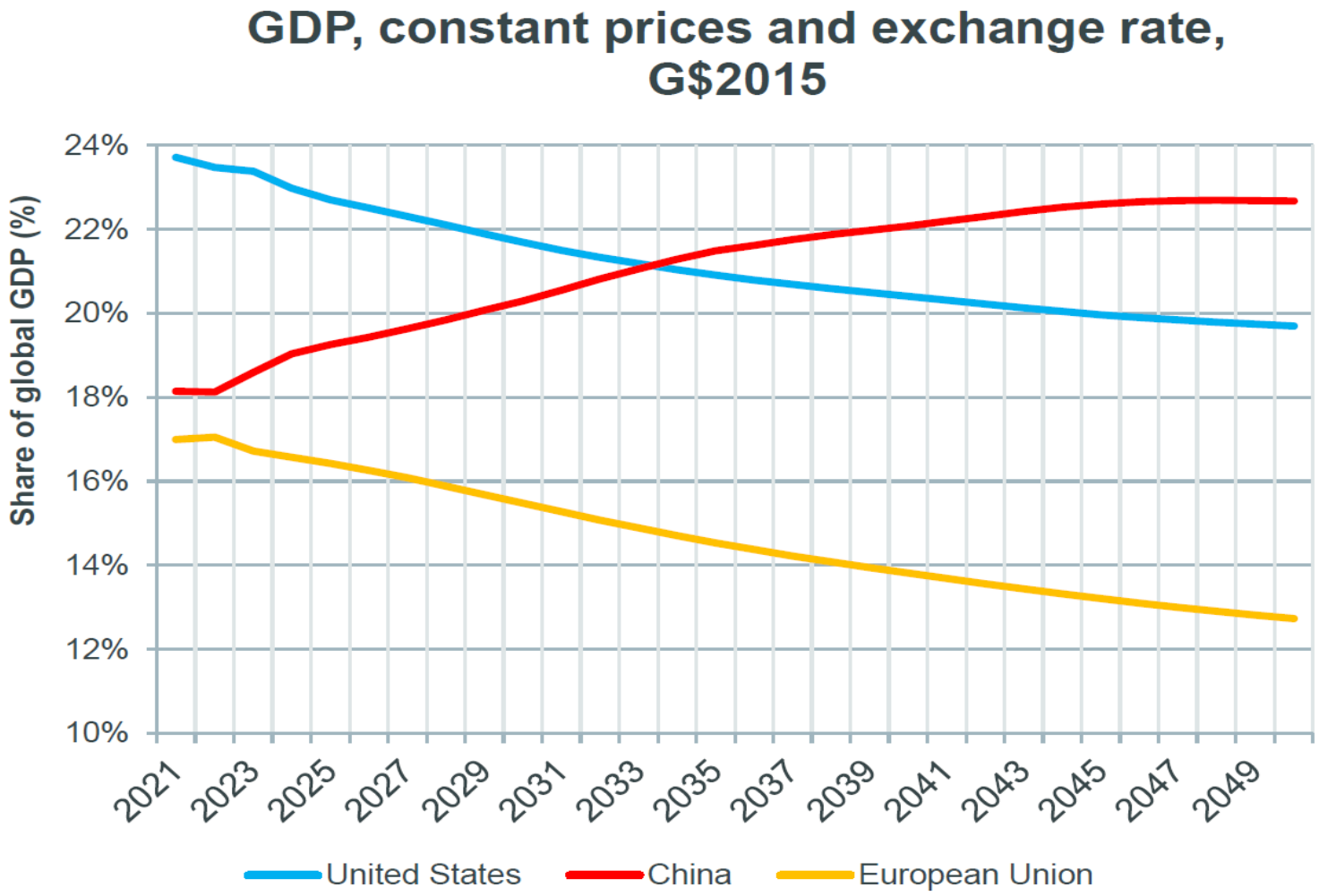
EU Climate Targets:

- Aim to reduce greenhouse gas emissions by 90% by 2040
- Achieve net-zero emissions by 2050

Importance of CCUS:

- Essential for deep decarbonization
- Supports hard-to-abate sectors like heavy industry and transport.

EU Share of Global GDP Projections



Current Challenges in CCUS

Market Immaturity:

- CCUS technologies are still developing
- Limited commercial-scale projects

High Costs:

- Significant capital expenditure for capture, transport, and storage
- Operational expenses remain high

Regulatory Hurdles:

- Need for supportive policies and incentives
- Complex permitting processes

Measurement and Verification:

- Difficulties in accurately monitoring stored CO_2
- Ensuring longterm storage integrity

Innovative Approaches to CCUS

Integrated Ecosystems:

- Combining multiple technologies for efficiency
- Creating symbiotic relationships between industries

Utilization of CO_2:

- Converting captured CO_2 into valuable products
- Examples: building materials, chemicals, fuels

Economic Viability:

- Developing profitable value chains
- Reducing reliance on carbon credits

Hydrogen as an Energy Solution

Hydrogen's Potential:

- Versatile energy carrier
- Can be produced from various sources

Decarbonizing Sectors:

- Industrial processes.
- Transportation (heavyduty vehicles, shipping, aviation)
- Heating and power generation

Types of Hydrogen:

- Green Hydrogen: Produced via electrolysis using renewable energy
- Blue Hydrogen: Produced from natural gas with CCUS
- Other Colors: Grey, brown, etc., indicating production methods

Hydrogen Market Outlook

Market Development:

- Transitioning from pilot projects to commercial scale
- Increasing government support

Challenges:

- High production costs for green hydrogen
- Infrastructure limitations
- Need for market mechanisms and trading platforms

Opportunities:

- Declining costs of renewables enhance green hydrogen viability
- Potential for job creation and economic growth

Hydrogen Demand Outlook [Source Aurora]

Hydrogen demand is expected to increase three-fold by 2050, c.40% of which is expected be met with domestic electrolytic production

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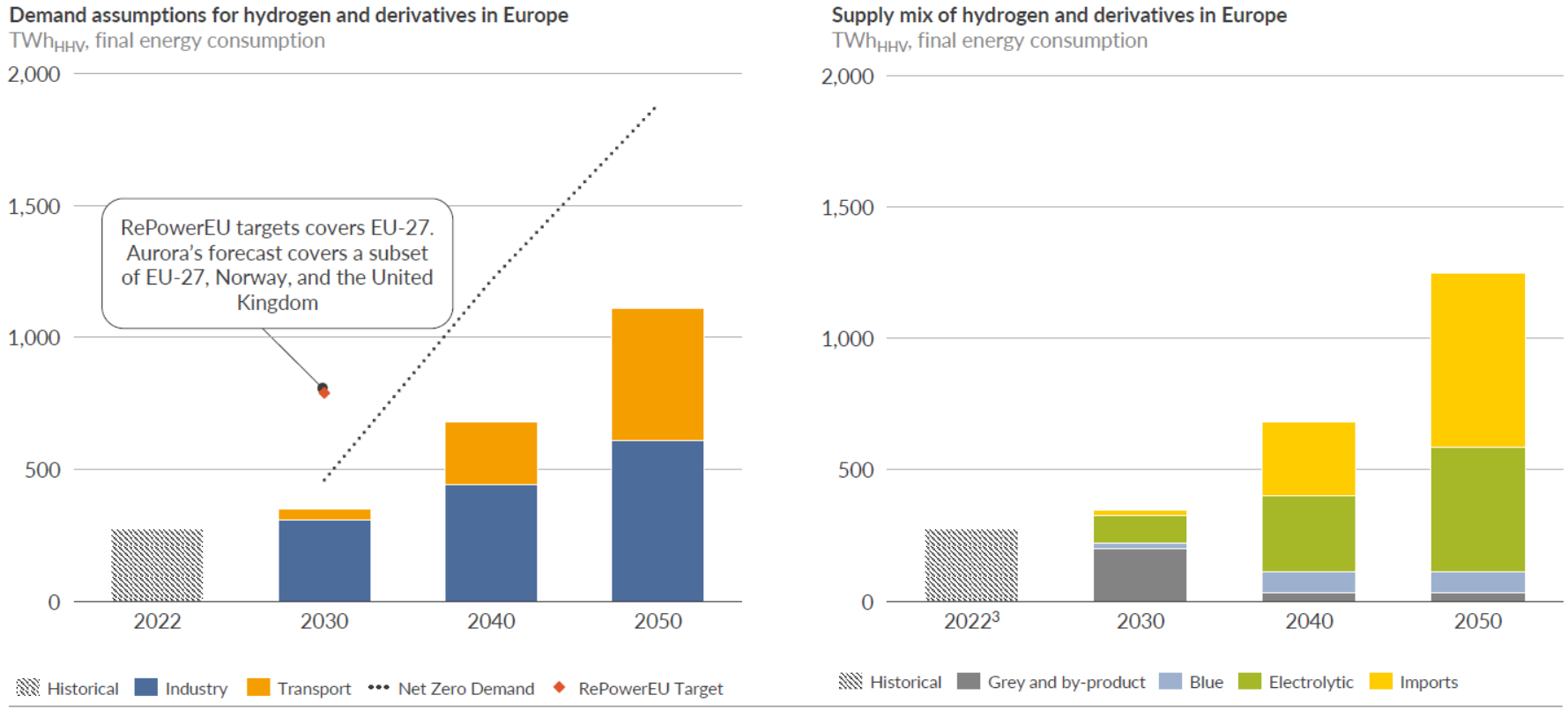

Hydrogen Infrastructure Development

Transport Networks:

- Developing dedicated hydrogen pipelines
- Repurposing existing natural gas pipelines

Storage Solutions:

- Underground storage in salt caverns and depleted fields
- Aboveground storage tanks

Grid Integration:

- Balancing supply and demand
- Integrating with electricity grids for electrolysis

CrossBorder Cooperation:

- Harmonizing standards and regulations
- Facilitating international hydrogen trade

Investment and Workforce Considerations

Investment Needs:

- Significant funding required for infrastructure and R&D
- Public and private investment essential

Funding Mechanisms:

- Government subsidies and grants
- Carbon pricing and trading schemes

Workforce Development:

- Addressing the skills gap in emerging technologies
- Training programs and educational initiatives

Supply Chain Enhancement:

- Developing local manufacturing capabilities
- Ensuring reliable and sustainable supply chains

Role of Ports in the Energy Transition

Strategic Hubs:

- Ports as gateways for energy imports and exports
- Facilitating global hydrogen and ammonia trade

Infrastructure Requirements:

- Adapting facilities for new energy carriers.
- Building terminals for liquefied hydrogen, ammonia, and methanol

Economic Impact:

- Job creation in port regions
- Stimulating regional development

Collaboration Efforts:

- Partnerships between ports, industries, and governments.
- Sharing best practices and technologies

Overcoming Challenges

Regulatory Frameworks:

- Establishing clear policies to support CCUS and hydrogen
- Streamlining permitting and approvals

Infrastructure Requirements:

- Adapting facilities for new energy carriers.
- Building terminals for liquefied hydrogen, ammonia, and methanol

Standardization:

- Developing industry standards for safety and interoperability
- Certification systems for green hydrogen

Public Engagement:

- Increasing awareness and acceptance
- Addressing concerns about safety and environmental impact

Innovation and R&D:

- Investing in research to reduce costs and improve efficiency.
- Supporting pilot projects and demonstrations

Case Studies and Success Stories

CCUS Projects:

- Operational facilities capturing and storing CO_2
- Examples of industries implementing CCUS successfully

Hydrogen Initiatives:

- Projects producing and utilizing hydrogen at scale
- Innovations in electrolysis and fuel cell technologies

Lessons Learned:

- Importance of collaboration
- Overcoming technical and financial barriers

Key Takeaways

CCUS and Hydrogen are Critical:

- Essential tools for meeting climate targets

Collaboration is Key:

- Success depends on partnerships across sectors and borders

Investment and Skills are Needed:

- Financial commitment and workforce development are crucial

Positive Momentum:

- Policy support and technological advances are driving progress

THANK YOU
FOR YOUR ATTENTION!

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