RESEARCH & PERSPECTIVES

The thinking behind the thesis

Green Methanol as the Pivot of the Clean-Fuels Economy

How a Storable Liquid Intermediate Links CO_2 Capture, Green Hydrogen and Aviation-Grade Fuel at Commercial Scale

Research & Perspectives

The Investment Thesis of the Family Office

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Abstract

The companion paper in this series argued that captured carbon is worth more as a feedstock than as a cost to bury. This paper takes the next step and identifies the molecule that makes the feedstock thesis real. We hold that **green methanol** is the pivot of the clean-fuels economy: a storable liquid that gathers three otherwise-disconnected inputs, captured CO_2, green hydrogen, and renewable power, and converts them into a tradable product that serves both marine fuel and, through the methanol-to-jet route, aviation. The paper explains why methanol occupies this central position, sets out the state of commercial deployment as of mid-2026, and is candid about the binding constraint on the thesis, namely the cost and availability of green hydrogen. Green methanol is uniquely well placed among clean-fuel candidates because it is liquid at ambient conditions, compatible with existing storage and bunkering infrastructure, and already moving through commercial supply chains: the world's first commercial-scale e-methanol plant is operating, and roughly 285 methanol-capable vessels sit on the global orderbook. Its economics remain premium and hydrogen-dependent, with unsubsidised green hydrogen at US$2.50 to US$7.00 per kilogram in 2026 and a marked cost advantage for Chinese electrolysis. For our family office the investment case is that methanol sits at the load-bearing junction of the value chain, capturing demand from two hard-to-abate sectors while retaining optionality between them. We conclude that the pivot is real but gated by hydrogen cost, and that the near-term opportunity lies with producers who control low-cost renewable power and biogenic CO_2. This sets up the third paper, on direct air capture and the cost of carbon feedstock.

Keywords: *green methanol; e-methanol; clean-fuels economy; green hydrogen; methanol-to-jet; maritime decarbonisation; storable intermediate*

1. Introduction: The Molecule in the Middle

A clean-fuels economy has to solve a coordination problem. Renewable electricity is abundant but intermittent and hard to store. Captured carbon is available but has no intrinsic value until it is built into something. Green hydrogen can be made from renewable power but is expensive to move and store. And the sectors that most need clean fuel, shipping and aviation, cannot use any of these inputs directly. Something has to sit in the middle and connect them.

This paper argues that green methanol is that connector, and that its central position is the reason our family office treats it as the anchor of the clean-fuels investment thesis. Methanol takes captured CO_2 and green hydrogen, both otherwise awkward to monetise, and combines them into a stable liquid that existing infrastructure can already store, move, and burn. It serves maritime demand today and aviation demand through a well-understood conversion route. In value-chain terms it is the load-bearing junction: the point through which carbon, hydrogen, and power all flow on their way to a saleable fuel.

The paper sets out why methanol holds this position rather than a rival molecule, describes how far commercial deployment has progressed by mid-2026, and treats honestly the constraint that governs the whole thesis, the cost and supply of green hydrogen. It closes with what the pivot means for where patient capital should be deployed.

2. Why Methanol Sits at the Centre

Several molecules compete to carry renewable energy into hard-to-abate transport: hydrogen itself, ammonia, and methanol are the leading candidates. Methanol's claim to the pivotal position rests on three properties that its rivals lack in combination.

2.1 It Is Storable and Infrastructure-Compatible

Methanol is liquid at ambient temperature and pressure, so it can be stored in conventional tanks and moved through conventional bunkering systems. Hydrogen must be compressed or liquefied at cryogenic temperatures; ammonia is toxic and requires strict containment. Methanol's penalty is energy density: it requires roughly 2.5 times the storage volume of heavy fuel oil. That is a real but manageable cost, and it is far smaller than the handling burden of the alternatives. This is what lets methanol act as the storable intermediate that buffers intermittent renewable power and turns it into a fuel that can wait for a ship.

2.2 It Consumes Both Problem Inputs

E-methanol is synthesised from green hydrogen and captured CO_2, so producing it draws down two inputs that are otherwise difficult to monetise. The reaction is direct: roughly one tonne of e-methanol requires on the order of 200 kilograms of green hydrogen and about 1.5 tonnes of CO_2. Methanol is therefore not merely a fuel; it is a sink for captured carbon and a carrier for renewable hydrogen, which is exactly why it converts the carbon-utilisation thesis of the companion paper into a concrete product.

2.3 It Serves Two End Markets from One Molecule

Green methanol is a marine fuel in its own right and the feedstock for sustainable aviation fuel via the methanol-to-jet route. One production base can therefore address two of the largest hard-to-abate sectors, and a producer can shift volume between them as relative prices and mandates evolve. That optionality, one feedstock serving both shipping and aviation, is unique to the methanol pathway and is central to why it anchors the value chain rather than sitting at its edge.

Table 1

Candidate Clean-Fuel Carriers Compared

Property	Green Methanol	Green Hydrogen	Green Ammonia
Physical state	Liquid at ambient	Compressed / cryogenic	Liquefied under pressure
Infrastructure fit	Uses existing tanks/bunkering	Requires new systems	Requires new systems
Toxicity/handling	Manageable	Leakage/flammability	Toxic; strict controls
Consumes captured CO_2	Yes (direct feedstock)	No	No
Serves aviation route	Yes (methanol-to-jet)	Indirect	No

Note. Comparison is directional and reflects deployment status as of 2026. Each carrier has contexts where it is preferred; methanol's advantage is breadth across storage, feedstock, and end markets.

3. From Concept to Commercial Scale

The pivot argument would be academic if methanol were still confined to laboratories. It is not. By mid-2026 the pathway has crossed from demonstration into commercial service on both the supply and demand sides.

3.1 Supply: The First Commercial Plants Are Running

The first commercial-scale e-methanol facility, the Kassø plant in Denmark, is operating on renewable power with an annual capacity of about 42,000 tonnes, and it delivered its first output to Maersk's pioneering dual-fuel vessel in 2025. In China, green-methanol capacity is scaling rapidly through both biomass and power-to-methanol routes, with the country holding a majority of the global renewable-methanol project pipeline. Operational capacity remains far below announced capacity, a gap examined in Section 4, but the technology is proven at commercial scale rather than pilot scale.

3.2 Demand: The Orderbook Is Real

Demand has moved ahead of supply. As of early 2026 the global orderbook of methanol-capable vessels stood at roughly 285 ships, about 6% of the fleet by capacity, led by Maersk, which had eight to ten dual-fuel methanol vessels in operation and more than seventeen on order. Maersk alone could require on the order of one to two million tonnes of green methanol per year by the late 2020s. This is a visible, contracted demand signal of a kind that storage-based decarbonisation cannot generate, and it is what gives the methanol pivot its commercial gravity.

Table 2

Green Methanol by Production Pathway (2026)

Pathway	How Made	Indicative Cost (US$/t)	Lifecycle GHG Cut
E-methanol	Green H_2 + captured CO_2	1,600–2,400	Up to ~95%
Bio-methanol	Biomass/waste gasification	400–700	~60–80%
Blue methanol	Natural gas + CCS	300–500	~35–65%

Note. Figures are indicative 2026 estimates and vary by project, feedstock, and power price. E-methanol carries the deepest emissions cut and the highest cost; bio-methanol offers a near-term commercial bridge.

4. The Binding Constraint: Green Hydrogen

A fair investment case must name the thing that could break it. For green methanol, that is the cost and availability of green hydrogen, which dominates e-methanol economics and remains the sector’s central bottleneck.

In 2026, unsubsidised green hydrogen averages roughly US$2.50 to US$7.00 per kilogram globally, well above the level at which e-methanol competes with fossil fuel oil without policy support. At about 200 kilograms of hydrogen per tonne of methanol, hydrogen alone can account for a large share of e-methanol’s production cost. Electrolyser cost reductions have also stalled: system-level costs in Europe and the United States sit near US$2,500 per kilowatt, roughly four times the Chinese level of about US$600 per kilowatt. The result is that the near-term economics of e-methanol depend heavily on access to low-cost renewable power and cheap electrolysis, conditions met in only a few locations.

This constraint does not sink the thesis; it shapes it. It explains why bio-methanol, which sidesteps the hydrogen cost by gasifying biomass or waste, is the commercial bridge of the late 2020s, and why the deepest-decarbonisation e-methanol route belongs to producers with stranded or ultra-low-cost renewables and biogenic CO_2. It also explains our emphasis, in the companion papers, on the cost of carbon feedstock and on producers positioned where power is cheapest. The pivot is real, but it turns on hydrogen, and the winners will be those who solve the hydrogen-and-power cost problem first.

5. What the Pivot Means for Where We Invest

If green methanol is the load-bearing junction of the clean-fuels economy, then the investment logic is to own or enable that junction rather than any single input or end market. Sitting at the pivot captures demand from two hard-to-abate sectors at once and preserves the option to move volume between them. The principles that follow guide where we deploy:

- **We back the intermediate, not a single end use.** We prefer positions in green-methanol production and its enabling infrastructure over bets tied solely to marine or solely to aviation demand, because the molecule's value is precisely that it serves both.
- **We favour low-cost power and biogenic CO_2.** Because hydrogen and carbon feedstock dominate the economics, we concentrate on producers with access to stranded or ultra-low-cost renewables and cheap biogenic CO_2, where e-methanol can reach competitive cost, and on bio-methanol as the near-term bridge.
- **We underwrite to contracted demand.** The methanol vessel orderbook provides a visible, multi-year demand signal; we prioritise projects with secured offtake over merchant exposure, using the demand pull that storage-based decarbonisation cannot offer.
- **We treat hydrogen cost as the key variable.** We stress-test every opportunity against green-hydrogen and electrolyser cost paths, and we favour geographies, China foremost, where electrolysis and renewable power are cheapest.

The through-line from the companion paper holds. If captured carbon is best understood as a feedstock, green methanol is where that feedstock becomes a product, and it is the point in the value chain where the clean-fuels economy either works commercially or does not. The next paper turns to the upstream question the hydrogen constraint raises: how the cost of captured carbon itself can be driven down, and what direct air capture must achieve to make the feedstock bankable.

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