

Collaborative Action Points For the Auto Industry Sustainable Development

Florence Chen Xu

Crude Oil
(Oligopoly Market)

[Series 1: Crude Oil Within the Context of Oligopoly Market]

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Automaker
(Cyclical Company)

[Series 2: Exploring the US EV Industry Through
the US Bicycle Sharing System]

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Climate Change
(Global Issue)

[Series 3: Collaborative Action Points for the Auto Industry
Sustainable Development]

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COLLABORATION

Data Sources & References

- ♦ Data Sources

- ♦ The Wall Street Journal
- ♦ United States Department of Energy
- ♦ United States Energy Information Administration
- ♦ United States Environmental Protection Agency

- ♦ References

- ♦ "Recommendations of the Task Force on Climate-related Financial Disclosures", 2017 Jun, <https://assets.bbhub.io/company/sites/60/2021/10/FINAL-2017-TCFD-Report.pdf>
- ♦ Coe, David T., Elhanan Helpman. 1995. "International R&D Spillovers." European Economic Review, vol. 39, no. 5 (May)
- ♦ "Energy Transition Report — Hydrogen Market Update" RystadEnergy, 2024 Jan, <https://www.rystadenergy.com/insights/energy-transition-hydrogen-market-outlook>
- ♦ Cheng Hoon L., Ritu B. Yan C.-S., "Unlocking Climate Finance in Asia-Pacific", International Monetary Fund, 2024 Jan, <https://www.imf.org/-/media/Files/Publications/DP/2024/English/UCFAPEA.ashx>
- ♦ Grégoire de J., Julien G., Tobias B., "Assessing hydrogen infrastructure needs in a scenario with hydrogen imports and EU production", European Commission, 2023, <https://op.europa.eu/en/publication-detail/-/publication/f5a15fd1-8f3b-11ee-8aa6-01aa75ed71a1/language-en>
- ♦ "Conference of the Parties serving as the meeting of the Parties to the Paris Agreement", Session 5, 2023 Nov, <https://unfccc.int/process/bodies/supreme-bodies/conference-of-the-parties-serving-as-the-meeting-of-the-parties-to-the-paris-agreement-cma>



How many Earths do we have in total?

Key Finding

- ◆ Achieving a seamless energy transition requires a comprehensive approach that extends beyond the capabilities of *individual* automakers, the *entirety* of the crude oil oligopoly market, or the impact of *unilateral* government directives (e.g., zero-emission and EV mandates) or *annual* United Nations Climate Change conferences. The noticeable lack of *collaboration and interconnectivity* among various stakeholders impedes efficient progress, subsequently hindering the sustainable growth of the auto industry. If addressing climate change is genuinely a universally acknowledged concern, it's time to foster collaboration across sectors and pave the way for impactful and sustainable development in the auto industry, as well as a more feasible hydrogen economy.

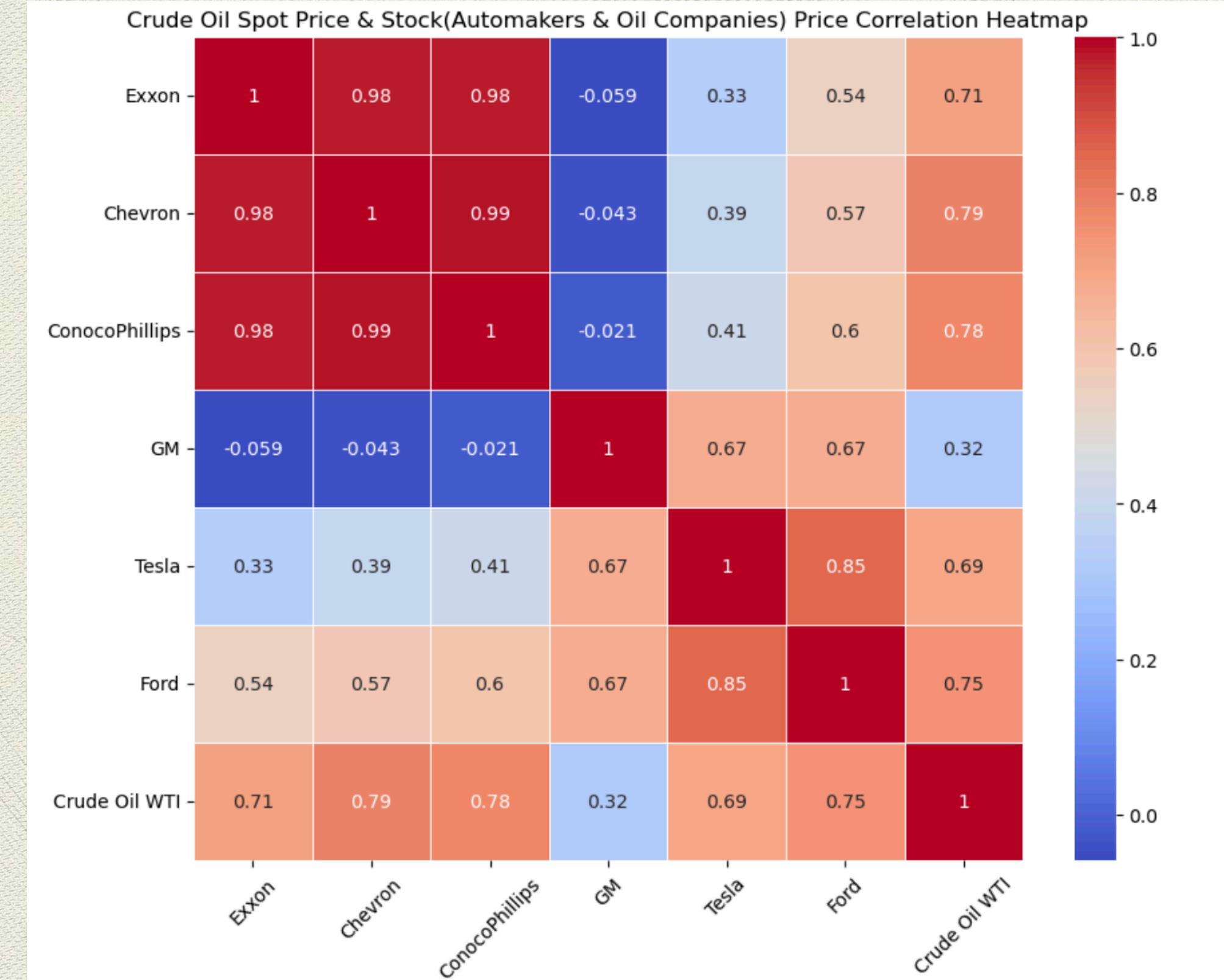
Collaborative Action Points For Related Stakeholders

Oil Companies

- “Artificial” tail risk should be avoided, given the heightened sensitivity between the stock oil prices and automakers.

1. Mitigating "Artificial" Tail Risk for The Better Economic Stability

- ◆ Adjusting oil supply amounts is recognized as suboptimal for addressing both short-term profitability concerns and long-term development challenges, including navigating the energy transition and managing stress from potential "stranded assets"
- ◆ The reliability of predicting oil prices is confirmed by a crude oil spot pricing model utilizing stable supply-side data, with an R-squared value exceeding 90%, indicating that more than 90% of the variability in weekly crude oil WTI prices can be accurately accounted for.



Source: Project Series 1 — Crude Oil Within the Context of Oligopoly Market (Link: https://github.com/florenceX5/Crude_Oil_Finance_Project.git)

Oil Companies

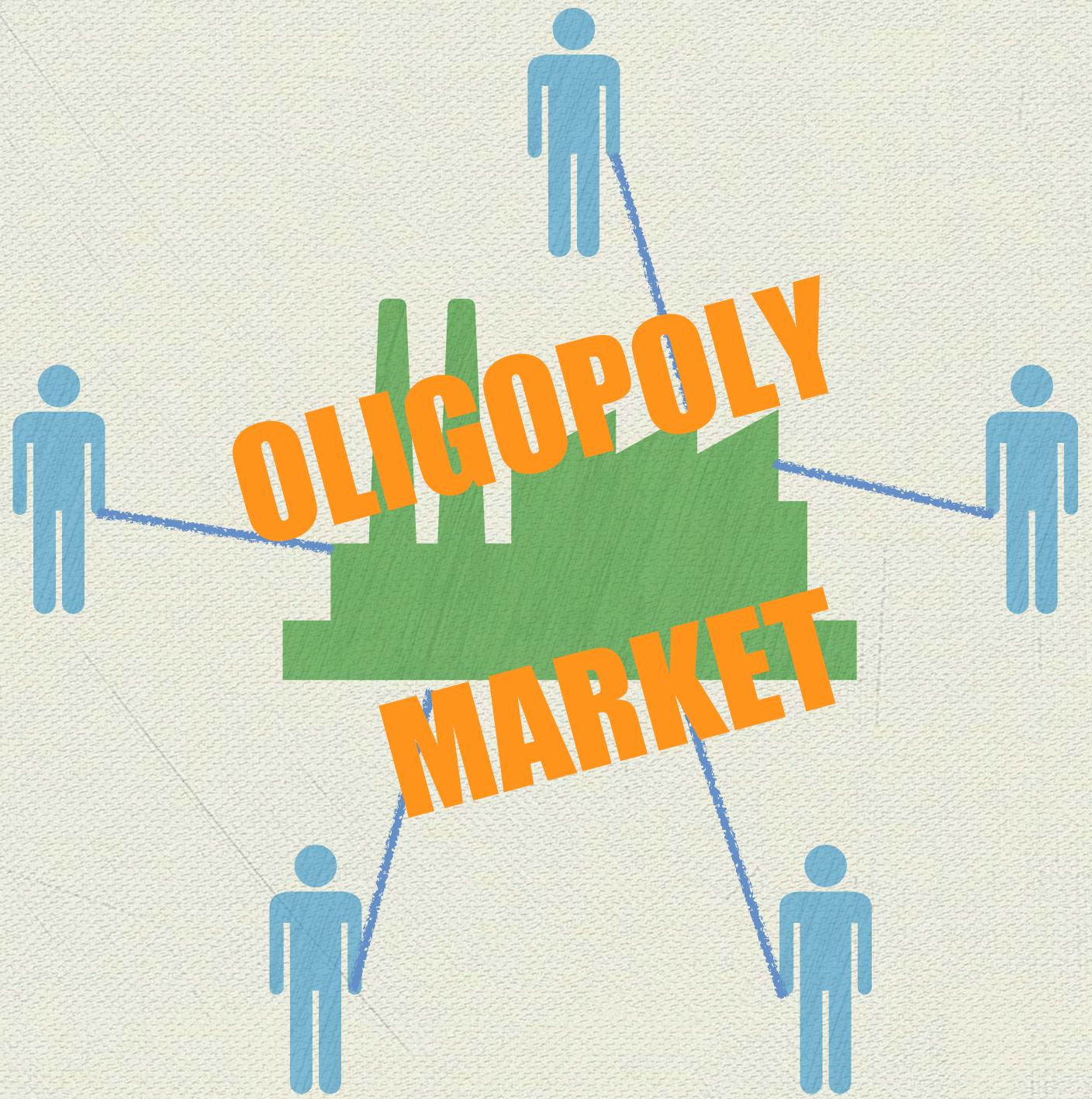
- The decline in short-term profitability should not be perceived as a loss, emphasizing the need for a more transparent schedule of oil production.

2. Redefining Short-term Profitability in the Context of the Energy Transition

- ◆ Rather than viewing the current decline in profits as a loss, it should be taken as strategic investments addressing the consequences of past actions impacting our environment and planning for a more sustainable future.

3. Advocating Transparency in Oil Production Scheduling

- ◆ While a collusive pricing strategy remains characteristic of an oligopoly market, adapting to changes in the current climate, where energy types can be renewed, prompts a reconsideration of pricing strategies.



Automakers

- Strategically collaborating on hydrogen vehicle introduction and jointly funding research and development enhances efficiency in addressing challenges within the current climate environment and available technologies.

1. Strategic Collaboration for Hydrogen Vehicle Introduction

- ◆ This collaborative effort will harness the combined branding power to enhance public awareness and acceptance of hydrogen as a viable new energy vehicle option.

2. Joint Funding for Research and Development(R&D)

- ◆ Adopting a joint approach to technology innovation is more efficient for addressing the challenges posed by the current climate environment.

**A powerful combination.
Hydrogen + Air = Electricity**

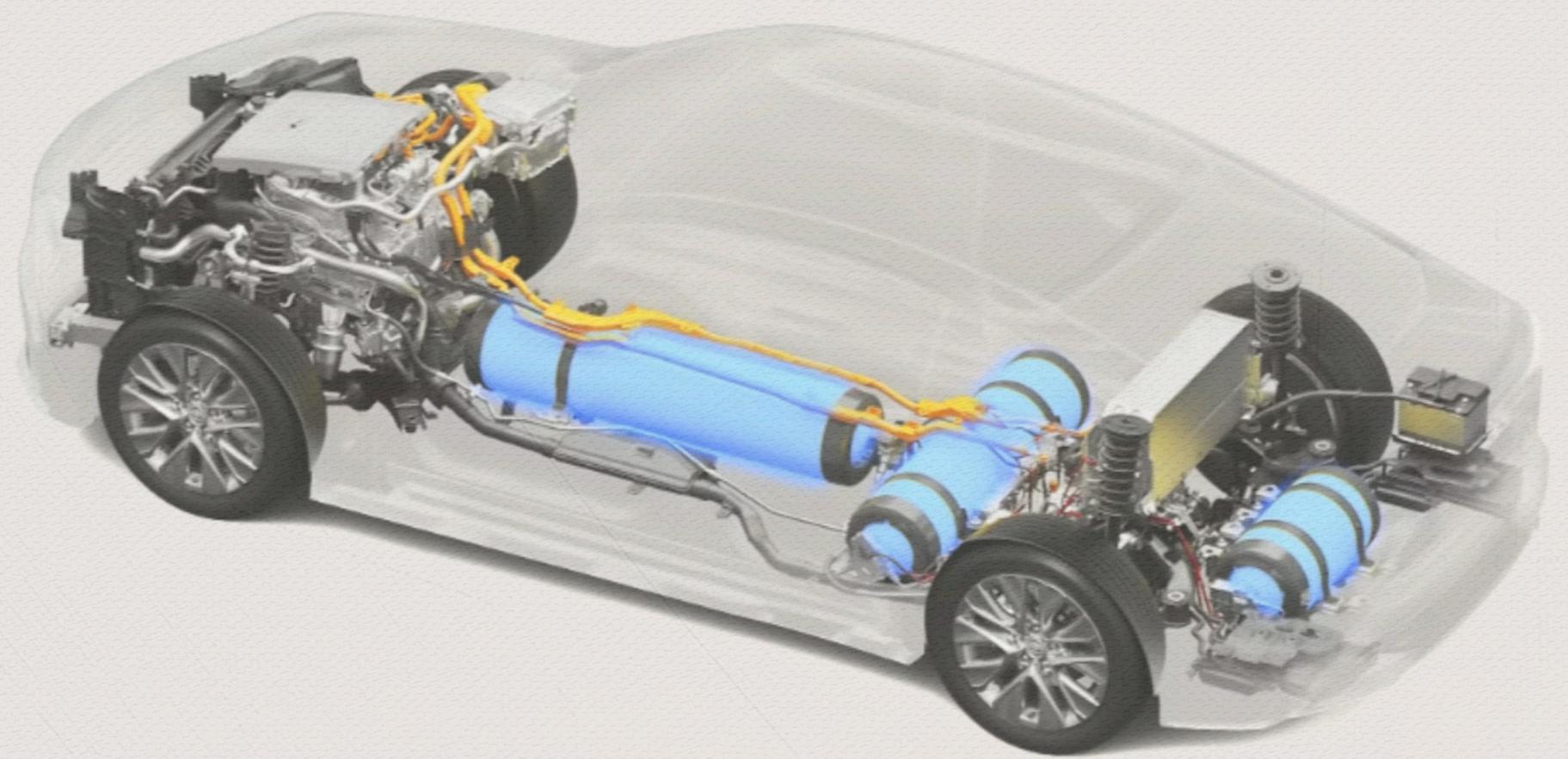


Image Source: Toyota

Automakers

Different Types of Vehicles

	Gasoline Vehicle	Electric Vehicle (EV)	Hybrid Vehicle	Plug-in Hybrid Vehicle	Hydrogen Vehicle
Power Source	Internal Combustion Engines (ICE)	Batteries	ICE + Electric Motor (with no external plug-in)	ICE + Electric Motor (with external plug-in)	Hydrogen Fuel Cells
Refueling Speed	Fast	Slower than gasoline vehicles			Similar as gasoline vehicles
Driving Length	Long	Limited compared to gasoline		Limited electric-only range; Overall similar as gasoline vehicles	Similar as gasoline vehicles
Environmental Impact	High tailpipe emission	Can be considered as clean energy		Low tailpipe emission depend on driving mode; electric-only mode produces zero tailpipe emissions efficient	Can be considered as clean energy
Battery Recycling	N/A	Potential environmental impact of battery disposal		Smaller batteries & less environmental impact of battery disposal compared to EV	Uncertain environmental impact on recycling fuel cell

Government

- The government could consider to take a leadership role in facilitating collaboration between oil companies and automakers to strengthen hydrogen infrastructure development.

- ◆ **Taking the Leadership for Efficient Hydrogen Infrastructure**

- ◆ Hydrogen transition complexities vary across shipping, aviation, and automotive industries, presenting potential higher challenges for the automotive sector based on current available technology:
 1. Auto hydrogen infrastructure is more decentralized and intricate compared to aviation (centralized at airports) and shipping (sea-based)
 2. The hydrogen infrastructure for autos entails higher risks due to its direct impact on people, occurring with greater frequency, contrasting the less risk-intensive goods transport in shipping.



Image Source: International Air Transport Association (IATA)



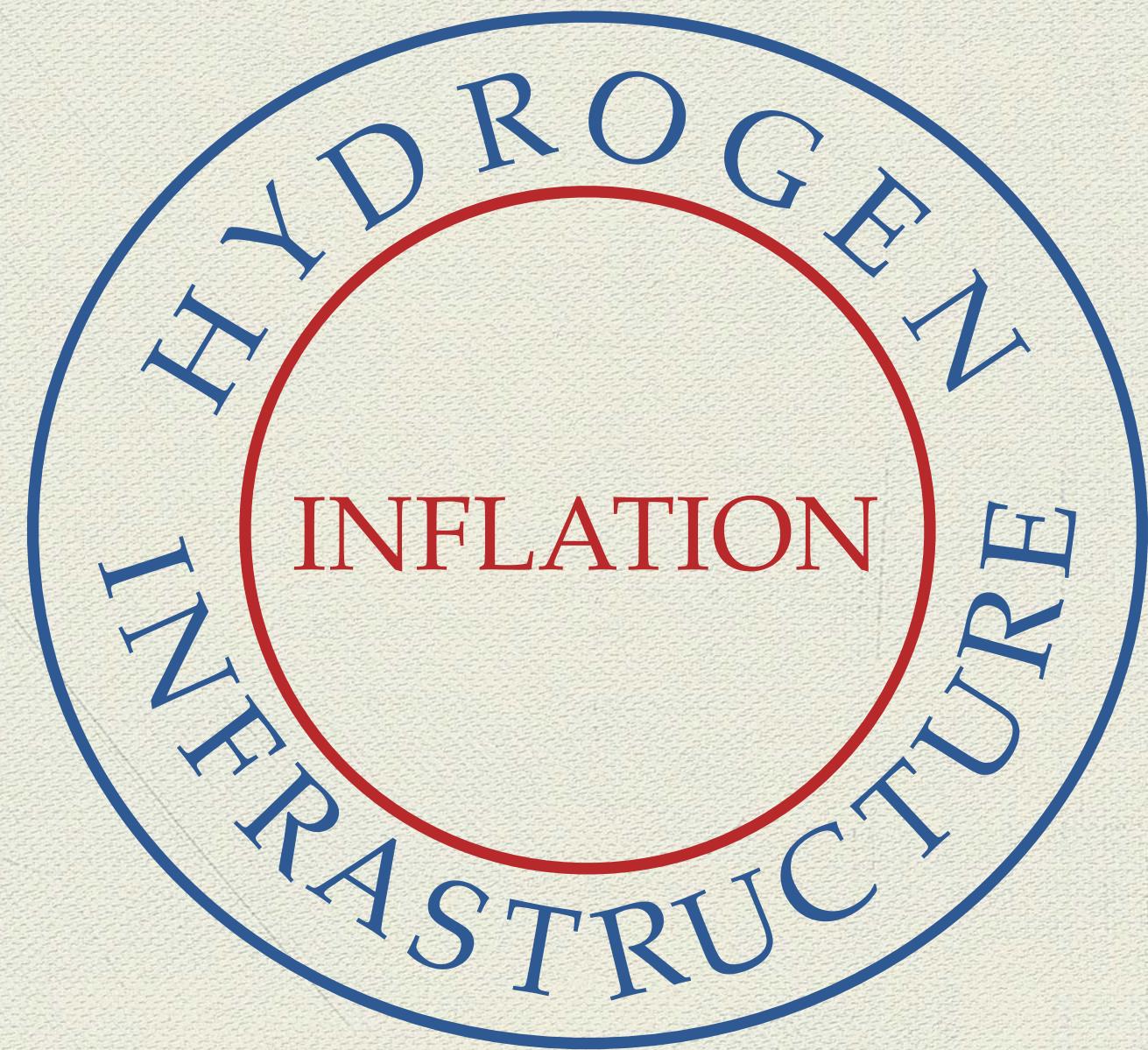
Image Source: Maersk

Government

- The government could consider to take a leadership role in facilitating collaboration between oil companies and automakers to strengthen hydrogen infrastructure development.

- ◆ **Pros of Government Intervention:**

1. Mitigate adverse effects of "unilateral" announcements (E.g., "Zero-emission plans," "EV mandate sales") to ensure a balanced transition, considering both demand and practical supply chain plans for automakers (E.g., providing employees required training skills for a smooth energy transition).
2. Recognize that investing in infrastructure offers protection against inflation, presenting a proactive and practical approach to avoid unnecessary market volatility, rather than planning for an "uncertain" soft landing economy.

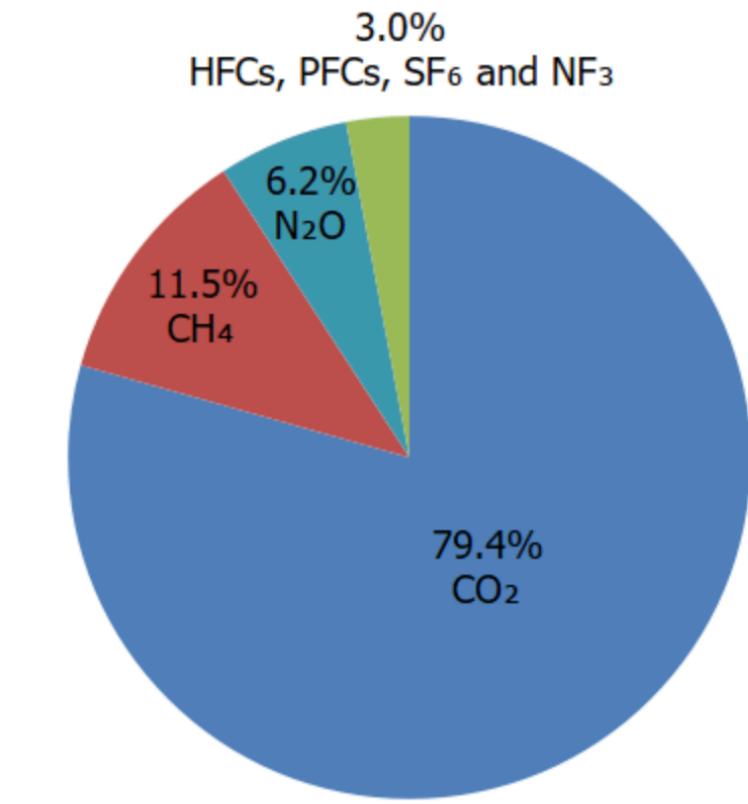


Cross-Boarder Organizations

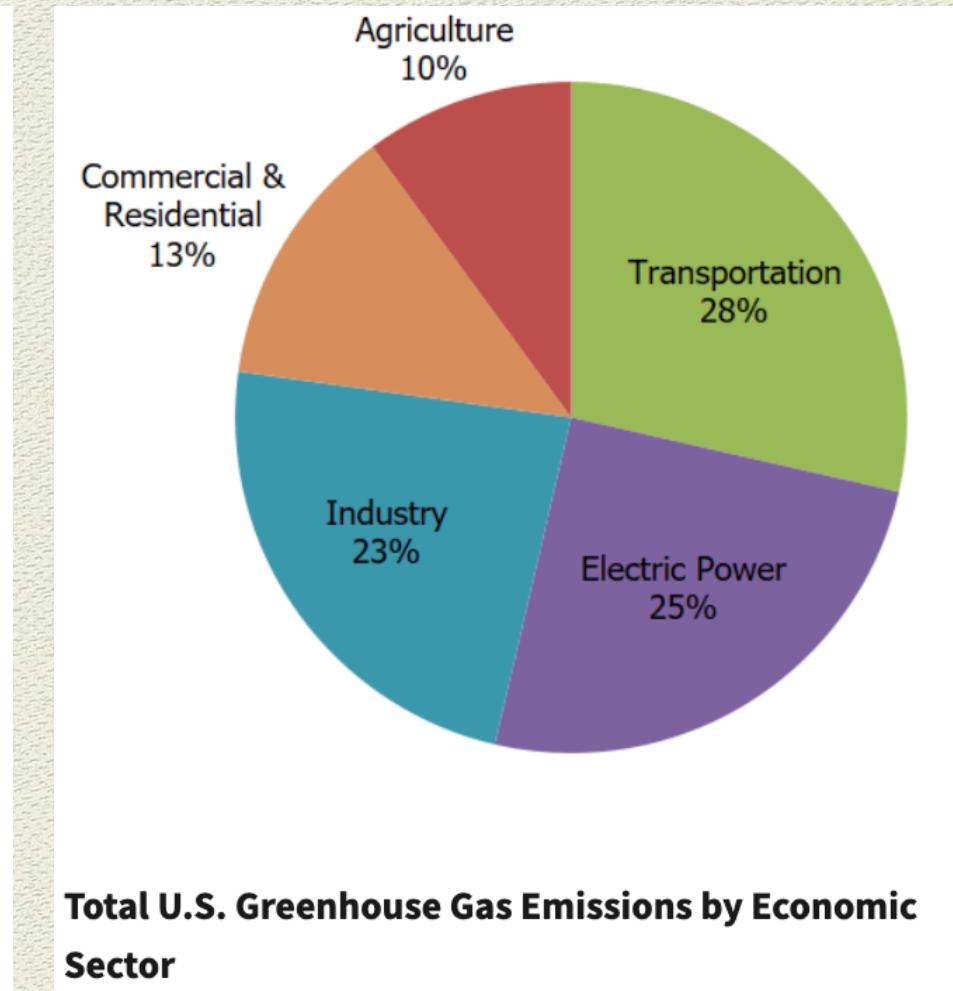
- Boosting global collaboration among cross-border organizations, like the UN, OPEC, IMF, EU, etc., and increasing sector-specific meeting frequencies, particularly in transportation, are necessary for an efficient energy transition.

1. Increasing Meeting Frequencies for Sector-Specific Focus (e.g. Transportation)

- Given daily greenhouse gas emissions, especially in impactful sectors like transportation, higher meeting frequency is necessary. For example, in the U.S. (1990-2021), where 79.4% of emissions are CO₂, and the transportation sector contributes 28%, discussions are crucial for this highest-polluting sector.
- While the UN Climate Conferences (COP) provide an annual official platform for global discourse, there is a myriad of issues and topics demanding attention, with "the phase-out of fossil fuels" emerging as one of the most hotly debated topics at the current COP28."



U.S. Environmental Protection Agency (2023). Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2021



Total U.S. Greenhouse Gas Emissions by Economic Sector

Image Source: United States Environmental Protection Agency

285

Press conferences

152

Global Climate Action events

366

Side events

533

Negotiating hours

58

Mandated events

Image Source: United Nations

Cross-Boarder Organizations

- Boosting global collaboration among cross-border organizations, like the UN, OPEC, IMF, EU, etc., and increasing sector-specific meeting frequencies, particularly in transportation, are necessary for an efficient energy transition.

2. Enhancing Global Collaboration among cross-boarder organizations (E.g. UN, OPEC, IMF, EU, etc.)

- This collaborative approach could help to not only address the disparities between developed and developing countries but also mitigates potential geopolitical risks, achieving a more cohesive global strategy.
- Reference the pan-European hydrogen network published by the EU in 2023 as an exemplary model of effective cooperations, showcasing the power of collaboration in tackling climate change.

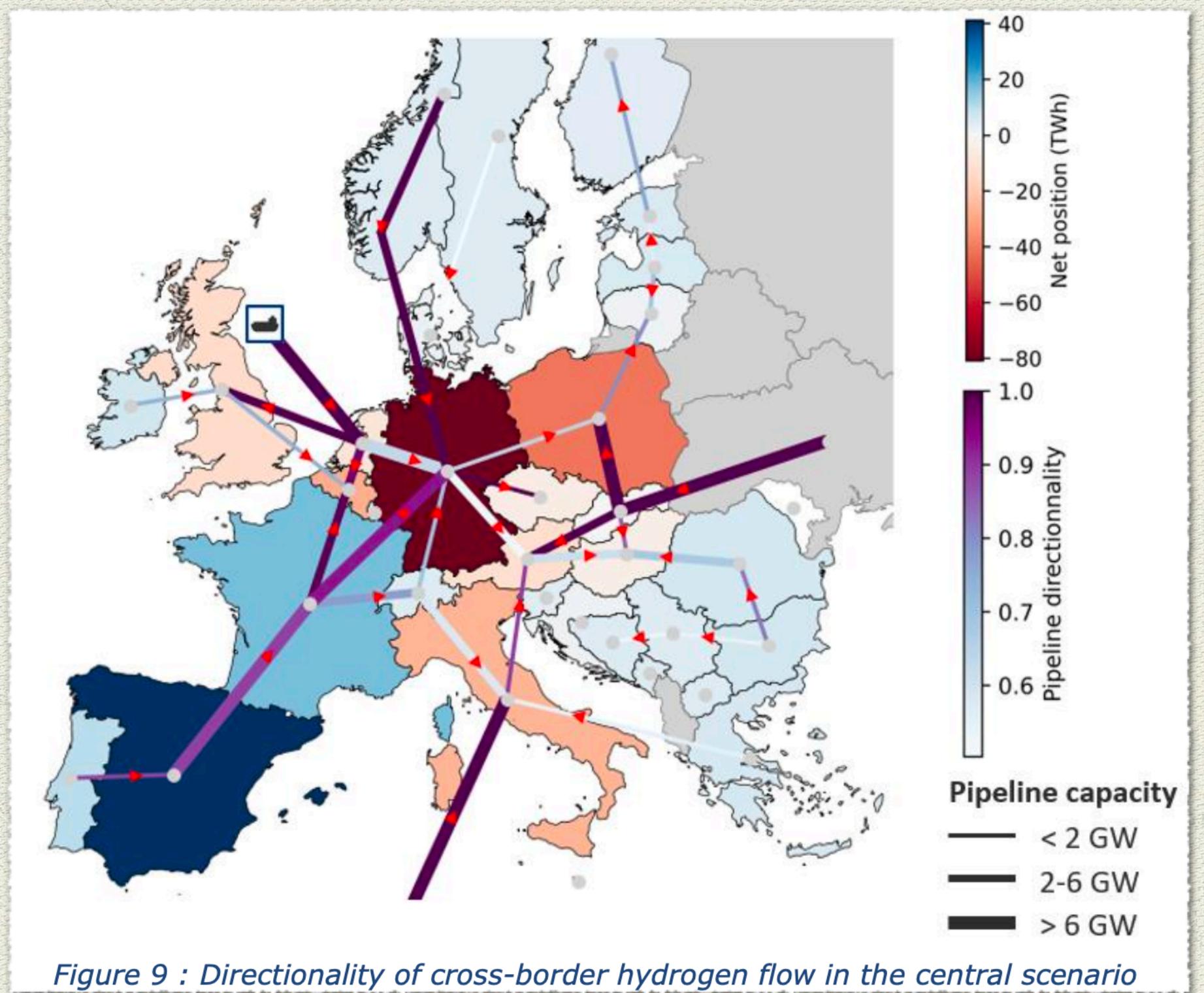


Figure 9 : Directionality of cross-border hydrogen flow in the central scenario

Image Source: European Commission

Epilogue

When I was a child, I fell in love with Mini Coopers after watching the movie called 'The Italian Job.' Last year, diving into programming was an unexpected and beautiful adventure that revealed life's intricacies woven with code. The summer of 2023 painted the New York sky orange, inspiring me to infuse more than just talk about crude oil and vehicles into my programming project. I decided to work on something related to global warming. Throughout this exciting process, each research endeavor deepened my understanding of the complex issue, revealing how people from various fields contribute with their expertise. Global warming is an ongoing challenge. If my project could compel people to hit the pause button in this fast-paced world, pondering over the urgency of climate change, then that, to me, is meaningful."

THANK YOU:)

