Fueling Strategies to Decarbonize Shipping

Research, intelligence, and insights on low-/zero-carbon marine fuels

Multi-Client Study Prospectus

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Outline

- **Study Prospectus**
- About ADI

ADI is offering a multi-client study on alternative marine fuels whose adoption depends on several drivers and challenges

	Drivers	
1	**Regulatory pressure**	▪ Shipping is one of the hard-to-abate sectors ▪ IMO targets CO_2 reduction of 40% by 2030 and 70% by 2050 from 2008 levels
2	**Growing alternative fuels supply**	▪ Increased supply of cheap gas, methanol, and ammonia … ▪ … Driving supply of alternative marine fuels
3	**Improving lifecycle costs**	▪ Alternative fuels offer short payback periods ▪ Regulatory incentives for using cleaner fuels

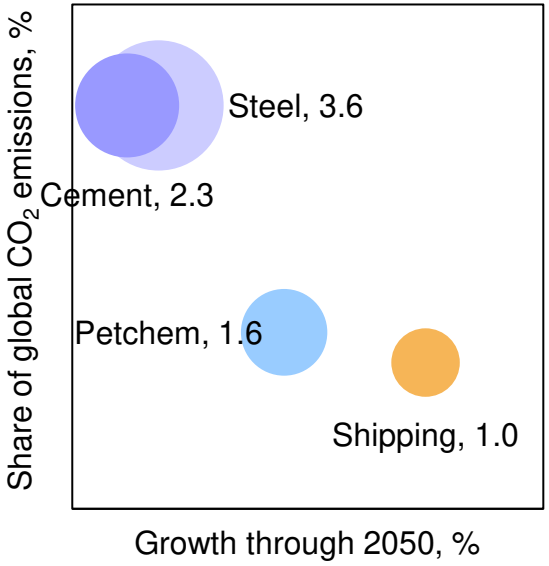
	Challenges	
1	**Infrastructure constraints**	▪ Infrastructure availability and regional variation ▪ Cost of building new fueling infrastructure
2	**Oil price uncertainty**	▪ Low and volatile oil price environment … ▪ … Impacts fuel costs and lifecycle economics
3	**Technology adoption risks**	▪ End-user adoption based on many factors … ▪ ... Including company and local issues

Alternative marine fuels covered in this study

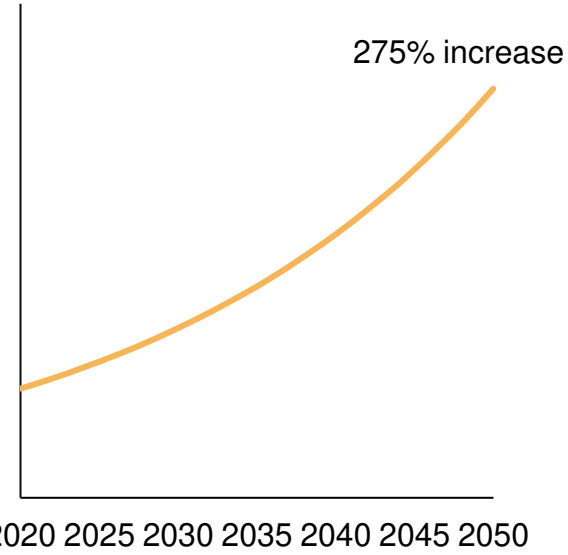
Low-sulfur fuels	CNG and LNG	Methanol	Ammonia	Hydrogen	Battery	Others

CO_2 emissions from the global shipping industry are expected to grow the fastest through 2050 while demand grows by 275%

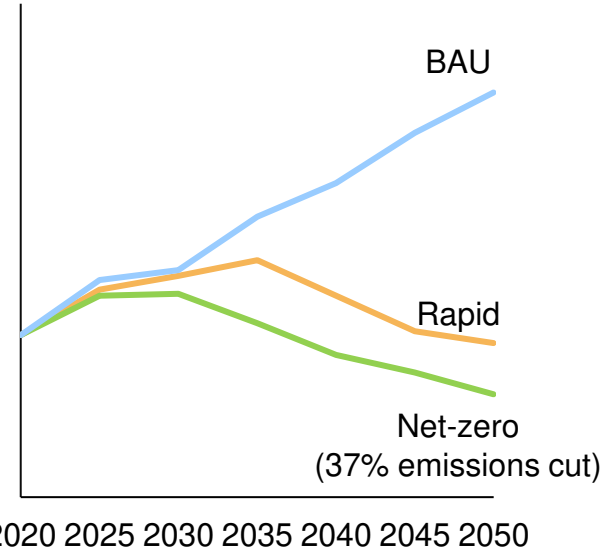
CO_2 from Hard-to-Abate Sectors
(Giga tons in 2019)



Global Marine Vessel Capacity
(Million Deadweight Tons)



Global Shipping Emissions
(Gt CO_2 per year)



Shipping Decarbonization Strategy

CCUS	Fuel switching
Low impact	High impact

Decarbonization Drivers

- The International Maritime Organization (IMO) aims to reduce shipping industry's CO_2 emissions by 40% by 2030 and 70% by 2050, from 2008 levels
- IMO 2020 will drive a shift from bunker fuel to low sulfur and low carbon fuel alternatives such as low sulfur fuel oil and other alternative fuels such as LNG, LPG, MeOH, NH_3, and H_2
- Carbon capture is not a feasible option for shipping making fuel switching a high impact solution

Source: ADI Analytics, IEA

We will study demand, supply, pricing, regulatory, economic, and technology issues around alternative marine fuels…

Overarching questions

- What are the key regulatory, technology, and infrastructure drivers for alternative marine fuels?
- How large is the global market for alternative marine fuels? How will it vary by region and fuel?
- Which factors will drive the adoption of marine fuel applications? What are the key scenario signposts?
- What will be the impact of switching to alternative marine fuels on industry's CO_2 emissions?
- What are the implications of marine fuel alternatives by value chain segment and stakeholder?

1 **Demand / supply**	▪ How is the global landscape for marine fuel demand and supply evolving? ▪ What are the costs and economics of production of alternative marine fuels? ▪ What factors must an end-user consider before switching fuels? ▪ How are commitments form stakeholders driving alternative fuels adoption?
2 **Technology and infrastructure**	▪ What are major alternative marine fuel technology trends? ▪ How is fuel distribution and refueling infrastructure developing? ▪ Who are the major technology, equipment, and infrastructure developers? ▪ How will maturity of alternative fuels impact production costs?
3 **Implications**	▪ What signposts exist to help guide key stakeholder strategies? ▪ Which fuel is most likely to be adopted in different scenarios? ▪ How will refiners and other suppliers of fuel be impacted? ▪ How will alternative fuels impact shipping industry capital spending?

… Through a structured and comprehensive report reflected in the proposed table of contents

1	**Executive summary**		
2	**Drivers**		▪ Regulatory pressures, and net-zero targets and commitments ▪ Cost and economic considerations
3	**Market size / segmentation**		▪ Regional market sizes / growth rates by ship and fuel type ▪ Outlook of marine fuels (diesel, natural gas, methanol etc.)
4	**Fuel profiles**	**Low-sulfur fuels**	▪ Regional alternative marine fuel demand ▪ Increased alternative fuel availability ▪ Infrastructure needs, costs, barriers, developments ▪ Conversion costs / economics across fuel types ▪ Non-economic issues for conversion ▪ Breakeven costs by ship and fuel type ▪ Most suitable ship types for each alternative fuel ▪ Major players in alternative marine fuels ▪ Key stakeholders (EPCs, technology players)
		CNG and LNG	
		Methanol	
		Ammonia	
		Hydrogen	
		Battery	
		Others	
5	**Strategic implications**		▪ Impact on key stakeholders (refiners, shippers, OEMs) ▪ Identify high growth segments (equipment, technology)
6	**Scenarios**		▪ Demand scenarios at multiple oil / gas price spreads ▪ Fuel demand analysis on several adoption scenarios
7	**Conclusions and recommendations**		▪ Key findings and major conclusions ▪ Stakeholder considerations

Outline

- Study Prospectus
- **About ADI**

ADI is a consulting firm serving oil & gas, energy, chemicals, and industrial clients with expertise, rigor, and passion

Operators | **Investors** | **Industrials** | **Traders** | **Government**


Oil

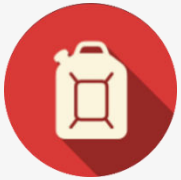

Gas & LNG


Midstream & NGLs


Refining


Fuels


Feedstocks


Petrochemicals

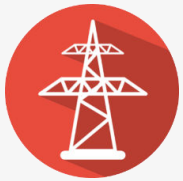

Basic Chemicals


Polymers & Plastics


Specialty Chemicals


Power generation


Renewables

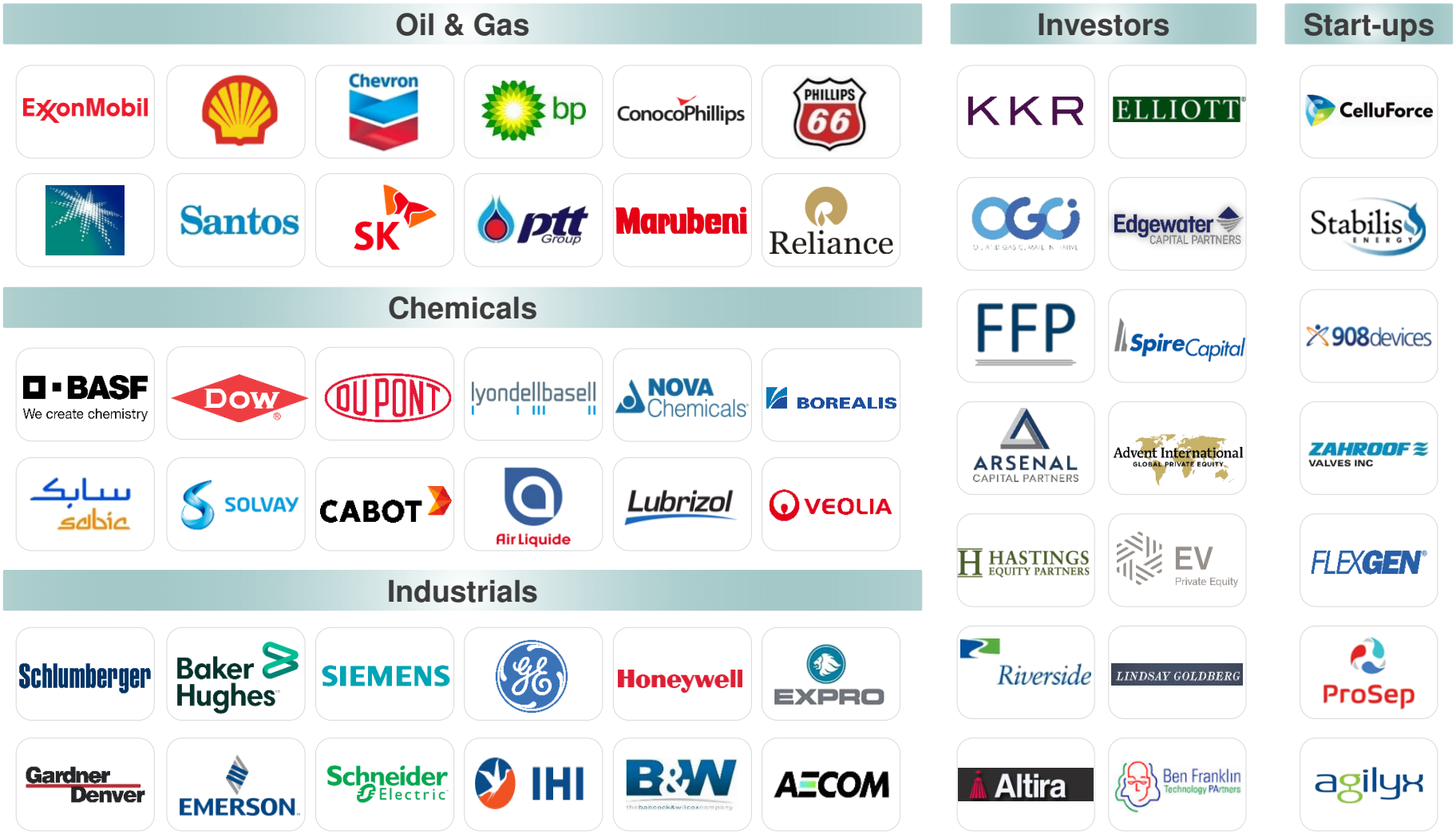

Transmission


Energy Transition


Transportation

Markets | **Operations** | **Technology** | **Commercial** | **Policy**

Over 200 clients – Fortune 500 brands, mid-sized firms, start-ups, and investors – engage ADI to shape decisions



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Global OpEx Outlook

Quarterly forecast and analysis of operating expenses in upstream, midstream, downstream, and LNG

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