



# Market Update for the Advanced Materials Sector

Issue 3: The role of advanced materials  
in addressing climate change

## The role of advanced materials in addressing climate change

Last year saw the price of gas, oil and, therefore, electricity rising to 14-year peaks on the back of the Russian invasion of Ukraine. Along with the macroeconomic headwinds that created, rising energy prices sharpened minds on the need for a greener world that excludes fossil fuels. More than 120 nations have now set or are planning to set net-zero targets for 2050 emissions. At the same time, companies are developing their own initiatives to lower emissions and create more sustainable supply chains.

Advanced materials have a crucially important role in all of this. Carbon fibre in aircraft construction reduces weight and improves fuel efficiency. High-performance battery materials enable electric vehicles to have longer ranges. Coatings for the construction industry reduce wear and increase lifespan.

In general, advanced materials play two roles in addressing climate change. First, they can improve the performance of end products through their superior properties. In some instances, such as pressure vessels for hydrogen vehicles, they serve as an enabler for that application. Second, the materials themselves can have a lower emissions footprint and environmental impact, replacing more harmful materials.

Nonetheless, advanced materials face their own challenges. Some entail significant environmental impact due to their energy-intensive processes or greenhouse gas by-products. For others, circularity can be challenging. Some materials may offer substantial benefits, but struggle with market acceptance.

This edition of FMG’s market update report will explore just some of the opportunities and challenges for advanced materials in terms of sustainability. Our lead article on page 8 discusses how producers can better incorporate sustainability into their value proposition.

The second article on page 10 explores how carbon fibre is an enabling material for sustainable applications, but will require rapid scaling to meet demand.

The final article on page 11 explores wind energy, a key market for advanced materials, and the financial challenges faced by the industry pre- and post-pandemic.

Our report opens with our Financial Review starting on page 4, which provides an update on several key industry financial metrics and outlines relevant M&A activity.



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## How does Future Materials Group define the advanced materials sector?

Creating a concise yet meaningful industry segmentation is a challenging task. Advanced materials, in particular, can have different definitions to different observers which can shift over time.

At Future Materials Group, we prefer a broad definition of advanced materials that captures a variety of technologies. In general, advanced materials tend to have the following properties:

*Advanced materials possess **intrinsic properties that offer an advantage** to the end-product or to the manufacturing process*

*Advanced materials are often **highly differentiated** and contain considerable intellectual property*

*The advanced materials market is often restricted by **high barriers to entry** created by complex processes and technical expertise*

The above criteria create a wide breadth of advanced materials, ranging from spherical metal powders for the additive manufacturing industry to specialised flavour additives for the nutrition industry. We can further analyse this sector and derive insight by applying a variety of lenses, such as exploring the underlying chemistry of the material, the functionality the material offers, the position in the value chain and the end market it serves. These lenses provide insight into

how companies develop their strategies and how investors value them.

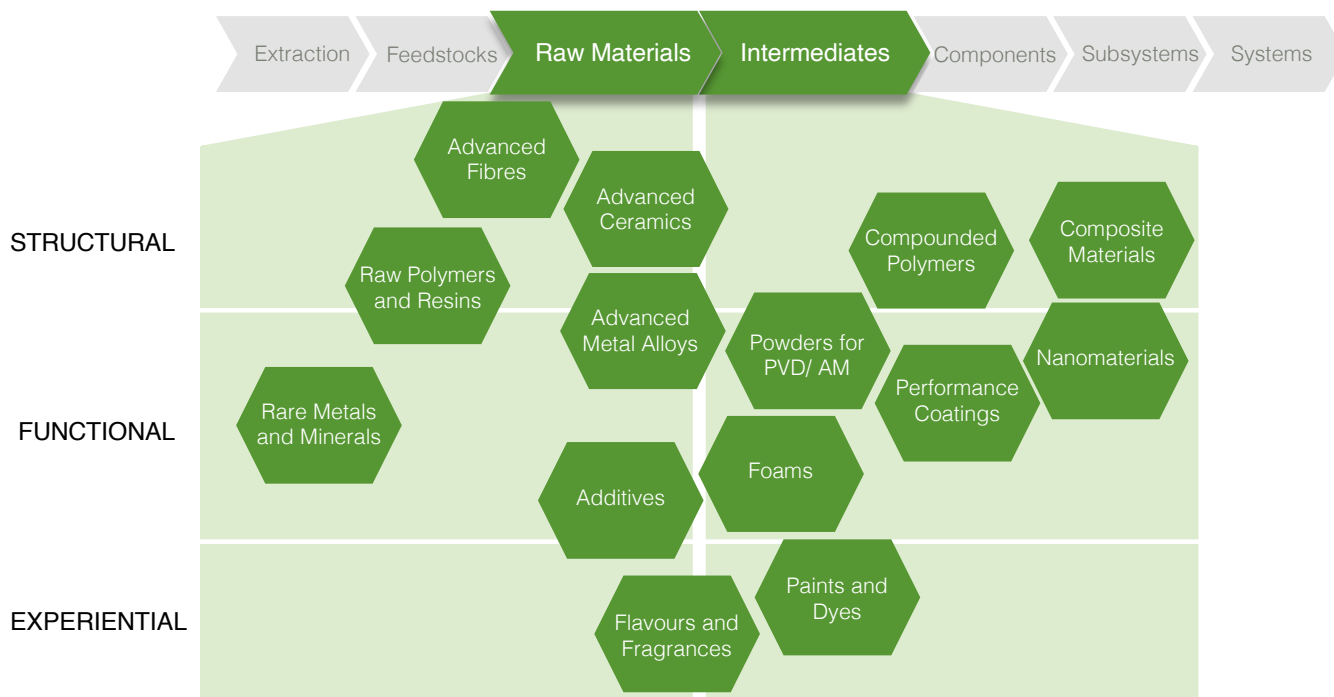
When analysing the market in this manner several commonalities emerge among advanced material companies. Advanced materials producers can often derive higher margins and are less asset intensive than their commodity chemical counterparts. As a result, advanced materials firms are typically traded at a premium in financial markets. Given the long development cycles for advanced materials, many companies use acquisitions to drive innovation and protect against commoditisation.

To monitor financial metrics within the industry, Future Materials Group has created a database of approximately 175 publicly-traded companies that helps quantify and analyse financial trends. As our focus lies with the materials industry, we focus on raw material and intermediates producers, rather than upstream feedstocks suppliers and downstream component manufacturers. The companies selected all have commercial production capacity as opposed to pure R&D firms. The chart below shows a small selection of different materials, functionality and value chain position.

Any definition of the advanced materials market is inherently dynamic as material technologies evolve over time. As some materials may shift towards commoditisation, new materials are constantly being engineered. Consequently, FMG's analysis will continue to evolve with the industry.

In our latest report, we have refreshed our lists of public companies in both the advanced material and commodity chemical sectors. As a result, you may notice small changes in the data versus our prior reports.

### ■ Landscape of select advanced materials



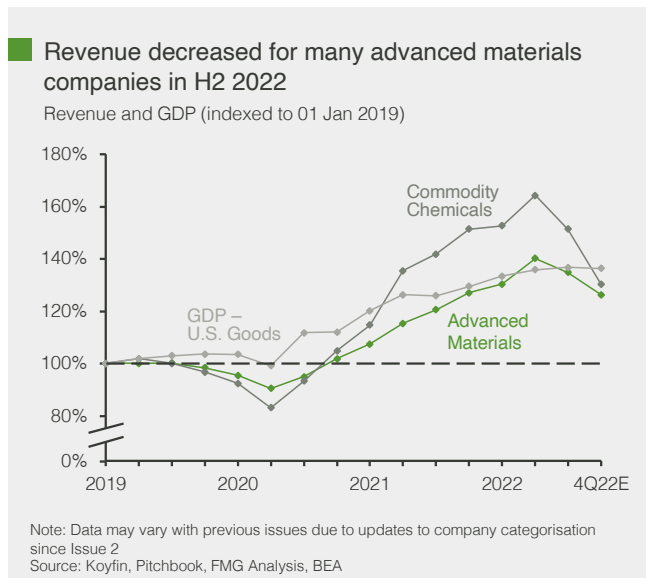
# Financial Review

- **Post-pandemic revenue growth slows - Page 4**
- **EBIT margins come under pressure for advanced materials companies - Page 4**
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## Post-pandemic revenue growth slows

*Revenues declined in the second half of 2022*

The median revenue decreased in both third and fourth quarters of 2022 across FMG’s cohort of approximately 175 publicly-traded advanced materials companies. 38% of them saw a year-on-year decrease in fourth-quarter revenue.



Several reasons were cited for revenue decline including macroeconomic headwinds, the Ukraine war, COVID lockdowns in China in late 2022, and customers reducing inventories. Several companies also reported a volume decrease driven by soft end-market demand.

The decline could be a sign that both end-market demand and raw material price increases are starting to slow. Following nationwide lockdowns, sales of goods increased rapidly and remained high. Growth in demand for goods slowed during 2022 in nominal terms and declined in real terms.

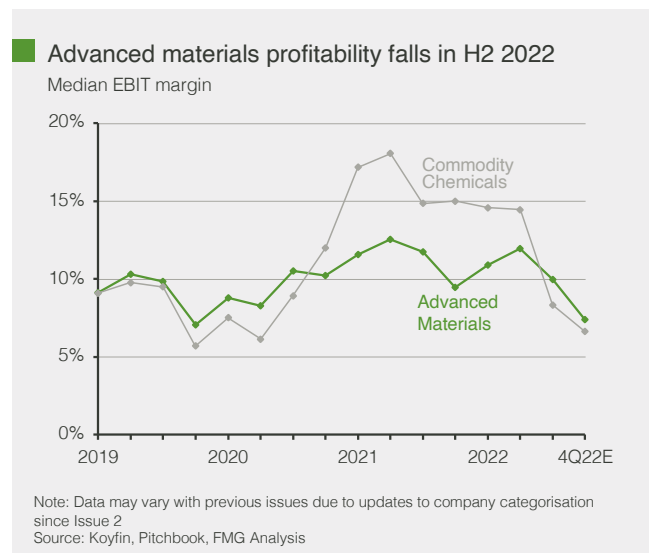
The slowing of demand may be reducing pressure on chemical prices, which saw rapid inflation over the same period. Revenue for commodity chemicals companies – which saw rapid revenue growth driven primarily by price increases for chemicals – is also down over the same period. U.S. Producer Price Index data shows many commodity chemical prices have stabilised or fallen since their rapid rise in 2021 and 2022. FMG cautions, however, that this trend has only been seen over two quarters, of which Q4 tends to naturally be a lower revenue quarter for many advanced materials companies in the West.

Across the cohort of advanced materials companies, battery materials providers remain an outlier, with strong revenue growth throughout the second half of 2022.

## EBIT margins come under pressure for advanced materials companies

*Softer demand may be impacting pricing power for some companies*

Profits for advanced materials experienced a slight decline in the second half of 2022. Median EBIT margins for the advanced material cohort fell below 10%, though it should be noted that Q4 often has seasonality effects that cause it to be lower than other quarters. While the median had fallen across the group, there remains considerable variation among individual companies. For those seeing a decline, lower revenue and subsequent lower utilisation tended to play a role, reflecting the lower revenues of the earlier chart.



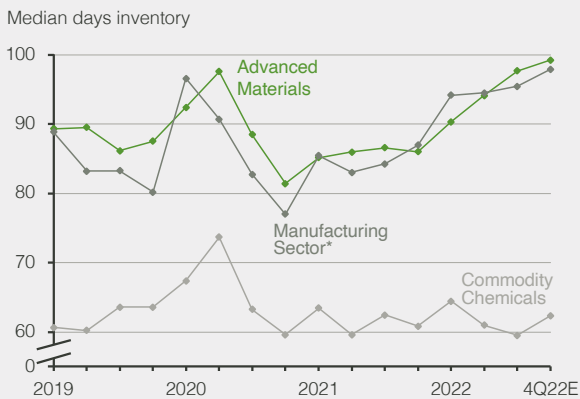
Commodity chemicals have experienced much more volatile changes in profitability, highlighting their cyclical nature. Following the pandemic, much of their profits arose from strong demand and the ensuing price increases as opposed to strict volume growth. Those price increases led to a period of high profitability for the sector that appears to be diminishing. In line with the previous figure showing a revenue decline, the recent fall in profitability could signal that pressure is loosening on prices for these raw materials, which is flowing down to the bottom line.

## Inventory levels continue to rise

*Customer de-stocking is widely cited as a cause*

Inventory levels for advanced materials companies continued to grow in the second half of 2022 and are now above pre-pandemic levels in terms of ‘days inventory’. Several companies continue to report keeping inventory to foster supply-chain resilience; some may also be building stocks ahead of expected growth (such as in rebounding aerospace supply chains).

**Inventory levels continue to rise above pre-pandemic levels**



\*Global large- and mid-cap equities with NAICS classifications of 31-33  
Note: Days inventory defined relative to cost of goods sold; Data may vary with previous issues due to updates to company categorisation since Issue 2  
Source: Koyfin, Pitchbook, FMG Analysis

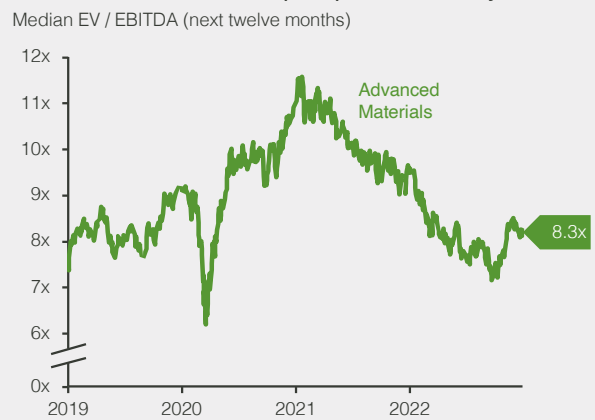
Inventory de-stocking from customers was noted across several companies in their earnings calls as a contribution to their own higher inventory levels. Some of the customer de-stocking may be a broader inventory correction, particularly in markets that experienced severe disruption during the pandemic (such as semiconductors or automotive). Other customer de-stocking may be precautionary due to weak demand, such as in consumer electronics, which experienced a slowdown at the end of last year. Market analysts will likely be monitoring these levels closely for signs that production is exceeding demand.

**Advanced materials companies market valuations show slight rebound in the second half of 2022**

*Valuation changes are largely in line with the broader stock market*

Valuation multiples declined across 2022 but showed a slight rebound in the second half. Across FMG's cohort of publicly-traded companies, forward-looking enterprise value to EBITDA multiples fell approximately 13% year-on-year.

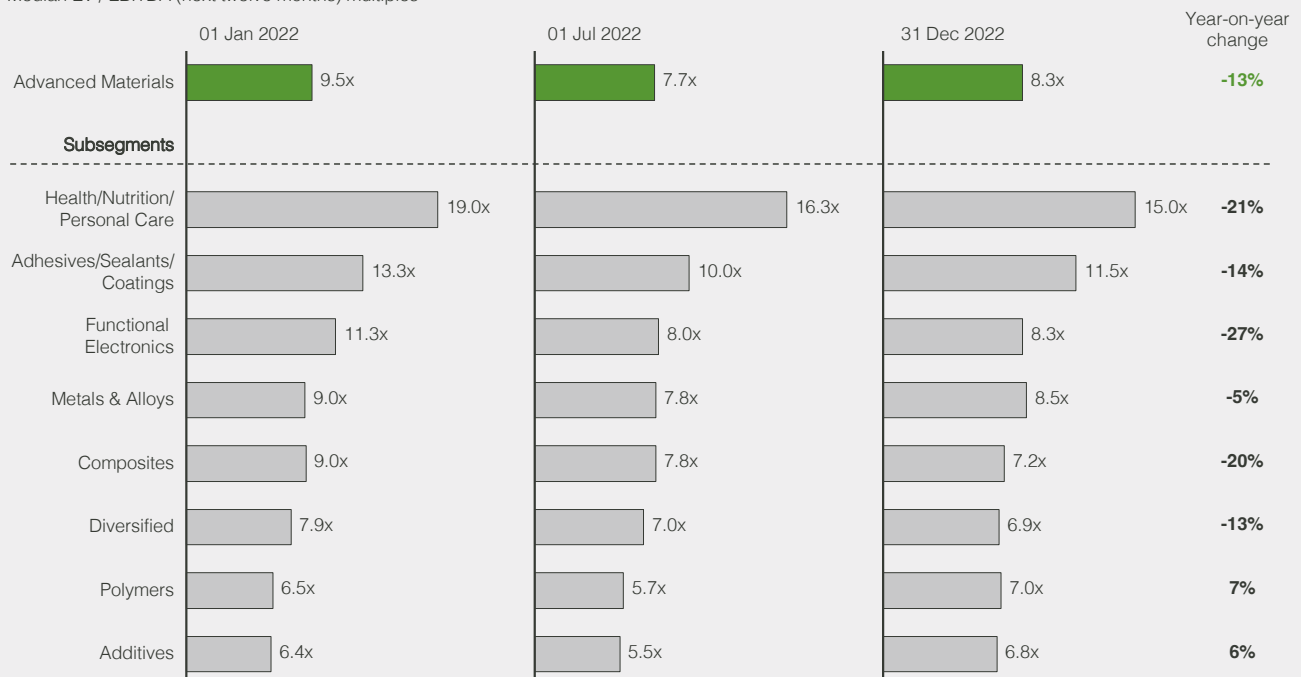
**Advanced materials multiples peaked in early 2021**



Note: Data may vary with previous issues due to updates to company categorisation since Issue 2  
Source: Koyfin, FMG Analysis

**In 2022, valuation multiples fell across advanced materials and most subsegments despite a recovery for many subsegments in H2 2022**

Median EV / EBITDA (next twelve months) multiples



Note: Data may vary with previous issues due to updates to company categorisation since Issue 2  
Source: Koyfin, Pitchbook, FMG Analysis

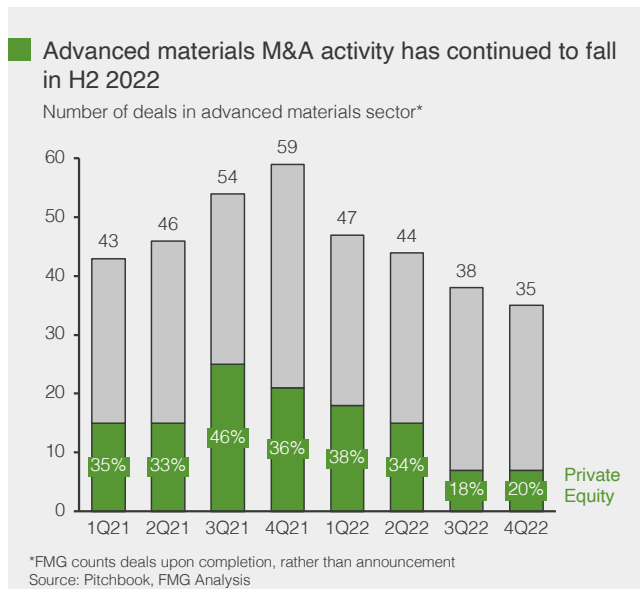
This was mainly due to a contraction in enterprise values rather than to any changes in expected EBITDA values, which have remained relatively constant.

The year-on-year decline largely follows the larger stock market decline over the same period, which saw a similar fall in valuation multiples. The decline was also relatively consistent across advanced materials sub-segments, with the exception of polymers and additives. Despite a drop in multiples, the *health, nutrition, and personal care* sector remained a highly-valued segment for advanced materials.

## M&A activity shows continued decline in second half of 2022

*Investors are seeking smaller deals with lower risk*

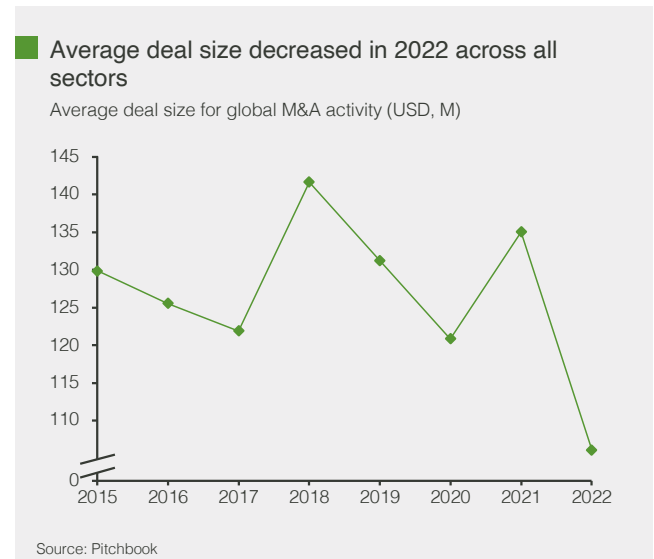
Advanced materials M&A activity tracked by FMG showed a further decline in the second half of 2022 as shown in the chart below. This correlates with a wider view across all sectors that last year was a challenging one for all dealmakers coping with inflation, rising interest rates and geopolitical tensions. While M&A activity continued, this uncertainty impacted the base business of both acquirers and targets, making M&A decisions more difficult.



FMG analysis of the types of advanced materials deals shows the full variety of M&A motivations, from portfolio realignment and acquisition of new competences, to geographical expansion and market consolidation.

Private equity activity was noticeably down over this period, with the share of deals decreasing in the second half of the year. This decline follows a wider slowdown of private equity activity across all sectors.

According to data from Pitchbook, deal sizes decreased across all sectors in 2022, suggesting small to medium size acquisitions are favoured (see chart below). Smaller deals typically have relatively lower risk, less reliance on financing, and less potential regulatory issues suggesting they are easier to complete in the current climate.



Looking forward, companies are likely to continue looking strategically at M&A in the advanced materials sector to expand markets, build new engines for growth, and fill capability gaps. Coupled with the prevailing economic situation, the relatively high level of fragmentation within advanced materials dictates that small to medium size acquisitions will continue to be the norm.

# Market Commentary

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## Developing strategies for sustainable products

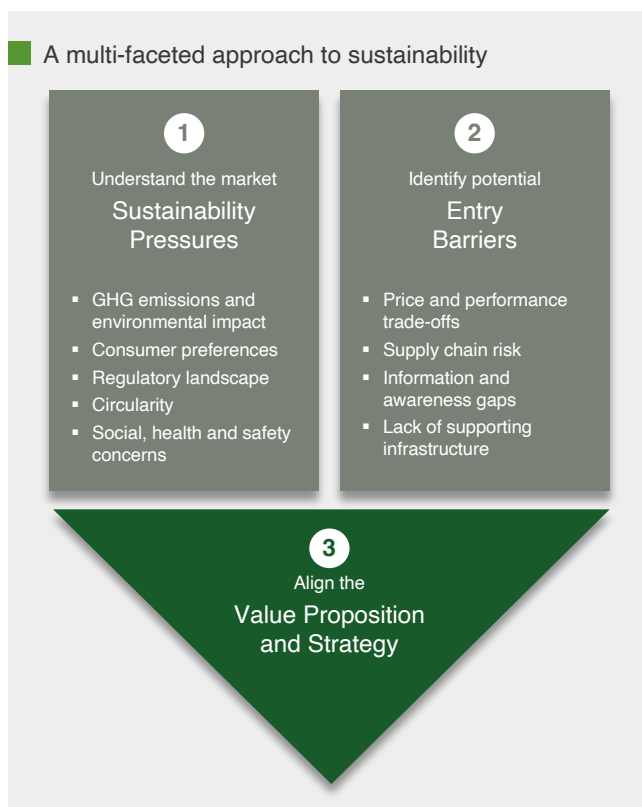
**Sustainability requirements are not the same across end-markets. Unless advanced materials companies tailor their approach and manage entry barriers, sustainable materials risk low adoption**

In the wake of the COVID pandemic, companies aimed to ‘build back better’ by embedding sustainability into their business models. However, translating this goal into tangible outcomes has proved challenging. For instance, in 2022 the Climate Disclosure Project reported that only a third of the 13,000 companies that had disclosed emissions had a credible climate transition plan.

Advanced materials companies face a three-fold challenge of decarbonizing their operations, developing sustainable products for their customers and ensuring that the products retain their quality and performance. Leveraging the experience of our consulting practice, Future Materials Group has separated the challenge of introducing sustainable products into a three-part framework.

### 1. Understand the sustainability pressures of the end-market

A major challenge for advanced materials companies is the diversity of sustainability pressures and value propositions across the end markets they serve. A sustainability attribute that resonates in one market may fall flat in another. Producers



must understand those market-specific requirements, including:

- Emission concentrations can vary significantly across a product's lifecycle. For some markets, the production of raw materials may generate the most greenhouse gas emissions. For others, product usage and end-of-life may have far greater impact than production emissions.
- Consumer preferences from B2B markets. Avoiding single-use plastics and use of animal products are two examples where consumer preferences influence buying decisions.
- Regulation can drive sustainable practices, such as limiting landfill use or banning environmentally-damaging materials.
- Circularity targets aim to limit use of virgin raw materials in new products. These may be set by a company, industry or government regulation.
- Social, health and safety concerns extend sustainability beyond emissions and environmental impact to include human rights, health and safety, and responsible sourcing.

While these pressures are present in almost all end-markets, their relevance can vary significantly between markets. For example, in a consumer market such as sporting goods, choosing a resin with the lowest lifecycle emissions may have the greatest sustainability impact. In aerospace, a resin that saves weight may have far greater impact than one with a lower carbon footprint given the fuel savings throughout the lifetime of the aircraft. Tailoring the attributes to the market requirements is critical for successful adoption.

### 2. Identify potential entry barriers

Even with thorough understanding of market requirements, companies still need to identify potential entry barriers to the adoption of sustainable materials. These barriers tend to fall into four categories.

First, sustainable materials may face price or performance trade-offs relative to the materials they are replacing. In 2010, for example, Sun Chips, a FritoLay brand, introduced 100% compostable packaging made from plant-based PLA. Unfortunately, customers found the noise excessive, which contributed to a 11% sales decline. Despite years of product development, Sun Chips reverted to the original packaging the next year.

Second, any material substitution creates manufacturing risk, often leading to opposition from other players in the value chain. In the 1950s, when HDPE was first used instead of metal detergent containers, testing missed stress cracking caused by detergent chemicals. This delayed HDPE adoption, while manufacturers amassed large inventories until suitable tests encouraged customers to switch. Such risks can heavily outweigh the benefits of new materials, even those with superior properties or sustainability.

Third, introducing a new material often involves overcoming an information and awareness gap. Consumers cannot

see or touch lower greenhouse gas emissions or improved recyclability. Hence, illustrating a materials positive benefits can create marketing challenges.

Finally, many sustainability innovations are dependent on a wider ecosystem, which may limit the pace of change. Recycling of advanced materials, for example, often faces a chicken-and-egg problem: manufacturers will only specify recycled materials if supplies are reliable and consistent, but few want to establish recycling business unless they can be certain of demand. As a result, recycled materials are not specified and recycling processes are not established.

3. Align value proposition with strategy

After understanding sustainability pressures and entry barriers, advanced material companies can act. It can be helpful to examine opportunities across two dimensions: sustainability impact (how well the strategy aligns with the pressures) and execution complexity (challenges posed by entry barriers), as shown in the figure below.

By targeting areas of maximum impact and manageable entry barriers, companies can create a competitive advantage with their sustainability product offering. This often involves changes to align the company's operation around the sustainability value proposition, whether through changing material sourcing, adapting manufacturing techniques, or re- envisioning the way a product is marketed.

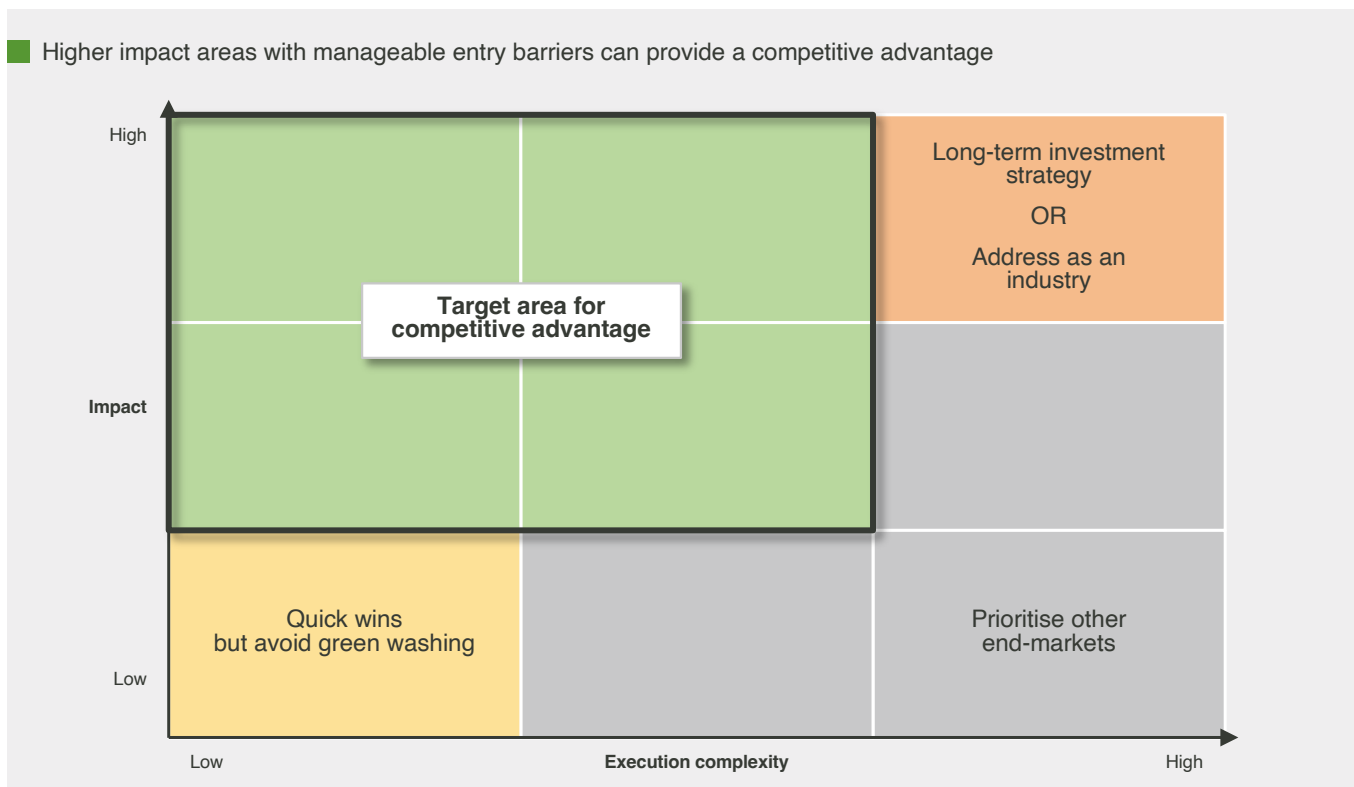
Some high-impact areas may be too challenging to address alone, and an industry solution may be more appropriate. This is particularly relevant to addressing infrastructure and ecosystem gaps. For example, the American Composites

Manufacturers Association advocates development of composites standards in infrastructure. Lack of design codes for composites is an industry barrier, but coordinated effort among players can lead to wider adoption.

Not all end-markets may fit a given value proposition, as shown in the lower right of the chart. This could indicate that advanced material companies should address markets where the proposition has a higher chance of succeeding.

The lower left of the chart is a tempting area but should be treated with caution: easy, low-impact steps can give an impression of a half-hearted sustainability approach. Quick wins are beneficial, but seek those that can set a foundation towards more impactful opportunities.

Developing credible and successful sustainable product strategies is critical for building back better in the post-pandemic world. Future Materials Group's three-part framework provides a high-level guide for advanced materials companies to introduce sustainable products that meet market requirements and address entry barriers effectively. By embedding sustainability into their business models, companies can create a competitive advantage and contribute to a more sustainable future.

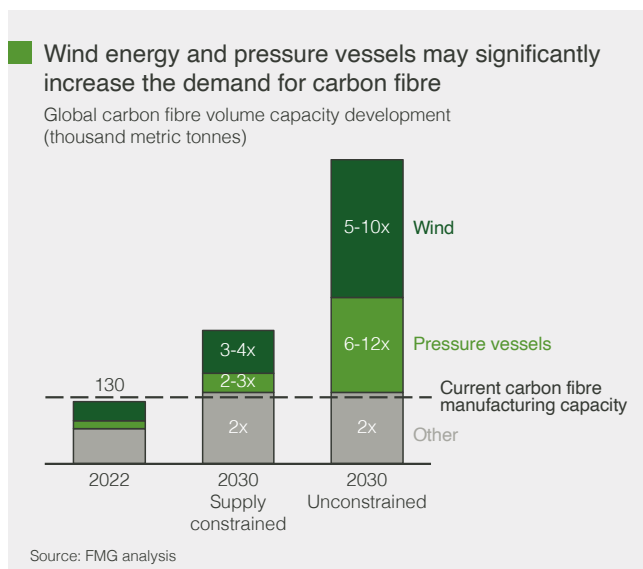


## Carbon fibre is a key material for the energy transition

*For large wind turbines and hydrogen pressure vessels, carbon fibre is not just a better material but rather the only material for these applications*

In June 2022, the World Economic Forum (WEF) published an article on the ‘materials transition’. Similar to the energy transition required to meet the goals of the Paris agreement, the materials transition aims to “evolve the current materials landscape by enhancing materials-induced efficiency, reducing emission-intensive materials through material substitution, and expanding upon direct and indirect material reuse and circularity.”

One of the materials cited by the WEF as part of the material transition was carbon fibre. FMG’s own analysis shows carbon fibre to be critical for the energy transition – and in need of scaling up.



### Expanding applications

Since its commercialisation in the 1960s and 1970s, carbon fibre’s combination of strength and low weight have made it ideal for high-performance applications. In aerospace, usage of carbon fibre on Boeing’s 787 and Airbus’s A350 have led to significant weight savings that improve the aircrafts’ fuel efficiency. Over time, carbon fibre has found its way into more industrial and consumer-facing applications where the material offered significant improvement over incumbent solutions.

Yet there are some applications where carbon fibre does not just improve a product, but enables its existence altogether. In large wind turbines and hydrogen pressure vessel applications, the strength and lightweight properties of carbon fibre are essential – these applications could not exist without it.

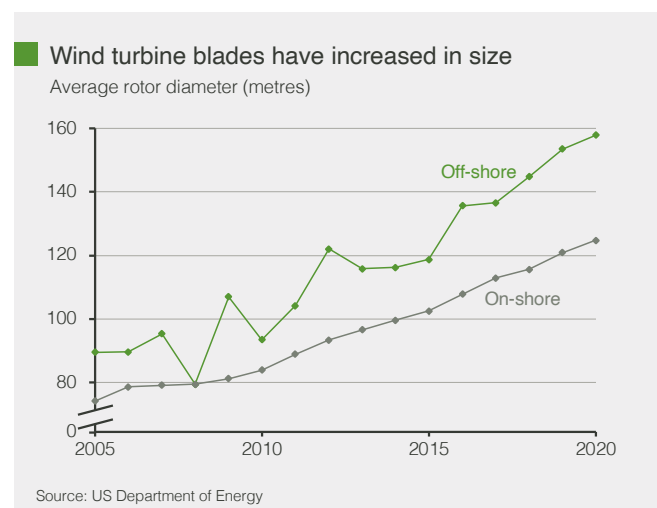
### Wind energy

Spar caps are ‘skeletons’ for wind turbine blades, providing strength along the length of the blade. Historically, these

components have been made of glass fibre composite materials. Vestas was a pioneer in using carbon fibre spar caps since 2004, while Nordex followed in 2011. Other manufacturers are now starting to follow suit.

Carbon fibre spar caps enable larger wind turbines, which can generate more electricity from a single turbine and lower operational costs. As blade size increases, greater emphasis is placed on lowering blade weight to reduce stress on the rest of the wind turbine and on increasing stiffness to avoid the blade striking the tower. Beyond a certain blade length, glass fibre spar caps become impractical. Carbon fibre, on the other hand, is lighter and stiffer than glass fibre, permitting thinner, lighter blades. As shown in the figure below, turbine blades have become increasingly longer, and this trend is expected to continue. As a result, carbon fibre spar caps are expected to gain further market share.

Wind energy is already the largest application for carbon fibre by volume, but the increased usage of carbon fibre spar caps and accelerating turbine installations will drive further demand. Based on historical rates of carbon fibre capacity growth, FMG believes that production of wind turbine carbon fibre could triple or quadruple by 2030. Yet even in that scenario, wind turbine installations would still fall short of the International Energy Agency’s net zero scenario. To meet that scenario, FMG estimates that carbon fibre capacity for wind energy would need to be five to ten times what is currently available.



This high demand for carbon fibre, however, is not a given. Manufacturers could find ways to use less carbon fibre with alternative blade designs. They may also push the limits of glass fibre, particularly high-performance versions, which might extend the blade length at which carbon fibre is required.

Growth in blade length may also not continue as expected. If glass fibre spar caps can deliver the required energy at acceptable prices, there might be less incentive to produce larger, more costly blades.

### Hydrogen pressure vessels

The growing hydrogen economy creates the need for storage solutions. Hydrogen has high energy density per kilogram, but low density in terms of volume. It is therefore impractical to transport large amounts unless stored at high pressure.

Storing hydrogen at high pressures typically implies substantial extra weight for the pressure vessels. For a typical metallic tank, hydrogen may only comprise 1-2% of the system weight. For fuel cell electric vehicles, this high system weight would make them impractical for most applications.

Composite pressure vessels, on the other hand, offer the capability of reaching high pressures at low weight. Carbon fibre pressure vessels can withstand greater pressures (up to 1,000 bar) than aluminium and steel (200 bar). Hydrogen weight fractions can also approach 6-7%, dramatically lowering the weight of the overall system. As a result, demand for carbon fibre for pressure vessel applications has taken off over the last several years.

Most carbon fibre pressure vessels are currently used for compressed natural gas, but the long-term demand outlook is highly dependent on hydrogen distribution and usage scenarios. Regionally, fuel cell vehicles are more popular in parts of Asia and the United States than in Europe, where the transition to electric power has been more dominant. For heavy vehicles, however, hydrogen offers key advantages over electricity in terms of range and refuelling time. For applications that involve a common depot for vehicles (such as city buses or delivery vans), fuel cell vehicles may be able to gain traction without large investment in infrastructure.

Given the necessity of composite pressure vessels for mobile applications, even a relatively small transition to hydrogen vehicles could have major implications for carbon fibre. FMG estimates that if just 1% of commercial vehicle production moved to hydrogen vehicles, this would consume about 15% of current global carbon fibre production. By 2030, FMG estimates that demand for carbon fibre for pressure vessels could double or triple current levels in our conservative scenarios. In the event that fuel cell vehicle sales penetrate the vehicle market more widely, unconstrained demand could easily reach six to twelve times current levels.

### Capacity requirements

Scaling production to meet demand will not be simple. Over the last decade, carbon fibre demand has grown at a compound annual growth rate of 12%, and FMG estimates that the industry will need to maintain similar growth rates in our conservative scenarios. However, carbon fibre production is capital intensive: a 1,000 tonne line costs in excess of USD 100 million and can take several years from conception to production. As such, producers are understandably risk-averse and are only willing to invest in additional capacity if they have relative certainty of high demand at a sustainable price. Some manufacturers are already investing in new capacity. Toray announced a JPY 100 bn capacity increase by 2025 in the US, Europe, and Korea. Hyosung, Zoltek, and DowAksa

are also expected to increase output by 2025, while Reliance and Sabic have announced their intention to enter the market. Several manufacturers in China are rapidly growing capacity. Despite these announcements, it remains unclear if the carbon fibre manufacturers will produce enough carbon fibre to satiate demand.

For wind energy and hydrogen pressure vessels, carbon fibre is not just a higher-performance material, but an enabling technology. High growth in these markets presents significant opportunities for producers. However, it also poses a high risk of the carbon fibre not meeting market demand, with implications for society's efforts to decarbonise and meet energy transition objectives.

## Western wind energy OEMs struggle with profitability

### *Demand for wind energy does not reflect the financial health of the supply chain*

In May 2022, four EU countries – Germany, Denmark, Belgium, and the Netherlands – pledged to build 150 GW of offshore wind by 2050, a tenfold increase in EU offshore wind capacity. Around the world, demand for wind energy has been accelerating. To meet the International Energy Agency's 'net-zero 2050' scenario, annual wind capacity additions need to more than triple by 2030.

Yet despite this backdrop of strong demand, Western original equipment manufacturers (OEMs) for wind energy are struggling financially. Just five months after the EU pledge, Siemens Gamesa announced lay offs of up to 10% of its staff. General Electric similarly said it would cut 20% of onshore wind staff in the US. "Companies are laying people off, at a time when the supply chain should be ramping up," stated Ben Backwell, chief executive of the Global Wind Energy Council, in an article appearing in the Financial Times.

For several segments of the advanced materials sector, the wind energy industry represents a large and growing opportunity. However, it is only viable if suppliers and OEMs can make a reasonable financial return.

### Economic uncertainty

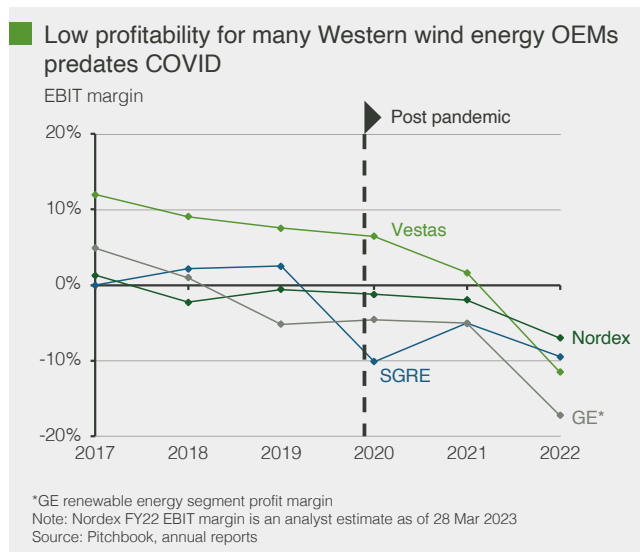
Much of the financial pinch that wind OEMs feel is related to worldwide economic developments arising since the COVID pandemic. The post-pandemic recovery created problems in four main areas: raw material price inflation, labour shortages, energy price increases, and increased shipping costs and delays. Wind OEMs have tended to be highly susceptible to all four.

Despite the long lead times for wind turbines, contracts did not have the flexibility to handle large cost increases, and OEMs were often liable for any delays to installation. The price of steel, which can comprise more than 80% of a turbine by weight, saw large swings in the post-pandemic economy.

“We’re not talking about a few percentages; we’re talking about steel increases that in some markets in the last six months have been more than 60%, 70%. So, for that reason, there are changes ... to pricing of the technology we deliver,” CEO Henrik Andersen said on Vestas’ Q1 2021 earnings call.

**Structural challenges**

While the macroeconomic environment certainly created issues for the industry, many of these amplified existing problems. As shown in the figure below, Western OEMs have faced profitability challenges for several years, with many large OEMs operating near breakeven profitability levels. This low profitability has its roots in three major issues.



First, the rapid pace of innovation within the industry makes it challenging for OEMs to see a return on investment. As illustrated in the figure on page 10 of the previous article, OEMs have scaled the size of turbine blades rapidly over the last several decades, introducing ever-bigger models. With the cost from conception to validation of a new generation of wind turbine being as high as USD 500 million, introducing new and larger models is a significant investment. Without correspondingly high production volumes, it is difficult for OEMs to recoup this investment. In addition, rapid innovation makes it challenging to combine smooth, efficient, operations with high quality.

Second, demand and government support in the West for wind energy has been inconsistent, creating peaks and troughs in installations. Given the high level of investment required, those swings can be especially damaging if utilisation of assets cannot remain high. In the US, for example, the end of the 100% Production Tax Credit saw American installations in 2020 increase 85% y-o-y in order to meet the deadline, before falling 20% in 2021.

The third cause for low profitability is fierce price competition. Many governments moved away from fixed, subsidised, tariffs towards adopting an auction-based system that fosters price competition. A high fixed-cost environment incentivises OEMs to lower prices to maintain volumes. Competition from China has also increased, with Chinese OEMs able to offer much lower-priced solutions.

**Signs of change**

There are signs that some of these factors are abating. Post-pandemic, some aspects of supply chains are returning to normal. The cost of steel, for instance, dropped considerably towards the end of 2022, although it has rebounded slightly since. OEMs are now adopting more flexible contracts that allow for price adjustments.

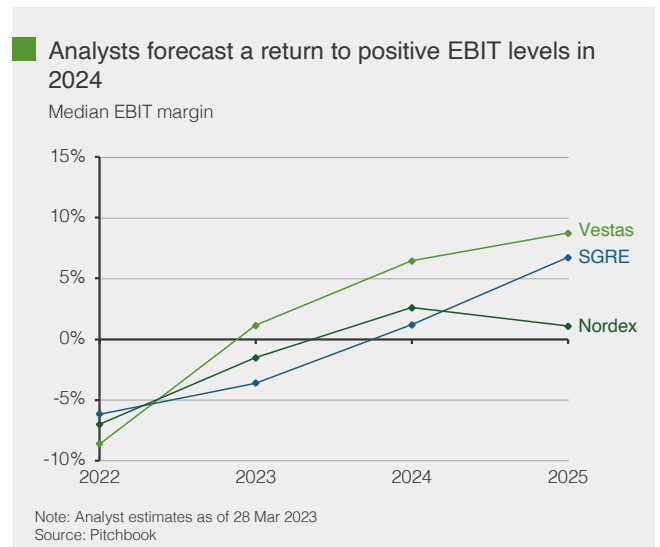
Demand is also starting to stabilise, helped by new government commitments in the US and the EU. The US Inflation Reduction Act, signed in August 2022, provides long-term incentives to the wind industry. In the last three months, EU policymakers have responded with the 2023 Renewable Energy Sources Act and 2023 Offshore Wind Energy Act, as well as a Green Deal Industrial Plan which aims to increase available funding and expedite the approval process.

Structurally, the industry may also be starting to shift strategy. The market has undergone significant consolidation, fostering the emergence of a small number of global players that can amortise investment less onerously across their much larger combined production volumes.

In addition to better scale, the race for bigger turbine blades may be starting to slow. This would allow OEMs to focus on existing product lines in order to make their production more efficient, with lower costs and better quality. At the 2023 World Economic Forum in Davos, Vestas CEO Henrik Andersen commented that wind turbines are big enough for now.

OEMs are also more selective on projects and raising prices for new orders. Over the course of 2022, Siemens Gamesa and Vestas increased their average selling price by 26% and 33%, respectively.

The current year is likely to remain challenging for OEMs, but market analysts forecast recovery between 2024 and 2025 as shown in the figure above. If OEMs can orchestrate this turnaround, the opportunities for wind energy installation and the impact on climate change are substantial.

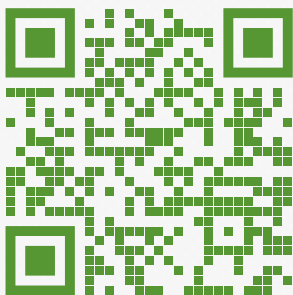


## About FMG

Future Materials Group is an independent strategic growth advisory firm, specialising in the advanced materials and high value manufacturing sectors. Working globally, the company helps businesses at all stages of their development, from start-up to maturity, to create and increase value through rapid yet manageable growth.

Our advisory work is entrepreneurial, with unparalleled insight into markets, technologies, and trends that span our three practice areas: Strategic Growth, Mergers & Acquisitions, and Growth Finance. Trusted by business owners, boards of directors, and senior executives to define the right strategic priorities for growth, Future Materials Group delivers innovative strategies and solutions to make lasting and meaningful impact.

If you would like to learn more about our analysis or have any feedback on our market update, please contact us at [info@futurematerialsgroup.com](mailto:info@futurematerialsgroup.com)



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