WHITE PAPER

The Shock That Reframed Energy Security and the Importance of Biofuels

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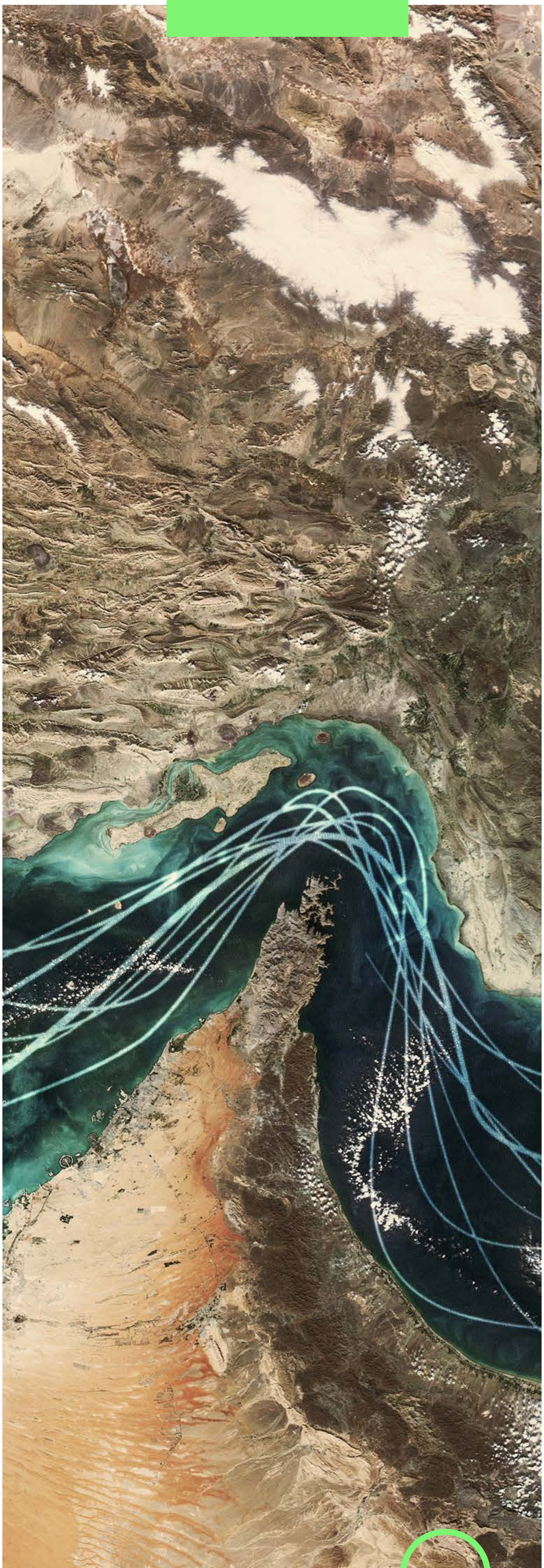
Executive summary

The recent energy supply disruption through the Strait of Hormuz has reframed biofuels from a decarbonization lever into a core energy-security tool. It exposed the vulnerability of a molecule economy concentrated around a few exporters and chokepoints, with impacts cascading across oil, LNG, petrochemicals, fertilizers and transport fuels.

While no single alternative can fully offset a disruption of this scale, biofuels can provide a practical shock absorber within a broader resilience portfolio, reducing marginal import exposure, creating domestic price anchors and improving crisis resilience. This also changes how the biofuel premium should be viewed: not only as a climate cost, but as an insurance cost for energy sovereignty, system resilience and sustainability.

Early policy responses already point in this direction. The next step is scaled, bankable system delivery: durable mandates, investable offtake, resilient feedstock systems and credible sustainability standards. Critically, expected food-price pressures from fertilizer shortages reinforce the need to shift incremental growth toward waste-, residue- and other advanced 2G pathways, rather than relying primarily on crop-based supply. This requires coordinated action from policymakers, producers, feedstock suppliers, offtakers and investors.



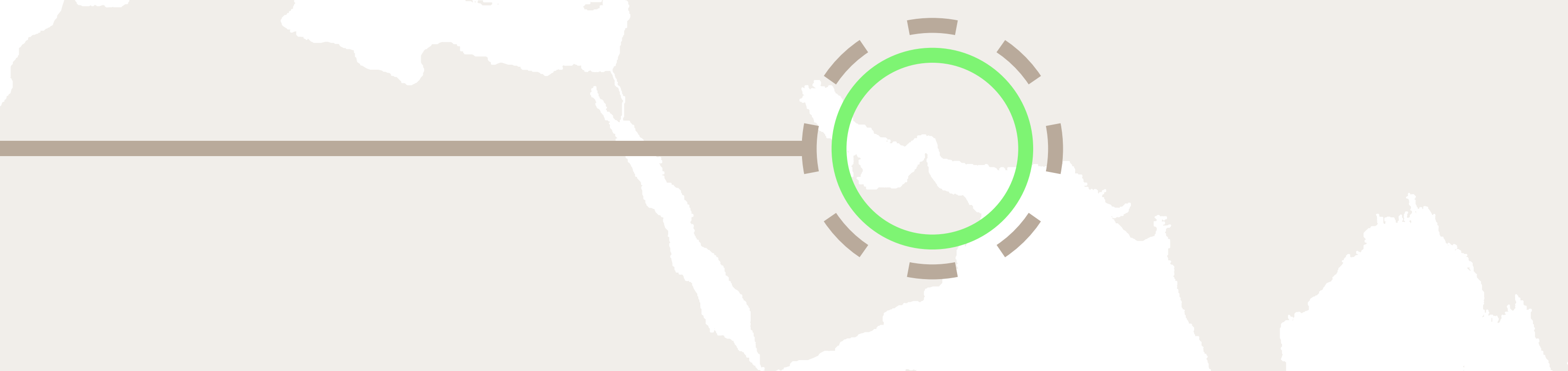
The energy shock and impact on global markets

The world has just seen the impact of stress on concentrated energy dependence. The recent closure of the Strait of Hormuz has triggered the largest supply disruption in modern history, with global oil supply falling by **11.5 million barrels per day** and flows through the Strait collapsing from more than **20 million barrels per day** to a fraction of that level. Prices surged to around **$130/bbl**. Governments were forced into emergency response mode, including the release of **400 million barrels** of strategic reserves. What makes this episode different from previous shocks are its scale and breadth: Hormuz is a chokepoint not just for crude, but also for gas and industrial molecules, with roughly **20% of global LNG trade** transiting the same corridor.

As flows tightened, the shock spread quickly beyond transport fuels into petrochemicals, fertilizers and industrial supply chains, exposing a highly concentrated and interconnected global molecule economy. Even under optimistic assumptions, normalization will take time, as inventories, logistics, insurance costs, and pricing mechanisms, compounded by **physical damage to upstream and export infrastructure across the Gulf**, could extend disruption well beyond the formal end of the conflict. This will slow the recovery of both physical flows and market confidence.

Asia felt this shock first and most severely, given its structural exposure to Middle Eastern energy flows. Approximately **83% of LNG transiting Hormuz is destined for Asian buyers**, with China, India and South Korea alone accounting for more than half of those volumes. The disruption translated immediately into falling inventories, refinery run cuts, and pressure on petrochemical production, while governments moved to shield consumers through subsidies, tax suspensions and emergency sourcing.

Europe faces a different but equally material set of consequences. Rising input costs and pressure on refining margins mean a growing risk of stagflation if elevated energy and fertilizer prices persist. Other importing economies, particularly across emerging markets, are facing the familiar combination of higher energy bills, current-account pressure, and inflation. The common thread is clear: a single corridor disruption has simultaneously repriced fuel, gas, and feedstocks, to the detriment of macroeconomic stability. Beyond oil dependence, the situation highlights a structural vulnerability embedded in how energy systems are sourced, priced, and secured.



Why this changes the biofuels debate

The Hormuz shock is changing the biofuels debate. Beyond their established decarbonization value, biofuels now matter even more for their contribution to building a second molecular system. Such a system is rooted in domestic agriculture, wastes, residues, municipal streams and local processing capacity, rather than in a handful of upstream exporters and maritime chokepoints.

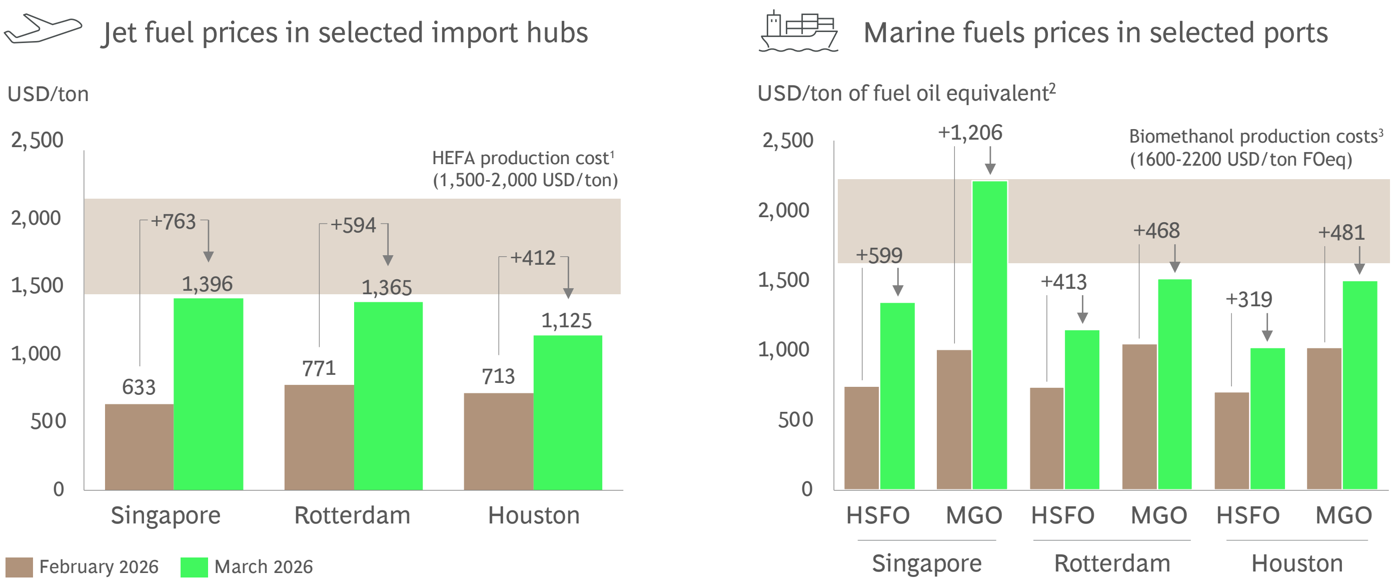
The January 2026 Global Biofuels Alliance paper on "Investments in Sustainable Biofuels" places energy security, import reduction, foreign-exchange savings, domestic fuel diversification, and price-volatility buffering at the center of the biofuels case. This positions biofuels not just as a decarbonization lever, but as a response to global energy volatility exposure, particularly in the Global South. Biofuels have long been linked to energy security and domestic economic development, especially in emerging markets. The current oil supply shock has sharpened that case, shifting framing from "lower-carbon fuel at a premium" to "strategic insurance against price volatility, import dependency, and physical supply disruption." The case for higher blending targets and stronger incentives becomes most urgent precisely in markets that are highly exposed to oil import risk.

The shock also reinforces a structural constraint in the biofuels industry: while higher fossil fuel prices strengthen the case for domestic alternatives, rising gas and fertilizer costs can increase the cost and volatility of crop-based feedstocks. The risk is material: the World Bank estimates that urea prices surged by nearly 46% month-on-month between February and March 2026, while IFPRI warns that sustained fertilizer and energy-price shocks could reduce fertilizer application, lower crop yields and heighten food-security risks, especially in import-dependent regions such as Africa and South Asia. Beyond the critical sustainability argument, this further underlines the urgent need to transition from 1G to 2G biofuels[1] by scaling waste-, residue- and other advanced pathways. At the same time, digestate from anaerobic digestion plants producing biomethane can serve as an organic fertilizer substitute, partially offsetting the net agricultural cost impact and dependency on fossil-based fertilizers (ammonia-derivatives through Haber-Bosch using Natural Gas as feedstock). This gives policymakers an additional argument for integrated biorefinery support, e.g., incentives and/or blending mandates for waste streams of biofuel plants[2].

1. First Generation (or 1G) biofuels are made from food/feed crops such as sugarcane, corn, or vegetable oils, while Second Generation (or 2G) biofuels are made from non-food residues and wastes such as bagasse, straw, used cooking oil, municipal waste, or forestry residues. 1G biofuels can face food-vs-fuel, land-use and fertilizer-emissions concerns, while 2G biofuels generally offer stronger sustainability potential by using wastes and residues.
2. E.g. Digestate or Fermented Organic Manure from biogas/biomethane plants, spent wash and press mud from sugar refineries and EtOH plants, lignin-rich residues from EtOH (e.g., 2G) plants, etc.

The concept of a "green premium" for biofuels needs to be reframed. As a starting point, we are seeing how high oil prices can dramatically reduce the green premium cost differential, at least temporarily (Exhibit 1). More importantly, in a post-Hormuz world, it is too narrow to view it purely as a climate cost. A meaningful share of that premium is better understood as an insurance premium for sovereignty and reliability, while adding to the local economy. It is the visible cost of reducing exposure to far less visible – but much larger – risks such as corridor disruptions, emergency stock releases, subsidy burdens, industrial curtailment and macroeconomic instability. Evidence already points in this direction. The IEA estimates that liquid biofuels lowered transport-fuel import dependence by 5–15 percentage points in relevant importing countries in 2024, while reducing global oil demand by around 2.5 million barrels per day. In Brazil, the impact reached 24 percentage points for overall transport-fuel import dependence and 45 percentage points for gasoline.

Exhibit 1. High oil prices driven by the Middle East crisis are temporarily approaching the cost of producing biofuels



Disruptions in O&G markets could push biofuels prices up through higher feedstock and logistics costs, rising crop prices due to fertilizers supply disruption, sudden demand shifts from fossil fuels into bio-options, and higher fossil marginal costs

1. HEFA produced from Used Cooking Oil Cost;
2. includes Bunker cost, FuelEU penalty, EU ETS tax, and Surplus Units revenue
3. Biomethanol produced through biomass gasification Assumptions: SU trading price = $220/t CO2eq; EU ETS price at $80/t

Source: Eikons, Rystad Energy, BCG SAF cost model; BCG analysis

At the same time, biofuels are not a standalone solution, and their role will vary by region depending on resource availability, infrastructure, and competing pathways. Strengthening energy security will require a broader system response: accelerating energy efficiency, scaling electrification alongside renewables and storage (including electric vehicles), diversifying fossil supply and trade routes, expanding nuclear where viable, and over time developing e-fuels as costs decline. Biofuels sit within this portfolio as one of the few immediately scalable, drop-in molecular solutions, particularly for transport (air, sea and ground), industry, power (biomethane), and other sectors where electrification is slower or constrained (see Exhibit 2). Their role is therefore not to replace the current system, but to **add resilience and optionality to it**, reducing exposure to single-point failures like the one we see today.

Exhibit 2. Biofuel relevance by type and transport sector, showing which fuels carry the strongest near-term growth prospects across road, aviation and maritime end-uses]

<table>
<tr><th>Biofuel</th><th>Process</th><th>Feedstock</th><th>Road-Light</th><th>Road-Heavy</th><th>Aviation</th><th>Maritime</th><th>Chemicals</th></tr>
<tr><td rowspan="2">Ethanol (EtOH)</td><td>Fermentation</td><td>Crops[1]</td><td rowspan="2">• 120Bn liters (US, Brazil, India), blended 5-20%, with 85-100% flex-fuel use in Brazil</td><td rowspan="2"></td><td rowspan="10"></td><td rowspan="2">• Ethanol covered under IMO interim alcohol-fuel safety guidelines</td><td rowspan="2">• Bio based alcohol and bio-ethylene production</td></tr>
<tr><td>Hydrolysis + Fermentation</td><td>Wastes & Biomass</td></tr>
<tr><td rowspan="2">Biodiesel (BD)</td><td rowspan="2">Trans-esterification</td><td>Crops[1]</td><td colspan="2" rowspan="5">• Bio-based diesel cumulatively 70Bn liters (Indonesia, Brazil, US, EU), 70% from Biodiesel, with rapidly growing HVO/RD
• Biodiesel not drop-in (5-10% common blends), RD is drop in (no blending wall)
• 2G Bio-Based Diesel from Used-Cooking-Oil (UCO) growing, but growth feedstock constrained</td><td rowspan="5">• Waste-based Bio/Renewable Diesel offer near-term decarbonization potential</td><td rowspan="2">• Use of bio-glycerine by-product</td></tr>
<tr><td>Waste oils</td></tr>
<tr><td rowspan="3">Renewable Diesel (RD)[3]</td><td rowspan="2">Hydrotreating (HVO)</td><td>Crops[1]</td><td rowspan="3"></td></tr>
<tr><td>Waste oils[2]</td></tr>
<tr><td>Gasification</td><td>Wastes & Biomass</td></tr>
<tr><td rowspan="3">Bionaphtha</td><td rowspan="2">Hydrotreating</td><td>Crops[1]</td><td rowspan="3">• Blended into or up-graded to gaso-line, by-product of SAF/RD plants</td><td rowspan="3"></td><td rowspan="3"></td><td rowspan="3">• Emerging renewable feedstock for steam crackers and bio-based olefins/plastics</td></tr>
<tr><td>Waste oils[2]</td></tr>
<tr><td>Gasification</td><td>Wastes & Biomass</td></tr>
<tr><td>Biomethane</td><td>Anaerobic Digestion[5]</td><td>Wastes & Biomass</td><td colspan="2">• Current 35-40 TWh as drop-in substitute for CNG and LNG fleets (EU, India, US, Brazil)</td><td>• Emerging biomethane to SAF route</td><td rowspan="2">• Short and mid term decarb solution as LNG (drop-in) and Methanol (dual-fuel) vessels orders in-crease</td><td>• Potential drop-in green solution</td></tr>
<tr><td>BIomethanol</td><td>Gasification</td><td>Wastes & Biomass</td><td colspan="2">• Potential blending for ICE vehicles (e.g., bio-MTBE)</td><td rowspan="4">• >1Bn liter market today (<1.5% of jet fuel globally), mostly HEFA (oily feed-stocks) with new emerging pathways (alcohols to Jet, biomass gasification)</td><td>• Potential conversion to olefins/plastics</td></tr>
<tr><td rowspan="3">Biokerosene (SAF)</td><td>Hydrotreating (HEFA)</td><td>Waste oils</td><td rowspan="3"></td><td rowspan="3"></td><td rowspan="3"></td><td rowspan="3"></td></tr>
<tr><td>Alcohol-to-Jet (ATJ)[4]</td><td>Bio-alcohols</td></tr>
<tr><td>Gasification[5] (FT, MTJ)</td><td>Wastes & Biomass</td></tr>
</table>

1. Crop routes still dominate, but scaling 2G feedstocks is important to mitigate food-system and land-use impacts while improving sustainability;
2. Includes Novel Vegetable Oils cultivated as rotational crops or in degraded lands;
3. Renewable diesel is also produced in ATJ process as part of product slate; Please note that ATJ process can also start from gasification and fermentation of syngas;
4. Gasification + Fisher Tropsch and gasification+ Methanol to Jet, includes TAJ from 1G ethanol
5. Biogas can also be produced from methanation of syngas, but main route is anaerobic digestion.

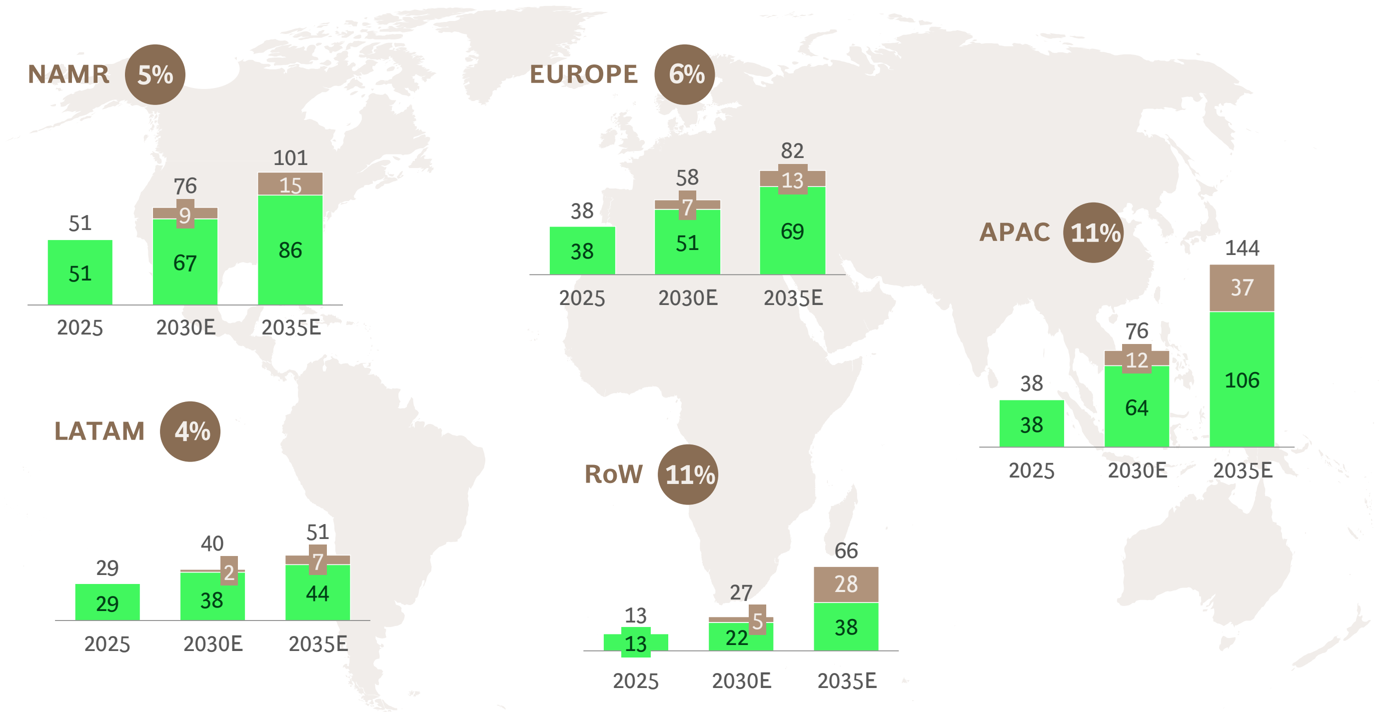
Note: Less mature routes as Bio-Oil from Pyrolysis or Biocrude from Hydrothermal liquefaction are no included;
Source: BCG analysis

Biofuels cannot replace the volumes that flow through the Strait of Hormuz, and the case for them does not rest on that claim. Their specific contribution is as a shock absorber, reducing marginal import exposure, creating a domestic price anchor, and buying time during a disruption. for example, when fossil fuel prices spiked, SAF and maritime biofuel premiums narrowed (Exhibit 2). Decoupled from the supply chain dynamics of fossil fuels, they behaved as a hedge.

Asia is becoming a leading growth engine for alternative fuels

Driven by its fossil fuel exposure, Asia is already acting decisively in the area of alternative fuels. And it has the scale and resource potential to turn that action into meaningful domestic supply. A recent BCG study identifies Asia Pacific as the **fastest-growing biofuels region globally**, with demand expected to rise at **11–14% annually**. This would increase the region's share of global biofuel demand from roughly **22% today to around 30-32% by 2035** (Exhibit 3).

Exhibit 3. Significant biofuel demand growth expected across all regions, led by Asia



1. Includes Ethanol, Biodiesel, waste-based diesel and gasolines, biogas and biomethane

Note: The base case reflects the average trajectory implied by current policy frameworks and market conditions, while accelerated case assumes planned policies are fully legislated, market barriers are broken down, and ample new production capacity is added to meet rising demand

Source: IEA, Global Biofuels Alliance, BCG analysis

India stands out as a leading case of policy-driven biofuels scale-up. Ethanol blending has reached nearly 20%, up from around 5% in 2018–19. The same analysis estimates that this has displaced around 26 million tonnes of crude imports and generated roughly $19.3 billion in foreign-exchange savings. India is also materially growing its biomethane capabilities (also labelled as Compressed Biogas or CBG). Mandatory CBG blending begins in FY2025-26 and is forecast to rise to 5% of the cumulative CNG[3] (transport) and PNG[4] (domestic) consumption beginning in FY2028-29, with more than 170 biomethane plants already functional. Biogases are an important biofuel pillar, with China and India as the main drivers of future growth. A recent BCG study estimated that APAC has 2,500TWh per year of biomethane potential (15% of that highly concentrated, with 60% split between China and India), representing roughly one third of the global biomethane potential.

Southeast Asia illustrates the breadth of the opportunity. Biodiesel mandates continue to strengthen, led by Indonesia's B40, with Thailand, Malaysia and the Philippines also increasing their ambitions. The region is also emerging as a SAF platform, with operational facilities already present in Singapore, Thailand, Malaysia, and (via co-processing) Indonesia driven by feedstock availability and supportive policies. China and India are building pipelines of similar projects, with China now having five certified / export-authorized commercial SAF facilities already operational.

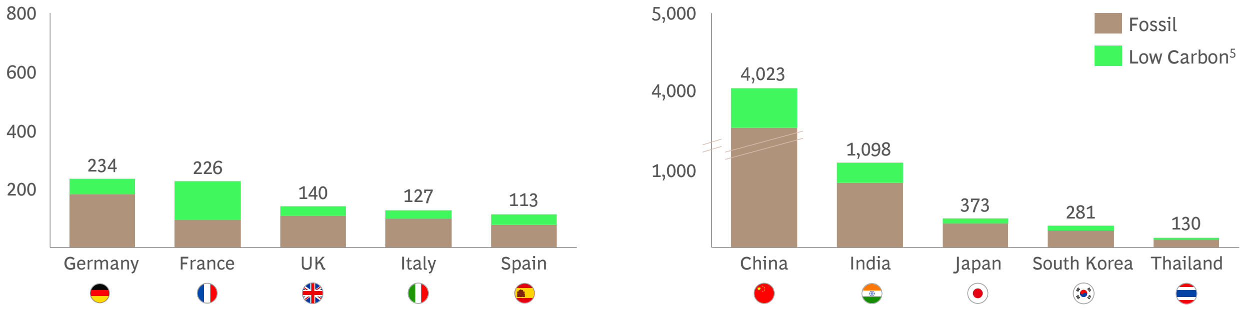
Taken together, this is what makes Asia so important. It is not just the region most exposed to fossil-fuel insecurity, but one of the few with enough policy momentum, feedstock optionality and demand growth to build a meaningful domestic alternative. And the Hormuz shock is likely to accelerate this trajectory. In many Asian markets, energy security, import substitution, rural incomes, and industrial development have long been part of the biofuel policy agenda, alongside decarbonization. The difference now is that resilience is becoming more urgent, more explicit and more financeable. It is reinforcing climate objectives, strengthening the case for mandates, improving the bankability of projects across the region, and underscoring the critical role that biofuels can and need to play in the future energy mix.

3. Compressed Natural Gas
4. Piped Natural Gas (city gas grid)

However, despite this progress and potential, it is important to recognize that energy dependency on Middle East fossil fuels remains pronounced, and biofuels' potential is not yet exploited at scale (Exhibit 4).

Exhibit 4. Across major European and Asian markets, energy dependency on ME is pronounced and biofuels' potential not exploited at scale

Total Energy Supply (Mtoe) — Europe - Energy supply by source (Mtoe) | Total Energy Supply (Mtoe) — Asia - Energy supply by source (Mtoe)



	Germany	France	UK	Italy	Spain	China	India	Japan	South Korea	Thailand
Net Energy Import of TES[1]	70%	42%	48%	79%	78%	24%	37%	87%	84%	57%
O&G Imports from Middle East[2] (%)	3%	7%	1%	15%	7%	6%	11%	23%	34%	15%
Biofuels[3] production (Mtoe)	11.6	3.1	3.2	3.5	1.7	10.8	3.4	0.01	1.3	2.4
Biofuels potential[4] (Mtoe)	77–127					330–400				

1. Total energy supply;
2. O&G imports from Middle East over total energy supply
3. includes liquid and gaseous biofuels
4. Considers only waste-based feedstock;
5. Includes renewable energy and nuclear

Note: All figures reflect 2024 data for Europe and 2023 data for Asia;Source: IEA, Kpler, Concawe, IRENA, BCG analysis

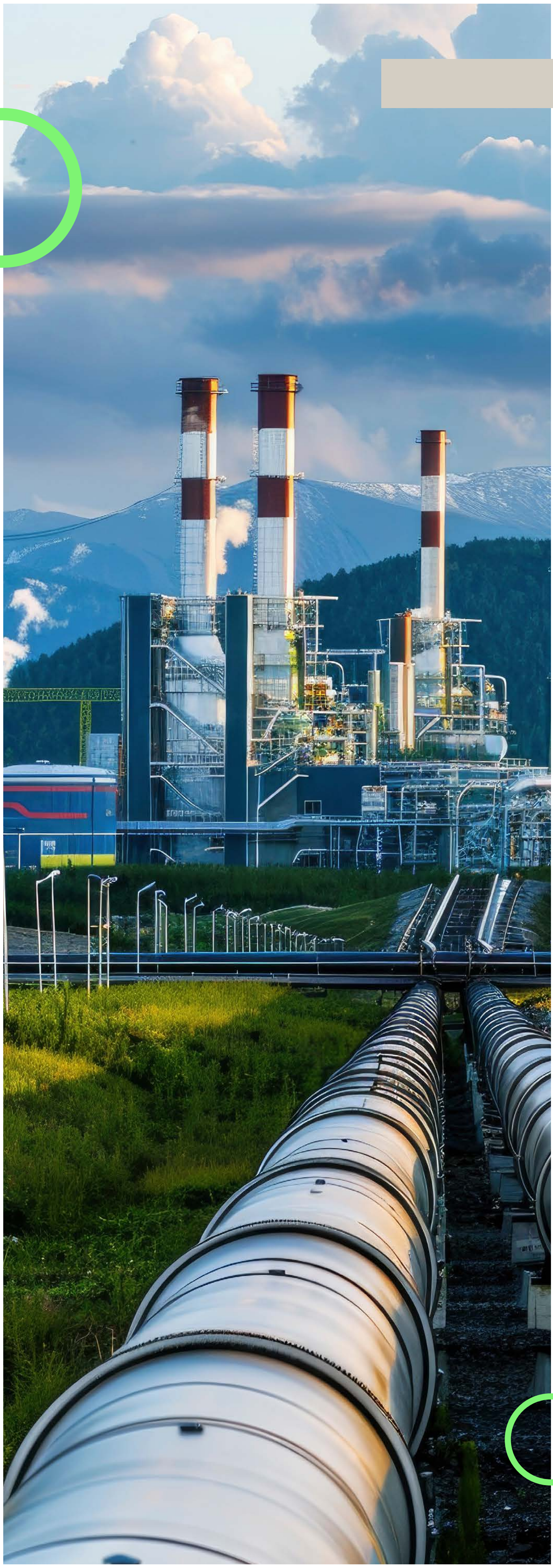
Europe's role in the next phase

In Europe, the challenge is different. It is less about building scale from scratch than about balancing three difficult objectives: preserving decarbonization credibility, reducing fossil dependence, and avoiding new strategic overdependence on a narrow set of imported alternative fuels.

Europe's growth in SAF, renewable diesel, and biomethane will increasingly be driven by **RED III**, **ReFuelEU Aviation** and **FuelEU Maritime**. At the same time, sustainability criteria are tightening, first-generation pathways are under more pressure, and domestic feedstock availability remains constrained. The implication is that Europe is likely to need more imported sustainable fuels, even as it tries to reduce dependence on imported fossil fuels.

Biofuels will not replace oil alone, but combined with biomethane, waste-based liquid biofuels, and diversified imports, they can materially reduce exposure to supply shocks. **In a post-Hormuz world, shifting away from concentrated fossil dependence is a strategic imperative.**

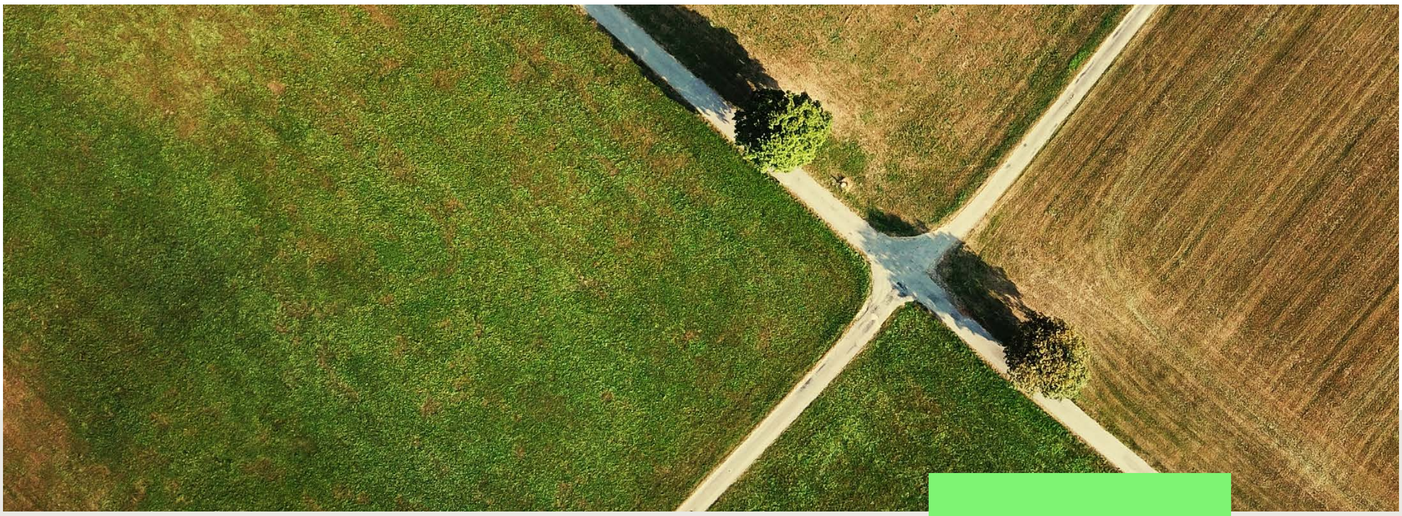
For Europe specifically, this also entails a shift in domestic production. Unlocking untapped feedstock pools – forestry and agricultural residues, municipal solid waste, black liquor – through established and novel conversion routes[5] is critical, and would reduce import reliance while keeping value-chain economics onshore and ensuring scalability and sustainability. Policy frameworks that actively incentivize the scale-up of these advanced pathways should be central to Europe's energy-security response. They can limit the growing need to substitute one form of fuel import dependency with another, while ensuring the highest sustainability standards with the use of 2G feedstocks.



5. E.g., gasification, pyrolysis, hydrothermal liquefaction, etc.

Implications: from policy ambition to system execution

The right response is not "biofuels at any cost." It is to treat biofuels, and more broadly sustainable fuels, as **strategic infrastructure**, embedded within a wider effort to strengthen energy system resilience. The exact mix will differ by region but in most, resilience will come from a combination of many technologies and solutions. The duration of the current crisis will also matter. The longer disruptions persist, the more likely governments and large energy consumers are to move alternatives higher up the agenda. This has direct implications not only for policymakers, but also for private-sector players across the value chain.



Governments and regulators

For governments, the priority can be to move biofuels out of the climate-policy silo and into core energy strategy, integrating them into a comprehensive set of solutions optimizing the energy mix for both sustainability and resilience. This means viewing them alongside strategic reserves, refinery resilience, LNG import infrastructure, and industrial policy, as well as other non-fossil solutions that can diversify the energy system away from oil and gas. A focus on **scalable, near-term pathways** (ethanol, bio-based diesel[6], biomethanol, SAF and biomethane), while continue to build the foundations for more advanced low-carbon fuels over time.

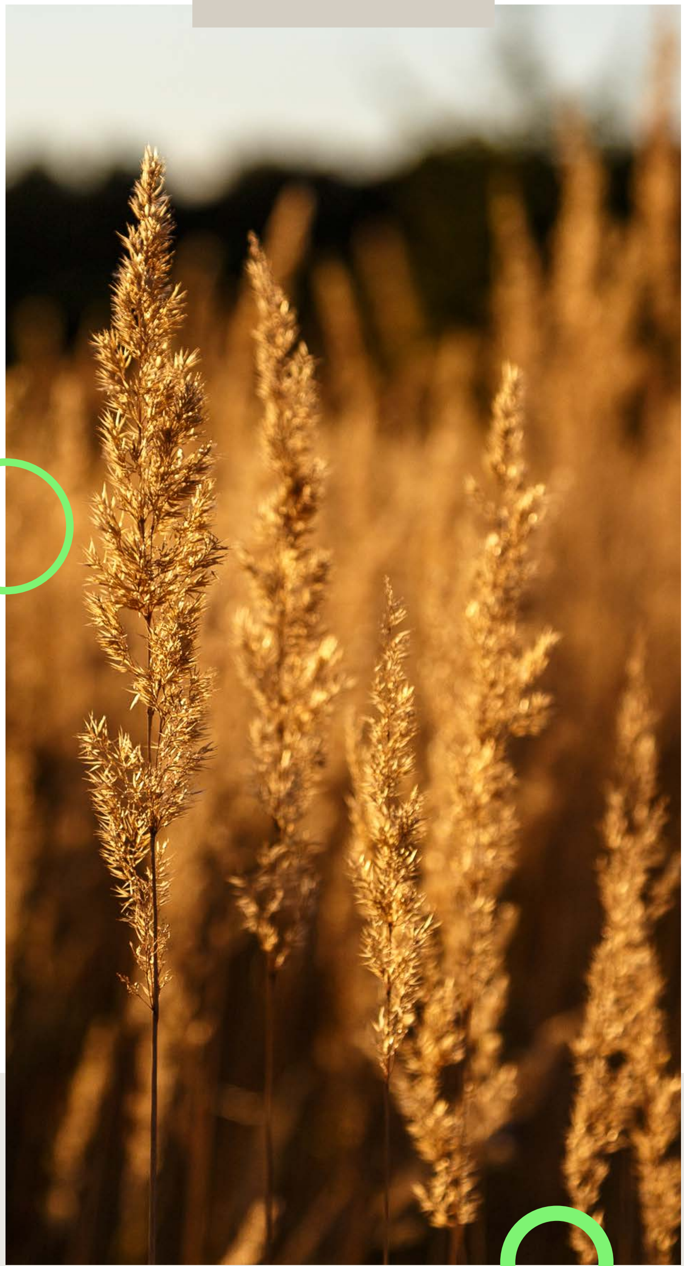
Demand can be made **durable and bankable**. Stable mandates, blending obligations, performance-based standards, and credible crediting mechanisms can all help to unlock investment. In parallel, governments could shift attention from fuel volumes to **feedstock resilience**, accelerating the development of waste, residue, and non-food supply chains to ensure both scale and sustainability. Finally, energy security cannot be achieved in isolation. Cross-border trade, certification alignment, and carbon accounting frameworks will be essential to support a more diversified and interconnected fuel system.

6. Includes both biodiesel (FAME) and Renewable Diesel (HVO from oily feedstocks, or co-product of GFT and ATJ processes)

Biofuel producers and developers

For producers, the shift is from opportunistic growth to system positioning. Demand is no longer driven only by decarbonization mandates, but increasingly by energy security, strengthening the underlying business case. This favors players that can secure long-term offtake, integrate across the value chain, and align with policy-backed demand. **Flexibility becomes a key advantage** across feedstocks, logistics, and end markets (transport, aviation, industry) as resilience starts to matter as much as decarbonization.

Execution will remain the differentiator. Feedstock access, technology choices, and operational reliability will separate winners from laggards. Producers that can diversify inputs, optimize yields, and build strong downstream partnerships will be better positioned to scale. **Portfolio approaches – aggregating assets across geographies and pathways** – will also play a growing role in reducing volatility and improving bankability.



Feedstock suppliers and upstream ecosystems

Feedstock is emerging as a strategic bottleneck. For agricultural players, waste aggregators, and industrial residue suppliers, this creates a step-change in relevance. The focus will shift from cost alone to **reliability, traceability and scalability of supply.**

This creates both opportunity and risk. In agricultural feedstocks, for example, stronger demand improves monetization potential, but tighter fertilizer markets and increasing sustainability scrutiny raise the bar on productivity and supply resilience.

Opportunities will expand across: (a) waste and residue collection systems, (b) energy crops and crop rotation models, and (c) integration with existing agricultural and industrial value chains. At the same time, **sustainability will become a binding constraint on scale**, both in terms of regulation and market acceptance. Suppliers will need to demonstrate compliance on land use, food security, and lifecycle emissions, making traceability and certification increasingly critical.

The bottom line

Biofuels are not a standalone solution, but they are one of the few immediately deployable levers to reduce exposure to imported fossil molecules. Their role is to add resilience and supply diversification to the system, alongside electrification, efficiency, nuclear, diversified fossil sourcing and, over time, e-fuels. They will not fully offset the impact of major oil shocks, like the current disruption in the Middle East. However, every incremental share of domestically produced biofuel reduces exposure to future supply disruptions, while the associated green premium can be understood, in part, as the cost of building resilience into the fuel system.

The shift underway goes beyond fuels. It is about how energy systems are designed, from "optimized for cost in stable conditions" to "resilient under disruption". **Early policy responses point in the same direction**, though we should be cautious in inferring causality. For example, in Brazil policymakers are currently considering raising ethanol blends to E32 from E30. Argentina has allowed voluntary blends of up to E15 to cushion fuel prices, and Indonesia has revived momentum toward B50. With every $1/bbl rise in crude prices adding up to roughly **$2B** to India's annual import bill, India is already looking beyond E20: draft amendments to vehicle certification rules would formally recognize higher biofuel blends including **E85, E100 and B100**, supporting a broader push to reduce petroleum import dependence.

This frames higher biofuel use as a way to reduce dependence on petroleum imports, while continuing to push infrastructure development for Compressed Biogas in passenger and commercial vehicles. In Vietnam, the government accelerated its mandatory E10 rollout by two months to April 2026, citing global energy volatility and the need to reduce reliance on imported gasoline. At EU level, the AccelerateEU plan presented in April 2026 cited €24 billion in additional fossil-fuel import spending since the start of the Middle East crisis as evidence of Europe's exposure, and reinforced the case for accelerating homegrown clean energy, electrification, sustainable biofuels, SAF and maritime fuel solutions under existing policy frameworks such as RED III, ReFuelEU Aviation and FuelEU Maritime.

Many of these measures were already underway, but the crisis reinforces a clear point: **countries with access to alternative molecules are better positioned to absorb supply shocks.**

Conclusions and takeaways

The closure of the Strait of Hormuz has fundamentally reframed the biofuels debate. The old question was whether biofuels were worth supporting despite a higher apparent cost. The new question is whether major importers can still justify running energy systems with so little redundancy beneath crude, LPG and gas-linked molecules. Four conclusions follow.

1. **THIS WAS MORE THAN AN OIL SHOCK.**
   It was a systems shock. It hit crude, LNG, LPG, petrochemical feedstocks, fertilizers, refining, aviation and household energy at once. It highlighted the central vulnerability of concentrated dependence.

2. **AS THE MOST EXPOSED REGION, ASIA OFFERS THE CLEAREST WARNING.**
   In response to their structural vulnerability, Asian governments have had to employ emergency supply deals, tax suspensions, fuel-fund support, stock draws, consumer shielding, and demand restraint.

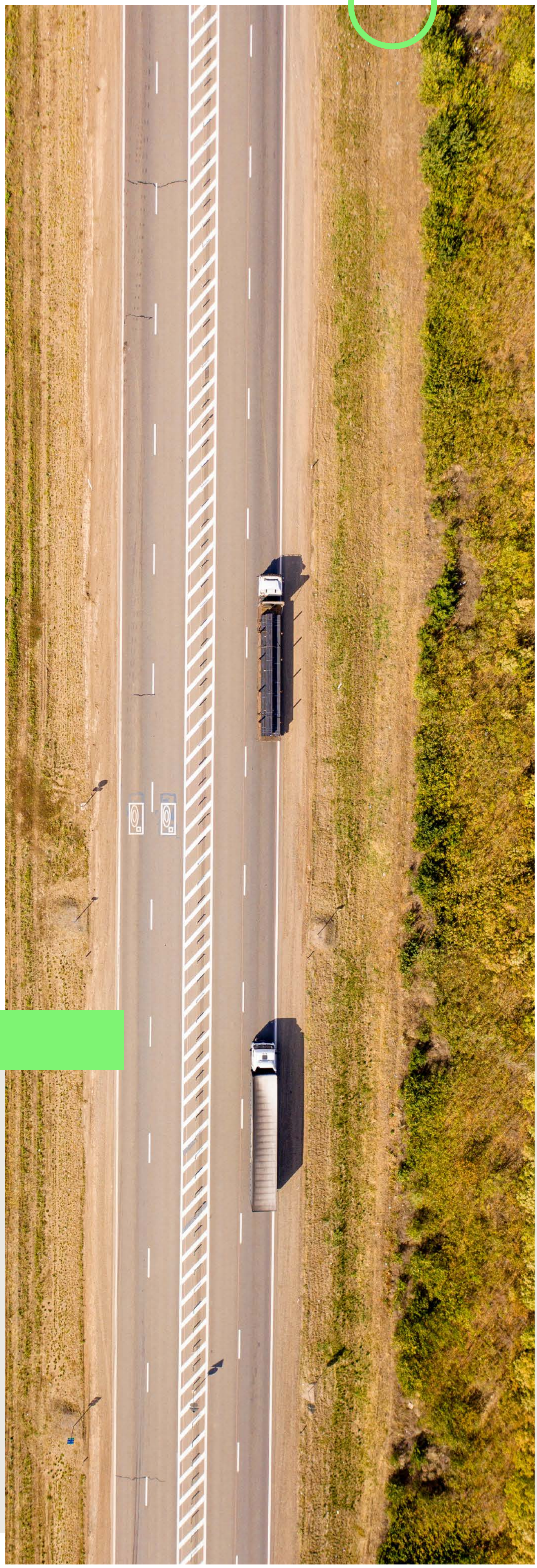
3. **EUROPE'S PROBLEM IS DIFFERENT, BUT NO LESS REAL.**
   It faces the risk of stagflation, tighter refining margins, and a growing need to diversify away from fossil imports, while avoiding future overconcentration in alternative fuel supply chains.

4. **BIOFUELS NOW MATTER STRATEGICALLY, FOR REASONS BEYOND DECARBONIZATION.**
   They help build a second, more diversified molecular system, reducing exposure to supply shocks. They are one of several levers – alongside efficiency, electrification, nuclear and e-fuels, etc. – needed to strengthen system resilience. Crucially, they are among the few that can scale quickly using existing infrastructure, offering an immediate hedge against future disruptions.

Recent events have made the costs of energy system concentration more visible. Unlike previous shocks, this disruption has exposed vulnerabilities across multiple molecules simultaneously, including oil, gas, feedstocks and fertilizers. The broad scope of disruption had made substitution more complex and reinforced the need for lasting structural diversification.

In that context, biofuels are no longer just for decarbonization, but a practical lever to strengthen resilience and diversify supply. The premium, then, should be understood as **an insurance cost for energy sovereignty and system resilience**, as well as for sustainability and climate impact.

Even as acute market pressures ease, the **episode has already shifted the debate by forcing governments and companies to price disruption risk more explicitly.** Once the "insurance value" of protection against price volatility and supply disruptions is factored in, the case for biofuels becomes more compelling than a simple fuel-cost comparison would suggest. This does not guarantee a permanent policy shift everywhere, but **it strengthens the case for more durable mandates, clearer offtake structures, and policy-backed revenue mechanisms** that can improve the bankability of biofuel projects.



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