ESF Europe

WHAT IS SHAPING THE FUTURE OF EUROPEAN REFINING & CHEMICALS?

Industry Insights from Our 5 New Advisory Meetings



- Stakeholder Strategy
- Low Carbon Projects & Pathways
- Sustainable Fuels
- Digitalisation & AI
- Circularity & Sustainable Chemicals

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ADVISORY MEETING TAKEAWAYS

01 STAKEHOLDER STRATEGY

REFINING CAPACITY IS BACK IN FOCUS

Europe's refinery base has declined significantly over the past two decades, from 105 refineries in 2002 to 72 today. More recently, the Russia-Ukraine and Iran-Gulf conflicts have further pressured available global refining capacity and product supplies. This tightening of supply has supported strong refining margins and points to a relatively healthy outlook over the next few years, driving major players such as Dangote and Reliance-backed First America Refining to announce significant investment in new refining capacity.

SECURITY OF SUPPLY IS HERE TO STAY

Today's crisis has put security of supply firmly back on the political agenda, and it is likely to remain a long-term priority. As policymakers increasingly recognise the importance of maintaining resilient and diversified domestic energy supply, this creates opportunities for both Europe's established refining and chemicals industries and developers of green and alternative fuels.

TAX THE WINDFALL OR FUND THE TRANSITION?

With individual European countries determining their own approach to windfall taxation, this could become a significant short-term challenge, particularly as winter approaches. The industry needs to make the case that today's earnings should be reinvested in European assets to improve efficiency, lower emissions, help fund the energy transition and support the industry's long-term sustainability and competitiveness.

DECARBONISATION VS. DEINDUSTRIALISATION

Europe cannot afford for decarbonisation to become deindustrialisation. We cannot simply scrap existing refineries and expect to build a new industrial economy from scratch around green hydrogen and biofuels. The transition needs to leverage Europe's existing assets, infrastructure and expertise, progressively transforming them while maintaining industrial capacity and competitiveness.

FINDING COMPETITIVENESS

Europe does not need to build every part of the low-carbon value chain domestically. For green hydrogen and transition fuels, competitiveness depends heavily on access to low-cost renewable energy and the ability to build quickly and economically. Europe can source energy-intensive inputs, such as green methanol, from the most competitive locations globally, while carrying out higher-value conversion into low-carbon products such as sustainable aviation fuel in Europe.

A MORE BALANCED POLICY AGENDA

Political support across Western Europe is evolving. The urgency around decarbonisation is increasingly being balanced with a greater focus on how industry can deliver the transition while protecting strategic autonomy, security of supply, and supporting wider economic prosperity.

FROM POLICY MOMENTUM TO ACTION

The chemicals sector has seen significant policy momentum in Brussels, moving at a pace not typically associated with Europe. Initiatives such as the Critical Chemicals Alliance and Industrial Accelerator Act are positive signals, but the key question is now delivery. Budgets, measurable impact, and concrete actions are still needed to translate policy ambition into investment and improved industrial competitiveness.

EUROPE'S NAKED EMPEROR

China's chemicals sector faces overcapacity, lower utilisation, and margin pressure, yet continues to benefit from a financial system that can act as a policy tool to support strategic industries through difficult market cycles. European producers are not competing on equal terms, reinforcing the need for Europe to consider how its own financing and industrial policy can support strategically important industries.

BASE CHEMICALS ARE UNDER ACUTE PRESSURE

Europe's petrochemicals sector is being squeezed by high energy and feedstock costs, carbon regulation, constrained investment and global overcapacity. But this is not just an upstream problem: continued closures risk a domino effect across the chemicals value chain, increasing import dependency and weakening Europe's competitiveness and geopolitical power.

MOLECULE RESILIENCE

Europe's disappearing critical chemicals production has huge consequences for the downstream value chains, from pharmaceuticals to vitamins that depend on them. The recent mothballing of INEOS' last world-scale acetyls plants in Europe is a clear example, with INEOS citing UK gas prices 12x higher than in the US and 8x higher than coal-based production in China. Europe needs to identify which strategic molecules and capabilities it cannot afford to lose, protect that foundation to build resilience and create the conditions for future investment.

BRING POLICYMAKERS THE EVIDENCE

Industry needs to demonstrate the real-world impact of retaining versus losing strategic assets, giving regulators the facts and long-term roadmaps needed to balance transition, competitiveness and security of supply.

DEFINING THE REFINERY OF THE FUTURE

Today, project developers outside the traditional refining system are pioneering the transition to green molecules. Where does that leave today's refineries, and how can they evolve into integrated energy and molecule hubs, and what regulations, infrastructure, and public support are needed to bring those technologies into existing industrial assets at scale?

EUROPE RISKS LOSING ITS PROJECT EXECUTION CAPABILITY

As investment and major projects move elsewhere, talent follows. Europe has spent decades building deep construction and project delivery expertise, but without a strong pipeline of investable projects, that capability is increasingly being exported to regions such as the Middle East and the US, making it harder to scale European projects when investment returns.

INDUSTRIAL CAPABILITY CAN UNRAVEL IN A DOMINO EFFECT

As cost gaps widen, margins compress, and investment migrates, industrial clusters are beginning to thin. Losing one part of an interconnected chemical cluster can undermine the shared infrastructure, skills, and economics across the wider ecosystem, repeating patterns already seen in other European industries such as automotive.

HIGH-GRADE EUROPE'S INDUSTRIAL BASE AROUND WHERE IT CAN WIN

Europe is unlikely to compete on energy or labour costs and faces a more fragmented capital market than the US. With that in mind, the question becomes: where is Europe genuinely world-class? With deep technical expertise, a strong education base, complex integrated clusters and valuable legacy assets, Europe needs to identify and invest behind the capabilities and assets that can remain globally competitive and sustainable long term.

REFRAMING REFINERIES AS FOUNDATIONAL INDUSTRIAL HUBS, NOT FOSSIL ASSETS

The future should be molecule-agnostic. Integrating renewable, synthetic and circular molecules into existing sites can leverage established processing capabilities, infrastructure, logistics and shared services. Collaboration is key to creating synergies that improve the competitiveness and scalability of new energy pathways.

BUILD ON EUROPE'S UNIQUE CLUSTER ADVANTAGE

Europe's integrated industrial clusters, with established supply chains, skilled workforce, and access to a highly attractive consumer market, remain major competitive strengths. The priority should be to give existing industry the time and conditions to modernise, while concentrating new investment within these clusters to reinforce their scale, integration and long-term competitiveness.

EUROPE DOESN'T HAVE AN INNOVATION PROBLEM; IT HAS A SCALE-UP PROBLEM

Europe excels at R&D and piloting technologies but too often loses the scale-up phase to other regions. We need a 10-, 20- and 30-year roadmap for scaling new technologies within Europe. If pilots and first-of-a-kind projects move to the US, China or elsewhere, there is no guarantee they come back.

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Tabita Verburg
Area President Dow Benelux, France, Iberica, UK and Nordics Chair Board
DOW



Jeffrey van Geloof
Refinery Director, VPR Energy
VITOL



Ahlem Friga-Noy
Senior Vice-President for European Public Affairs
TOTALENERGIES



Antonio Joyanes
EVP Energy Parks
MOEVE



Leila Faramarzi
Executive Director Petrochemicals
CEFIC



Alejandro Escalona
Biofuel Value Chain - Regulatory & Strategy Sr Manager EU
FLUOR



Alan Gelder
SVP Refining, Chemicals & Oil Markets
WOOD MACKENZIE



Franco Magnani
EVP Risk
POWER2X



Duncan Manuel
SVP Digital & Asset Transformation
KBC (A YOKOGAWA COMPANY)



Niels Bech
Director Strategic Development
KALUNDBORG REFINERY A/S



Quentin Debuisschert
Chairman & CEO
AXENS



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ADVISORY MEETING TAKEAWAYS

02 LOW CARBON PROJECTS AND PATHWAYS

HIGH MARGINS MASK THE STRUCTURAL CHALLENGE

Today's strong refining margins should not be mistaken for a structural improvement in European competitiveness. Before the Iran-Gulf conflict, the outlook was significantly more bearish, and the underlying challenges remain. High energy and labour costs, ETS exposure, and competition from newer, lower-cost capacity elsewhere continue to pressure the long-term viability of several European refineries.

FROM REPLACEMENT TO COEXISTENCE

The narrative of a few years ago has shifted from fossil refineries being phased out to a more balanced view in which conventional and renewable molecules coexist. The transition to renewables continues, but on a more managed, gradual trajectory, and today's stronger fossil margins do not fundamentally change that direction. Smart companies can use cash flows from conventional assets today to fund investment in transition technologies and renewable molecules that will drive long-term growth.

WE NEED EACH OTHER TO UNLOCK THE TRANSITION

The ambition and underlying demand have not fundamentally changed, but uncertainty has slowed the pace and altered the approach. New low-carbon energy systems cannot be built in isolation. Infrastructure investment needs committed off-takers, while off-takers need infrastructure and viable markets before they can commit. Breaking this deadlock requires greater collaboration not only across the industrial value chain, but also with governments, investors and the wider financial community to align investment, infrastructure and demand, share risks and accelerate project delivery.

PROTECT THE ECOSYSTEM, NOT JUST THE ASSET

One of Europe's greatest industrial strengths is the deep integration of its refining and chemical clusters, the Port of Rotterdam being a prime example. But that integration creates vulnerability. When one plant closes, the impact can ripple across the cluster, weakening the economics of other assets and creating a domino effect across the wider industrial ecosystem.

FINANCE THE TRANSITION, NOT JUST THE DESTINATION

While the policy debate is increasingly balancing sustainability with security of supply and affordability, frameworks remain heavily focused on 2040–2050 targets, but greater attention is needed on financing the journey to get there. Industry needs capital to decarbonise, while emerging green-molecule value chains need financing to move from development to commercial scale. Investors need clear, consistent policy direction and support to reduce risk, strengthen project bankability and unlock investment.

COMPETING FOR CAPITAL

As energy security and affordability have risen alongside sustainability, the investment landscape has changed. Large integrated energy companies with significant balance sheets once again have a broader choice of opportunities, with investment in oil, gas and LNG firmly back on the table. While traditional refining has long competed with upstream for capital, green developers now compete on multiple fronts, not only with conventional energy projects but also with established low-carbon alternatives such as renewable power and batteries. With investors facing a broader set of opportunities, green molecule projects must demonstrate increasingly compelling economics and returns to secure investment.

NAVIGATING THE REGULATORY LABYRINTH

Europe's renewable fuels framework remains highly fragmented, with different rules across countries, transport sectors and technologies. Even within individual markets, feedstock eligibility can vary by production pathway. Navigating this regulatory labyrinth is challenging even for large companies with significant compliance resources and can become a major barrier to entry and scale for smaller developers, particularly when they compete for investment and customers with conventional fuels that don't face the same regulatory complexity.

DON'T OVERLOOK THE QUICK WINS

European policy has tended to focus on large, headline net-zero projects, some of which have struggled to reach FID or ultimately failed. Yet the industry has been highly successful at delivering smaller, incremental gains from existing assets through process optimisation, energy efficiency and targeted improvements. These lower-risk investments can reach FID more easily, be implemented quickly and cumulatively deliver meaningful emissions reductions while improving the efficiency and competitiveness of Europe's existing industrial base. Greater policy recognition and support for these proven solutions could unlock more immediate and cost-effective decarbonisation opportunities.

POLICY STABILITY IS ESSENTIAL TO BANKABILITY

Change in Law (CiL) risk remains a major stumbling block for emerging low-carbon projects. Shifting government policy makes it difficult for developers, offtakers and lenders to commit to the long-term, often 10-year agreements needed to finance projects across the value chain. In an emerging market characterised by high capital costs, low margins and intense competition, no single participant can absorb that risk alone. This is a clear market failure: governments and regulators need to provide greater long-term certainty and, initially, help de-risk the market until it becomes sufficiently mature and liquid for banks and private capital to finance projects on more commercial terms.

LECTRIFICATION BEYOND EMISSIONS

Successful electrification projects can do more than reduce emissions; they can address operating constraints, improve flexibility and strengthen margins and competitiveness. As electrons become part of the refinery or plant equation, storage, flexible demand, and other technologies can help optimise electricity use, capitalise on energy-market volatility, and create new sources of value. However, realising the full decarbonisation benefits will also depend on expanding access to reliable, affordable, low-carbon electricity and developing cleaner power grids.

GOOD ECONOMICS ARE NOT ENOUGH

Technologies or feedstocks that deliver incremental improvements in yield, efficiency and profitability are attractive, but investment must still be de-risked across the value chain and, for global companies, compete against opportunities elsewhere in the world. In a capital-constrained environment, even commercially promising projects can struggle to secure investment without sufficient policy support, market certainty or committed offtake.

GETTING MOST OF THE WAY AT A FRACTION OF THE COST

The transition does not always require entirely new assets. By public benchmark, a greenfield HVO plant can require around €2,500 in CAPEX per tonne of installed annual production capacity, whereas converting existing refinery assets for renewable feedstocks or co-processing can require around 25% of that investment. While it may not deliver 100% renewable production from day one, it can achieve a significant proportion of the decarbonisation benefit at substantially lower cost.

THE INNOVATION FUNNEL IS GETTING BLOCKED

Subsidy opportunities are helping drive innovation across bio-oil, recycling, carbon capture and integrated conversion technologies, but projects often struggle to move from development to commercial deployment. Innovation only creates value if projects can progress to commercial deployment. Without a viable route to scale, the innovation funnel becomes blocked.

INNOVATION DOESN'T HAVE TO HAPPEN IN-HOUSE

There are win-win opportunities to accelerate innovation by connecting established industrial sites with the start-up ecosystem. Refiners and chemical companies can provide the assets, infrastructure, operating expertise and real-world environment needed to demonstrate and scale new technologies, while start-ups can remain focused on developing and improving the technology. This can reduce development risk, accelerate deployment and provide a faster route from innovation to commercial scale.

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Christopher Barryg
Vice President, Head of EMEA Downstream Consulting
WOOD MACKENZIE



Wouter Vos
Energy Transition Manager
ZEELAND REFINERY



Carlos Ayuso Martin
Technology Development and New Ventures Director
MOEVE



Thomas Björklöf
Vice President, Technology
VAROPREEM



Chris Avison
Head of Low Carbon Solutions & Renewables
KENT



Damien Feral
Downstream Decarbonization Technology Director
SCHNEIDER ELECTRIC



Fiona van den Brink
Senior Director Innovation & Net Zero Technologies
LYONDELLBASELL



Niels van Buuren
EVP Business Development & Methanol
POWER2X



Daniel Carter
President, Consulting
WOOD



Luca Mancuso
Head of Process Optimization and Efficiency
SARAS



Jean-Marc Sohier
Director
CONCAWE



Paul Billings
Sales Director - Low Carbon Energy
HONEYWELL TECHNOLOGIES UOP



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ADVISORY MEETING TAKEAWAYS

03 SUSTAINABLE FUELS

MANDATES DON'T BUILD PLANTS, MARGINS DO

Europe has successfully created demand through ReFuelEU and other decarbonisation measures, but demand alone does not unlock FIDs. The challenge is no longer proving the need for sustainable fuels; it is creating projects that can generate acceptable long-term returns.

IT'S NOT A SLAM DUNK

Despite strong mandates and growing demand, participants cautioned against assuming success is inevitable. Without greater policy certainty, stronger economics and more coordinated value-chain development, Europe risks falling short of its ambitions.

EUROPE RISKS BECOMING A SUSTAINABLE FUELS IMPORTER BEFORE BECOMING A SUSTAINABLE FUELS PRODUCER

Europe has been highly effective at stimulating demand, but many questioned whether enough has been done to stimulate domestic production. Europe risks achieving its climate goals while missing a major industrial opportunity.

THREE REGULATIONS WALK INTO A BOARDROOM... AND INVESTORS WALK OUT CONFUSED

ED, ReFuelEU, ETS, CORSIA and emerging national frameworks often pursue similar objectives through different rules and methodologies. The result is greater complexity, higher compliance costs and slower investment.

THE FIRST SAF PROJECTS ARE CARRYING THE WEIGHT OF AN ENTIRE INDUSTRY

Early commercial plants are doing more than producing fuel. They are proving technologies, validating business models and building investor confidence. From Enilive's biorefineries in Venice and Gela to Saras' synthetic aviation fuel initiatives, every successful project helps de-risk the next wave of investment.

EUROPE HAS BECOME VERY GOOD AT CREATING OBLIGATIONS. NOW IT NEEDS TO CREATE CONFIDENCE

The strongest message from the discussion was not the need for additional targets, but for long-term certainty. Without confidence in future revenues, even mature technologies struggle to attract financing.

BEYOND HEFA: THE SEARCH FOR THE NEXT BILLION LITRES

HEFA remains the industry's workhorse, but nobody expects it to meet long-term demand growth alone. The next decade will require multiple pathways, including ATJ, Fischer-Tropsch, Methanol-to-Jet and Power-to-Liquid fuels, to scale in parallel.

FEEDSTOCKS, FEEDSTOCKS, FEEDSTOCKS

Technology often dominates the conversation, but feedstocks remain the industry's biggest bottleneck. Without scalable and sustainable feedstock supply, there is no pathway to meaningful growth.

EUROPE'S BIGGEST UNTAPPED RESOURCE MAY ALREADY BE IN EUROPE

Agricultural residues, waste streams, municipal solid waste and industrial CO_2 represent a significant but underutilised opportunity. The challenge is not a lack of resources, but creating the conditions needed to unlock them.

ENERGY INDEPENDENCE IS QUIETLY RETURNING TO THE CONVERSATION

Sustainable fuels are increasingly being viewed through both a decarbonisation and energy security lens. Investment strategies from companies such as Motor Oil and Saras reflect a growing focus on industrial resilience alongside emissions reduction.

A FUEL MOLECULE IS ONLY AS STRONG AS THE VALUE CHAIN BEHIND IT

Producing sustainable fuels requires more than a production plant. Feedstocks, infrastructure, storage, logistics and offtake agreements must all develop in parallel. The Port of Amsterdam's expanding renewable fuels and methanol infrastructure highlights the importance of these enabling assets.

THE E-SAF DILEMMA

Everyone agrees e-SAF will play a fundamental role in long-term aviation decarbonisation. The challenge is that the industry's most strategic solution is also currently its most expensive, making cost reduction and scale-up critical priorities.

FROM TECHNOLOGY RISK TO POLICY RISK

Historically, projects were delayed because technologies were unproven. Today, many participants argued that policy uncertainty poses a greater challenge than engineering.

EUROPE'S SUSTAINABLE FUEL FUTURE WILL NOT BE BUILT BY A SINGLE SECTOR

Fuel producers need feedstocks. Feedstock suppliers need incentives. Infrastructure developers need demand certainty. The discussion reinforced a clear message: no single organisation can scale sustainable fuels alone.

CLIMATE, AGRICULTURE AND SECURITY OF SUPPLY: THE THREE-LEGGED STOOL

Successful sustainable fuels policy must balance emissions reduction, feedstock development and energy security. Focusing too heavily on one risks undermining the others.

THE INDUSTRY KNOWS WHERE IT WANTS TO GO. THE QUESTION IS WHETHER EUROPE CAN CREATE THE CONDITIONS TO GET THERE

Seven years ago the challenge was proving sustainable fuels were possible. Today, the challenge is scaling them fast enough, competitively enough and profitably enough. The next phase of the transition will be determined less by ambition and more by execution.

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Rahul Malik
Consulting Manager
S&P GLOBAL ENERGY (EMEA)



Enrico Gigliolio
Chief New Initiatives & Renewables Officer
SARAS



Georgios Mitkidis
Head of Alternative and Renewable Fuels
MOTOR OIL



Sarah Nicholas
Global Lead Aviation Public Affairs
SHELL



Andrea Mastropietro
Head of Enilive BD
ENI



Joey van Elswijk
Commercial Manager Renewable Fuels
PORT OF AMSTERDAM



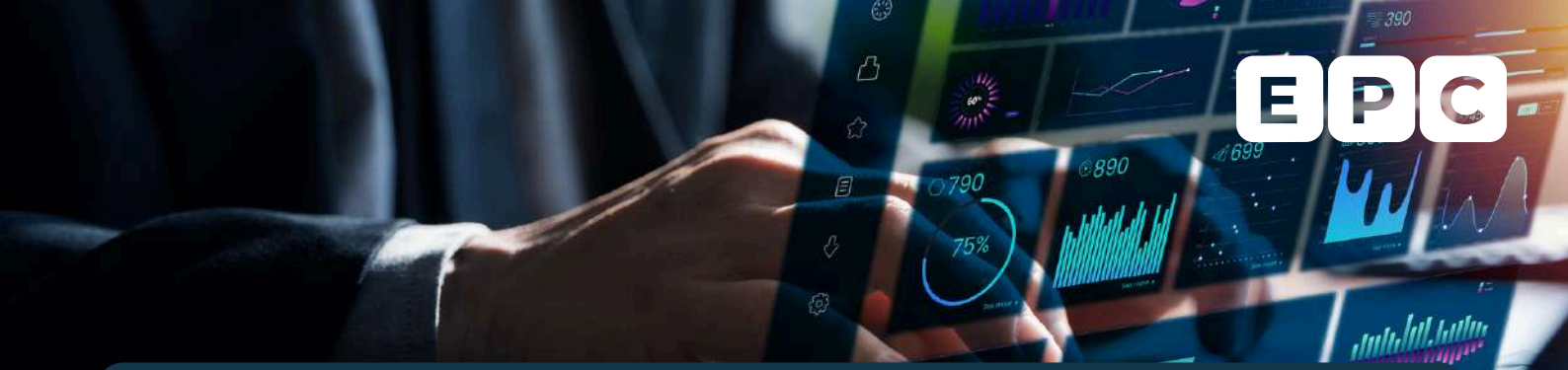
Marta Yugo
Biofuel Value Chain - Regulatory & Strategy Sr Manager EU
bp



Dylan Loudon
Technology Manager Fischer Tropsch and Syngas Processes
SASOL



Vincenzo Tota
Senior Manager Process and Chemicals
WOOD



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ADVISORY MEETING TAKEAWAYS

04 DIGITALISATION & AI

EVERYONE IS TALKING ABOUT AI. VERY FEW ARE TALKING ABOUT WHAT IT TAKES TO SCALE IT

Industry consensus has moved beyond asking whether AI can create value. The debate is now centred on how to move from pilots and proof-of-concepts to enterprise-wide deployment that delivers measurable improvements in reliability, productivity and business performance.

THE PILOT PHASE IS OVER. THE PRODUCTIVITY PHASE HAS BEGUN

The challenge is no longer testing AI. The challenge is embedding it into day-to-day workflows, operational decisions and industrial processes in ways that generate sustainable value across plants, assets and integrated value chains.

AI WON'T FIX A BAD BUSINESS PROCESS

Applying AI to an inefficient process rarely solves the underlying problem. The strongest use cases start with the business challenge, not the technology.

YOUR AI IS ONLY AS GOOD AS YOUR WORST DATA

AI is only as effective as the data that underpins it. Data quality, accessibility and governance remain some of the biggest barriers to creating meaningful business value across operations.

DATA MAY BE BORING, BUT IT'S STILL THE FOUNDATION

While attention is focused on generative AI, copilots and autonomous agents, many companies in the refining and chemical industries are still grappling with fragmented systems and inconsistent data. AI success remains heavily dependent on getting the basics right, particularly in asset-intensive environments where operational data is often fragmented across systems, sites and functions.

FROM AI STRATEGY TO AI GOVERNANCE

The conversation has shifted from *"What can AI do?"* to *"How do we govern it?"* Governance, accountability, cybersecurity and risk management are rapidly becoming board-level priorities as AI adoption accelerates. Successful programmes balance top-down direction and controls with bottom-up experimentation and adoption.

NOBODY WILL SCALE WHAT THEY DON'T TRUST

Trust emerged as one of the strongest themes of the discussion. Explainability, transparency, testing and human oversight will be critical if engineers, operators and business leaders are to rely on AI-generated recommendations in safety-critical industrial environments. The challenge is not only proving that AI works, but also demonstrating value and sharing successful use cases to build confidence across the organisation.

THE REAL CHALLENGE ISN'T TECHNOLOGY. IT'S PEOPLE

Many advisors argued that workforce adoption is likely to be a greater barrier than technology readiness. Leadership literacy, change management, skills development and culture will determine how quickly AI scales across the enterprise. As AI, drones and robotics become more common in refineries and plants, the skills required from the workforce are changing rapidly, creating new training requirements for both experienced personnel and the next generation of engineers.

AI IS CREATING A NEW DIGITAL DIVIDE

The gap between companies experimenting with AI and those successfully deploying it at scale is growing. Competitive advantage will increasingly come from execution rather than access to the technology itself.

THE NEXT GENERATION OF COPILOTS WILL BE COLLEAGUES

AI assistants, copilots and emerging autonomous agents are moving beyond productivity support and into asset management, maintenance, planning and operational decision-making. The question is no longer whether people will work alongside AI, but how to define the right balance between human expertise and machine intelligence.

CYBERSECURITY BECOMES EVEN MORE IMPORTANT IN AN AI-FIRST WORLD

As AI becomes embedded into critical industrial operations and control environments, cybersecurity can no longer be treated as a separate conversation. Security, governance and AI risk management are becoming increasingly intertwined.

INDUSTRIAL AI STILL HAS TO OBEY THE LAWS OF PHYSICS

Trust increases when AI is grounded in engineering principles, simulations and physical constraints. Physics-based models and digital twins are increasingly being combined with AI to improve reliability and decision-making. The advisors highlighted the growing use of hybrid approaches, where AI-generated recommendations can first be tested in simulations or digital twins before implementation in the plant.

SPEED MATTERS, BUT CERTAINTY MATTERS MORE

While there is pressure to move quickly, the advisors cautioned against deploying AI without adequate governance and controls. The companies that succeed will be those that balance innovation with trust, reliability and security.

IF YOU CAN'T MEASURE IT, IT ISN'T AI VALUE

The discussion repeatedly returned to business outcomes. Rather than focusing on algorithms or models, leaders are increasingly asking: ***Where is the value? What problem are we solving? How will success be measured across operations, reliability, safety, margins and sustainability?***

SUSTAINABILITY MAY BE AI'S BIGGEST VALUE OPPORTUNITY

Energy optimisation, emissions reduction, utilities management and low-carbon asset integration were identified as some of the most tangible and measurable opportunities for AI to deliver business value. For the downstream industry navigating both competitiveness and decarbonisation pressures, AI is increasingly being viewed as a tool for delivering both.

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Nikolaos Giannakakis
Group Chief Information Officer
MOTOR OIL



Liz Allen
Director Transformation and Digitalisation
GALP



Mike Ioannou
General Manager Digital Programs and Products
SHELL



Stephanie Goseine-Minderhoud
AI Transformation Change Lead
LYONDELLBASELL



Karine Boccara
Sr. Director, Chemical Consulting, Sustainability & Circularity Lead
S&P GLOBAL ENERGY



Simon Rogers
Chief Technology Officer
KBC (A YOKOGAWA COMPANY)



Yannis Bonis
Aspropyrgos Refinery Industrial Control Systems Dep. Manager
HELLENIQ ENERGY



Oswaldo Rodriguez
Head of Product & Marketing
AKSELOS



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ADVISORY MEETING TAKEAWAYS

05 CIRCULARITY & SUSTAINABLE CHEMICALS

10 CRITICAL QUESTIONS AND CONCERNS AT THE FOREFRONT OF OUR ADVISORS' MINDS

01 Where will demand for circular products come from?

02 Can circular products compete with fossil-based alternatives?

03 Is regulation enabling progress or holding it back?

04 Will Europe end up outsourcing its circular economy?

05 Are we proving technologies without proving business models?

06 Who carries the risk of commercialisation?

07 Are we overlooking the quick wins?

08 Can the industry collaborate where it matters most?

09 Are carbon accounting standards keeping pace?

10 Are we moving fast enough to meet 2050 targets?

PROCUREMENT ECONOMICS TEND TO WIN

Corporate sustainability commitments and customer preferences have not translated into voluntary demand for circular and low-carbon products at the scale anticipated. Interest remains, but while virgin materials are cheaper, purchasing decisions are driven primarily by price.

Shell's 50-kilotonne pyrolysis oil upgrader at Moerdijk, which supplies feedstock for circular ethylene and propylene, shows the consequence: despite efforts to engage brand owners across the value chain, it is running at half capacity, not because of feedstock shortages but because of insufficient demand.

NO DEMAND, NO INVESTMENT

Europe does not lack circular technologies; what it lacks is demand for the products they make, and without that demand, investment will not follow. Smart regulation is needed to create a distinct market for circular products, so that they are not competing on price alone with fossil-based alternatives, and to close the cost gap and give investors certainty. In the short term, the Packaging and Packaging Waste Regulation (PPWR) is the main driver, although questions remain over its implementation and whether companies can start generating circularity credits ahead of its requirements. Beyond packaging, the industry needs demand-creation mechanisms covering both plastics and chemicals; instruments such as ACTI could play an important role if incorporated into the Industrial Accelerator Act.

MOVING BEYOND A ONE-SIZE-FITS-ALL APPROACH TO CIRCULAR CHEMICALS

Different applications will be driven by different factors: some by regulation, others by customer demand and others by feedstock security. Recognising these distinctions is essential, as not every circular pathway or application will prove economically viable.

NO REGULATION, NO TRANSITION

The chemicals industry needs a level playing field, similar to the framework ReFuelEU Aviation established for fuels, which offers both valuable lessons and cautionary tales. Regulations such as the PPWR, CPR and ELVR are steps in the right direction, but they regulate individual products rather than the system. They need to be brought together under a holistic circular-carbon framework that supports circular ecosystems rather than individual products or plants, keeps carbon circulating and reduces dependence on virgin fossil and imported feedstocks. With geopolitical pressures raising the importance of supply security, this would also deliver on one of the original ambitions of Europe's circular economy: a resilient, integrated industrial base.

EUROPE RISKS OUTSOURCING ITS CIRCULAR ECONOMY

The rationalisation and deindustrialisation of Europe's chemicals sector is already eroding the industrial ecosystem that circular technologies depend on, weakening competitiveness and increasing reliance on imports. Favouring preferred circularity technologies and closed-loop solutions over a technology-neutral approach adds to the problem by slowing scale-up; Europe should not make great the enemy of good. As China invests heavily in circularity and pyrolysis capacity, Europe could end up exporting plastic waste, then reimporting recycled materials to meet its own regulatory mandates, instead of building and retaining production capacity at home.

PROVE BUSINESS MODELS, NOT JUST TECHNOLOGIES

Proving a technology is only one milestone; securing reliable feedstocks, long-term customer demand, infrastructure and investment is equally critical, and no single player owns the entire value chain. Rather than proving technologies first and assembling the market afterwards, the industry should build the commercial architecture alongside technology development. It also needs more discipline: the industry is very good at launching pilots, but must become equally good at stopping them when the economics or market fundamentals don't support scale-up, redirecting scarce capital to more viable opportunities.

START ROWING WITH THE OARS WE HAVE TODAY

Technologies currently at TRL 5 are unlikely to make a significant contribution to 2050 climate targets, even though continued innovation remains essential beyond that horizon. Near-term impact depends on proven, large-scale technologies such as waste-to-methanol-to-olefins and bioethanol pathways. Getting them deployed means closing the financing gap from FEED to FID, particularly for SMEs facing higher capital costs, through corporate co-investment, more patient institutional capital, greater investor risk appetite and a shift from long-term IP development towards project finance.

LESSONS FROM WIND

Government support and enabling regulatory frameworks were instrumental in scaling onshore and offshore wind over the past two decades, driving down costs and creating a commercially viable industry. Similar mechanisms could accelerate the deployment and competitiveness of emerging circular and low-carbon technologies.

RE-REFINED BASE OIL (RRBO), A PROVEN CIRCULAR BUSINESS MODEL

Used-lubricant re-refining shows how circularity can be commercially viable when it is built on established collection systems, mature technologies and targeted economic incentives. In countries such as Italy, producer- and user-funded schemes support the collection and valorisation of used-oil feedstocks, allowing re-refiners to produce virgin-equivalent base oils (Group II and III) that compete at market prices. Unlike plastics recycling, RRBO benefits from a relatively specialised, high-value market and established infrastructure, showing how feedstock incentives, product quality and market structure can together underpin a profitable circular business.

COLLABORATION FOR IMPACT

Industry collaboration is most valuable where companies face shared barriers but lack the individual scale or economic incentive to overcome them alone. The goal is not collaboration for its own sake, but collective action that unlocks solutions that would otherwise be commercially unviable for individual players.

CARBON ACCOUNTING STANDARDS MUST EVOLVE TO ENABLE THE TRANSITION

Greater industry alignment on carbon footprint measurement, traceability and the transfer of emissions data across value chains is essential. Existing frameworks, including the GHG Protocol and SBTi, need to evolve faster to reflect emerging technologies and circular feedstocks. Clearer, harmonised standards, supported by tools such as digital product passports, could unlock new opportunities and recognise the value of alternative technologies and feedstocks across the value chain.

10 PRIORITY ACTIONS FOR EUROPE'S CHEMICAL INDUSTRY

Quick wins
Act now

01
Scale what already works

02
Unlock existing circular capacity

03
Replicate successful circular business models

04
De-risk projects earlier

Medium-term
Build the market

05
Create demand for circular products

06
Collaborate to overcome shared barriers

07
Modernise carbon accounting and traceability

Longer-term
Enable systemic change

08
Establish a technology-neutral regulatory framework

09
Strengthen Europe's industrial competitiveness

10
Apply lessons from successful industrial transitions



Xavier Milcent
Global Plastic Recycling Development Manager
EXXONMOBIL



Paula Sanabria Luque
VP, Circulen Revive & Renew EAI
LYONDELLBASELL



Vincenzo Maida
Head of Industrial
VERSALIS (ENI)



Arjan van Vliet
Energy Transition & Circularity Advisor
SHELL



Vuk Trifkovic
Managing Director & Partner
BOSTON CONSULTING GROUP (BCG)



Charlie Tan
CEO
GLOBAL IMPACT COALITION



Reinier Grimbergen
CTO and Co-Founder
BLUE CIRCLE OLEFINS



Milica Folic
Product Line Director - Clean Fuels & Chemicals
TOPSOE



John Young
Head of Technology Commercialisation
OMV



Cecile Plain
Senior Business Development Manager - Technology Principal Expert
AXENS



As Europe's refining and chemical industries face mounting pressure to balance competitiveness, decarbonisation and industrial resilience, bringing the right industry voices together has never been more important.

That's why, new for **ESF Europe 2027**, we're introducing five focused advisory meetings — each centered on one of the industry's most critical themes. Bringing together senior leaders from across the sector, these meetings will help shape an agenda that reflects the industry's real priorities, challenges, and opportunities today.

ESF Europe

Join us from **23–25 February 2027**, in **Amsterdam**, one of Europe's leading industrial hubs, which plays a central role in shaping Europe's industrial future.

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Conference Director
Kay Mitchell
kaymitchell-downstream
kay_mitchell@europetro.com



Market Development & Commercial Director
Sandil Sanmugam
sandilsanmugam
sandil_sanmugam@europetro.com