Clean Air

Leading emission reduction technology, for today and tomorrow

"We are fully focused on delivering our cash generation target, further strengthening our commercial capabilities, winning our targeted business and driving efficiencies."

Anish Taneja, Chief Executive, Clean Air

This year marks the 50th anniversary of our emissions control technologies, which have saved many thousands of lives so far and will continue to protect the health of many millions more into the future. 2023/24 saw us continue to execute on our strategy and play to win by delivering on our financial targets, reducing our costs and supporting a high-performance culture. As we continue to strengthen our business for the long term, we are also actively leveraging our technology to win growth opportunities around and beyond automotive catalysts.

In parallel, we have adapted to our dynamic market through continuously strengthening our commercially-focused approach.

We are seeing a slight cooling of the battery electrification market, which has led in turn to an increase in near-term volume forecasts for our products in some key markets. This change, coupled with the agreed later introduction date of Euro 7 legislation, has begun to influence future bids and contract acquisitions.

Due to bid outcomes from previous years, we are prepared for a reduction in volumes in 2024/25. This will be fully mitigated by our costs transformation and the cooling of the electrification market. Against this backdrop we continue to win with customers, with several large-scale business wins expanding our presence in key markets.

Transforming at pace

During 2023/24, we implemented positive change across all levels of the business. This is delivering more value for customers today and positioning the company to capitalise on new future growth areas.

Pricing

We are offsetting commercial headwinds by optimising pricing and reducing value leakage through the contract life cycle.

Manufacturing footprint

We completed the targeted closure of four facilities as part of our ongoing work to consolidate our manufacturing base in fewer, more efficient and flexible sites, with plans for further consolidation under consideration. We worked with employees, customers, suppliers and communities to ensure a smooth and safe transition.

Efficiencies

We are driving cost efficiencies throughout the business, from procurement to production. In product management we are designing to value, optimising our manufacturing processes to reduce input requirements while improving performance. The transformation of our procurement function is allowing us to implement significant savings in both direct and indirect purchases. And we continue to improve our manufacturing excellence, with the standardised JM Production System (JMPS) that was piloted by Clean Air in 2020 now being rolled out across the group.

High-performance culture

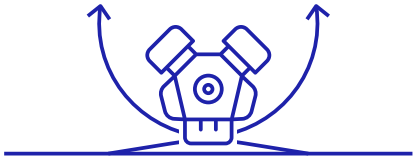
Through clear strategy, embedded leadership behaviours and a culture of open and honest two-way feedback, our employees can excel and innovate continuously to achieve our shared goals.

Clean Air continued

Clean Air is playing to win with, around and beyond automotive catalysts

Leading
in the durable global HD vehicle market

Increasing win rate
in the LDG vehicle market



Applying expertise
to growth areas around and beyond ICE (internal combustion engine)

Our performance in 2023/24

Clean Air is well on track to reach its original target of generating at least £4 billion of cash by 2030/31, with £2 billion already delivered in the three years to date. As a result we have upgraded our target to at least £4.5 billion of cash by 2030/31.

As well as continuing to deliver key business wins, our performance this year was underpinned by the ongoing execution of our strategy to improve cost efficiencies, consolidate our footprint, and strengthen our commercial capabilities.

We are delivering against our strategic milestones by winning profitable business across a range of industries and markets. Throughout the year, we won targeted Euro 7 business and added several large-scale business wins to those won in 2022/23, growing our future share of market. Our localised approach in China is helping us tap into growing market appetite across the region. Strategically focused R&D activities helped strengthen our performance by creating efficiencies and improving customer experience.

All of this is reflected in an increase in customer satisfaction, with our net promoter score (NPS) increasing by seven points to 24. Customers praised our collaborative approach and technical excellence, while also highlighting the need to be more consistently responsive across our customer base.

We maintained a good safety record, achieving top-quartile status for safety performance when benchmarked against peers in the chemical sector.

The successful closure of four factories shows our commitment to operational excellence and ensuring a zero-harm environment for our employees, customers and the wider community without disrupting our customers' operations.

Seizing the growth opportunities of the energy transition

Our leading technology and expert teams have a significant role to play in the move to a low-carbon economy. Our strategy is about more than delivering today—we are also strengthening Clean Air for decades of future growth around and beyond automotive catalysts. We are applying our expertise in new and developing growth areas, such as emission controls for hydrogen-fuelled combustion engines, and solid oxide fuel cells.

Looking forward

We are focusing on delivering our cash generation target, further strengthening our commercial capabilities, winning our targeted business and driving efficiencies. Our development of world-leading catalysts will continue to be supported by tightening global emissions controls. In Europe, a provisional agreement has been reached on Euro 7 emissions standards. We estimate the new standards will come into effect from 2027 for light duty and 2028 for heavy duty vehicles. Beyond Europe, we expect more developments globally, with the US already setting tighter standards from 2027 onwards and China and India expected to bring proposals in 2024/25.

With the continual improvement of our core business, the external signals of a slowdown in the battery electric vehicle (BEV) market, and the growth opportunities around and beyond automotive catalysts, we believe the Clean Air business continues to have a bright future.

Winning with Cummins

This year we were awarded both the North American and the Global Direct Sourcing Supplier of the Year Award from Cummins. These prestigious awards not only recognise JM's outstanding customer-centric approach and technical solutions, but also signify our continued close collaboration with a key partner in the energy transition.

Watch our video: Pioneering clean air technology for 50 years and beyond

Platinum Group Metal Services

Harnessing PGMs to enable the energy transition

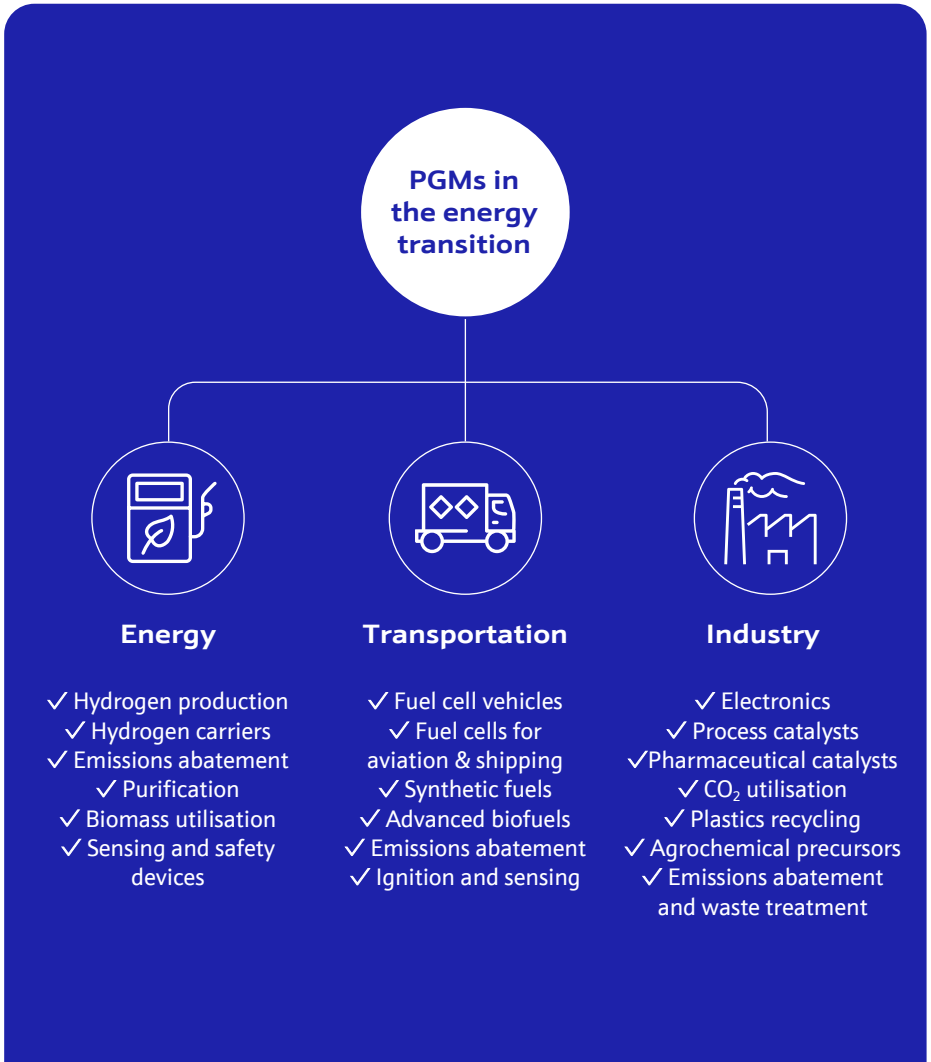
"This year saw us develop our product pipeline, deliver operational efficiencies, invest in our assets and pioneer a new circularity solution for the hydrogen economy."

Alastair Judge, Chief Executive, Platinum Group Metal (PGM) Services

Our deep knowledge and experience in platinum group metals (PGMs)and their chemistry is critical in the transition to net zero. We harness the unique properties of these metals to tackle complex technology challenges for our customers across the wide range of markets that we serve. In addition to existing uses, the energy transition is driving future demand for PGMs in many new applications.

PGMs from the majority of these applications can be recycled and reused in new products indefinitely. As a world-leading recycler of PGMs, at twice the size of our nearest competitor (by volume), we currently refine circa 20% of all PGMs globally from primary and secondary sources. This circular business model puts JM right at the heart of the shift to a more sustainable world.

We are transforming our PGM Services business so that we can create more long-term value for customers in existing and new markets. 2023/24 saw us develop our product pipeline and pioneer a new circularity solution for the hydrogen economy, while investing in our assets and delivering increased operational efficiencies. We're already seeing the benefits of these improvements in our customer satisfaction, with our net promoter score (NPS) increasing from 35-43.

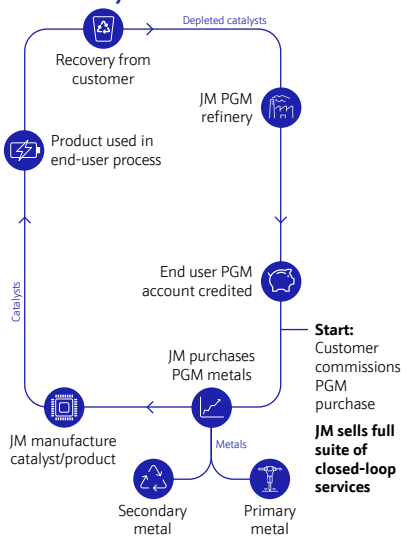


Platinum Group Metal Services continued

Leading in circularity

This year we made significant progress on delivering innovative circular solutions for customers across a wide range of sectors. One key development was our HyRefine™ technology, which recycles both the membrane and the PGMs in the performance-defining components of hydrogen fuel cells and electrolysers. This enables both of these valuable materials to be reused, while reducing waste and emissions in the refining process. We continue to demonstrate how PGMs can play a central role in promoting circularity and addressing availability gaps within the global energy ecosystem.

JM's fully circular PGM offer



Our performance in 2023/24

During 2023/24 the market environment was challenging as rhodium and palladium prices continued to decline. These developments adversely impacted the entire PGM ecosystem, as demonstrated by restructuring announcements from several major mining businesses. As a result, sales declined by 17% to £462 million and underlying operating profit was down by 35% to £164 million. Additionally, levels of autocatalyst scrap remained low.

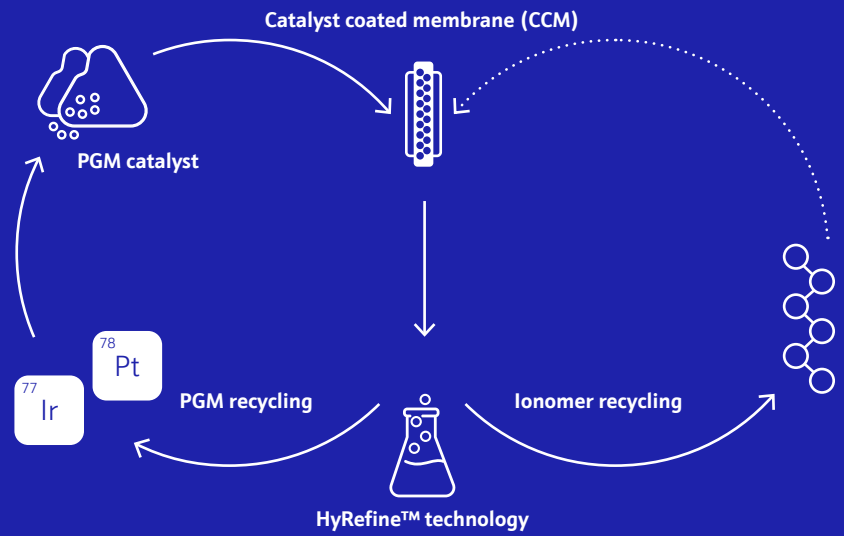
In response to these headwinds we focused on developing our products business, which is largely independent of metal prices, while also driving cost savings and operational efficiencies. The PGM Services product business has doubled since 2019 as we grow our product base beyond auto catalysts and develop new PGM applications – including in the hydrogen economy, pharmaceutical and agrochemical markets. After allowing for metal prices and exchange rates, PGM Services underlying operating profit was broadly flat in the year.

Other R&D initiatives in 2023/24 concentrated on safely extracting PGMs from complex new feeds and reducing the environmental footprint of our refining process.

To drive operational efficiencies we are automating and optimising processes within our plants. We opened new refining capabilities in China, and we can now provide a full refining offer to our customers across the region. We continue to progress our new refinery investment in the UK which is now in the final execution stage and is on schedule to be completed in 2026.

Looking ahead

We have an important role to play in the global shift to more sustainable energy systems, by leveraging our expert knowledge of PGMs and the increasing demand they are facing across industries including aviation and life sciences as well as the hydrogen economy. We will continue to evolve our product portfolio by developing innovative and circular offerings, creating fully circular models that enable our customers to meet increasingly stringent environmental targets. Improving our own operational efficiency remains a cornerstone of our strategy: we are investing in our refining assets and upgrading them where necessary to ensure they give us sustainable competitive advantage.



Pioneering circularity for the hydrogen economy with HyRefine™ technology

2023 saw PGM Services break new ground in the hydrogen economy with the successful lab-scale demonstration of our HyRefine technology. As the number of hydrogen projects worldwide continues to grow, there is a need to embed circularity into the process from the start. With HyRefine we now have a way of recycling the two most critical components of hydrogen fuel cells and electrolysers: the PGMs in the catalyst layer, and the membrane ionomer. These can be recycled into new catalyst-coated membranes, a core component of hydrogen fuel cells and electrolysers.

HyRefine uses a purely chemical process and provides significant cost, efficiency and sustainability benefits. When compared to traditional PGM refining its carbon footprint is up to 80% lower, with:

- 83% less waste produced
- 79% less energy used
- 67% less water used

Following successful five-litre lab-scale demonstrations in November we are now scaling up HyRefine for 50-litre pilot trials at our facility in Brimsdown, UK.

Watch our video: A circular solution: JM's HyRefine™ technology

Catalyst Technologies

A growth-focused solutions provider in the chemicals and energy space

"As the world is also looking to convert alternative feedstocks for energy and fuels, we are operating in markets with enormous growth potential."

Maurits van Tol,
Chief Executive,
Catalyst Technologies

Catalyst Technologies is a core growth driver for JM. Through our expertise in process technology and catalysis, we enable the efficient creation of chemicals and fuels that benefit millions of people every day. As the world is also looking to convert alternative feedstocks for energy and fuels, we are operating in markets with enormous growth potential. Our technologies are largely feedstock-agnostic, so we can serve organisations that need a trusted, experienced technology partner, whether for the efficient conversion of fossil feedstock or new alternative feedstocks such as biomass, municipal solid waste and captured carbon dioxide.

Winning business in sustainable solutions

Low-carbon (blue) hydrogen

JM offers both autothermal reforming (ATR) and gas heated reforming (GHR) technologies for the low-carbon (blue) hydrogen and ammonia market. We have a very long history in the deployment of ATR with reference plants around the world.

The combination of our ATR technology with a gas heated reformer brings further advantages: it enables higher process efficiency and lower feedstock usage compared to conventional ATR technology, and we are delivering projects that will capture over 98% of CO_2 produced.

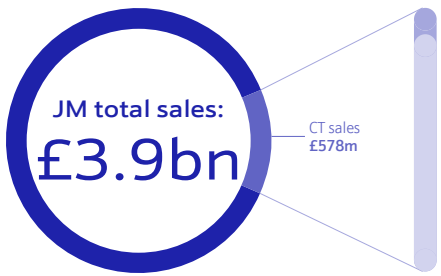
In 2023/24, we won two large-scale low carbon (blue) hydrogen projects in the UK – H_2 NorthEast with Kellas Midstream and bp's H_2Teesside. We have a strong pipeline for further ATR-only and ATR-GHR projects.

Sustainable fuels

JM has a portfolio of innovative technologies for creating sustainable fuels. Our award-winning Fischer Tropsch (FT) CANS™ technology developed with bp converts syngas into sustainable fuels, and when paired with our HyCOgen™ technology, can convert captured CO_2 and electrolytic (green) hydrogen made from renewable energy into e-fuels.

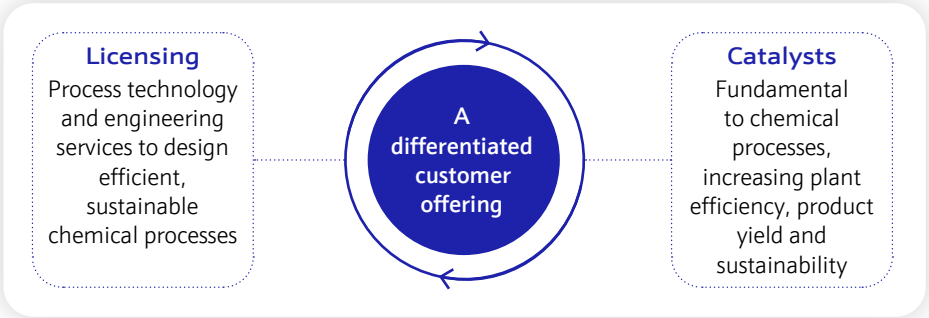
We also provide sustainable methanol technologies including our proprietary eMERALD™ CO_2 to methanol process, building on our leading position and deep expertise in conventional methanol licensing. In addition we license the BioForming® process originally invented by Virent and co-developed by JM and Virent, which helped to power Virgin Atlantic's demonstration of the first transatlantic 100% sustainable aviation fuel flight by a commercial airliner in November 2023. In 2023/24, we secured four sustainable fuels projects across FT and sustainable methanol. In March 2024 we won the largest sustainable aviation fuel project in the world using the FT route, with DG Fuels.

2023/24 sales



Licensing	10%
Catalysts	90%

Catalyst Technologies continued



Our performance in 2023/24

We performed strongly across 2023/24. We executed on our strategic milestone to secure 10 additional large-scale project wins across 2022/23 and 2023/24, demonstrating our commercial and technical strength in blue hydrogen and sustainable fuels. Sales were up 6% with strong growth in Licensing, up 20%. In Catalysts, we saw higher average prices across our portfolio and delivered strong performances in formaldehyde and key syngas segments. In Licensing, we made progress in scaling our business and targeting new opportunities. Big wins in low-carbon hydrogen and sustainable fuels alongside other areas like oxo alcohols and butanediol demonstrate the strength of our offering. We are a trusted partner to our customers all the way from initial project design through to commissioning and ongoing technical support. The value we provide is reflected in our industry-leading customer satisfaction NPS score of 54 this year. As a result, our underlying operating profit was up 56% to £75 million, and our underlying operating profit margin grew 390 basis points to 13.0%.

Transforming for future growth

This year we significantly simplified the business by evolving the previous CT structure into two business units, Catalysts and Licensing, to drive faster decision-making. Currently most of our business comes from supplying catalysts rather than licensing. As we win more business in the blue hydrogen, sustainable fuels and chemicals markets, we expect 40% of our business to come from licensing by 2030. We implemented a value creation programme focused on value-based pricing, manufacturing excellence and procurement efficiencies. This is putting us on track to meet our longer-term margin targets and creating more value for our customers.

To capture the opportunities we see in the market we expanded our commercial capability in the US and are opening a new office in the Middle East. We increased the number of engineers in our teams by 20% over 12 months to support our Licensing business.

Looking ahead

Our first priority is always the safety of our people. CT has made great progress this year on our commitment to not harming anyone as a result of our processes and activities, lowering our process incident severity rate by 76% and total recordable injury and illness incident rate by 27%.

Our second priority is to deliver on our near-term financial commitments through continued efficiency and productivity measures.

Our third priority is to grow for the future by winning more projects in sustainable technologies on top of a very solid base in our existing licensing business.

Deploying our leading LCH™ technology in H_2Teesside

This year we signed a licensing and engineering agreement for our LCH technology at bp's proposed flagship low-carbon (blue) hydrogen facility in Teesside. This aims to be one of the UK's largest low-carbon hydrogen facilities, targeting 1.2GW of hydrogen production by 2030 – which would represent over 10% of the UK Government's hydrogen target of 10GW by 2030.

Industry in the Tees Valley accounts for 64% of total local CO_2 emissions, compared to 24% nationally. H_2Teesside will help power and decarbonise existing local industry, as well as new businesses attracted to this low-carbon hydrogen produced at scale.

Watch our video: Delivering decarbonisation at scale with low-carbon hydrogen

Hydrogen Technologies

Adapting to a dynamic market, delivering growth and driving efficiencies

"Collaboration along the whole of the hydrogen value chain is essential for the energy transition to be successful. Recent market developments accentuate the need for partnerships."

Mark Wilson, Chief Executive, Hydrogen Technologies

The long-term importance of hydrogen is becoming increasingly clear. It is essential for tackling the generational challenges of climate change and global decarbonisation — particularly in sectors where driving down emissions poses a significant challenge. We believe we are uniquely positioned to be a leader in this vital market.

In Hydrogen Technologies we provide critical components for the growing hydrogen economy, underpinned by decades of experience in fuel cells and a deep understanding of PGMs.

Whilst we still believe in the long-term future of hydrogen, there has been a slowdown in growth throughout the year. Continued uncertainty about the exact nature of the financial incentives for hydrogen investment in the US and Europe has resulted in delayed investment decisions and slowed progress on existing projects. We are adapting to the changing demand profiles of our customers as they navigate this short-term uncertainty. Throughout 2023/24 our priorities were diversifying our customer base and strategic partnerships, scaling the business and delivering sales growth.

Delivering efficiencies in manufacturing

Over the past year, we have focused on improving our operational performance and have made good progress rolling out manufacturing efficiency initiatives. In particular we have increased the line speeds and improved the overall effectiveness of our equipment, driving greater output from our plant in Swindon, the UK. The success of these initiatives has allowed us to optimise our planned investment.

Transforming for our customers

We are working to maximise synergies across the JM group and deliver an enhanced and collaborative value proposition to our customers. The successful demonstration of JM's HyRefine™ technology this year generated lots of interest and represents a significant enhancement of JM's end-to-end suite of hydrogen offerings.

In a new and evolving market, organisations need strategic partners with experience, capability and market-leading technology. Building on a unique position, we expanded a long standing partnership with a leading provider of fuel cells. While the relationship has previously centred on direct methanol fuel cell systems, it will now transition to the development of proton exchange membrane (PEM) components for hydrogen fuel cells, an ultra-low carbon intensity alternative to those powered by fossil fuels. Higher customer satisfaction scores in 2023/24, demonstrated by an increase in Net Promoter Score, show that our approach is working and that customers across the portfolio see the value that JM provides.

Our performance in 2023/24

Sales for the year were up 31% to £71 million, driven by demand from our strategic customers. Our underlying operating loss of £50 million reflects our considered investment in building capacity and product development in line with market growth. Despite the challenging external environment, we progressed deals with new customers, expanded existing strategic partnerships, and continued to work with new customers on both our specialised catalyst-coated membranes (CCMs) and membrane electrode assemblies (MEAs).

Hydrogen Technologies continued

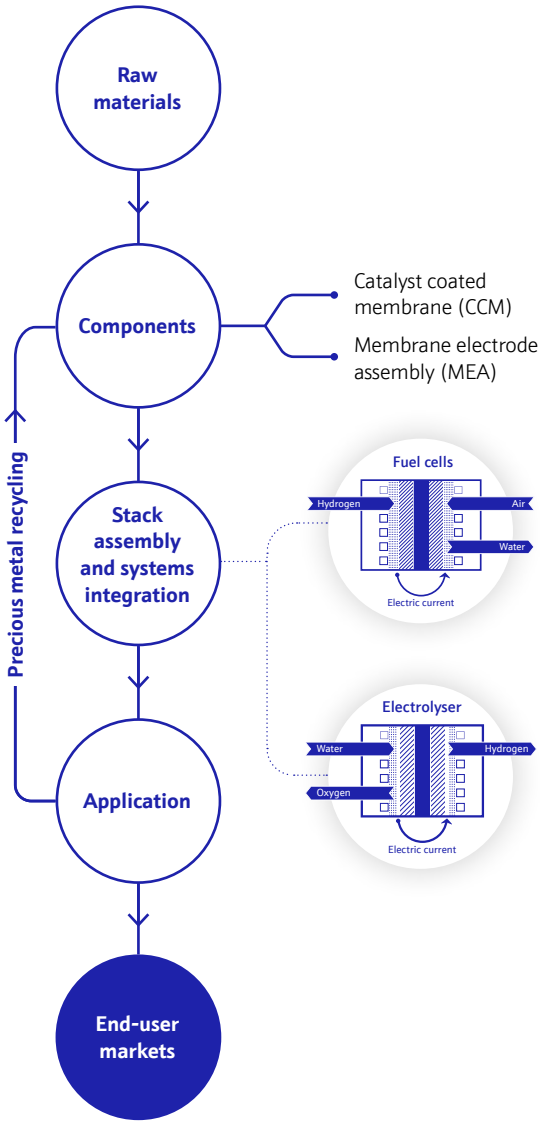
Looking ahead

We have positioned ourselves well in our core markets in North America, Europe and China. In the US, our planned investment remains on hold whilst we evaluate future market evolution and supply plans with our customers. In the UK, whilst construction of our new plant in Royston is substantially complete, we are re-aligning the start of production with market development. In China, we are continuing to progress customer relationships, especially in fuel cells, and continue developing partnerships whilst remaining disciplined in our approach to scale up in this fast-growing market.

We are playing to win in the hydrogen market. Despite a market slowdown, hydrogen is still an essential part of the net zero transition. It is critical that we continue to develop our leading-edge technology to better meet our customers' evolving needs. In the immediate term we are reducing our investment and operating costs to manage the business in an agile way, ensuring we are ready to scale in line with market growth.

Heading into 2024/25 we are focusing on taking the steps needed to establish a leadership position in our market, whilst ensuring that our business is more agile, efficient, and capable of leveraging the full expertise of JM. As the short-term market demand continues to change and develop, we are diversifying our customer base and continuing to drive increased efficiencies in manufacturing – and we are expecting to break-even by the end of 2025/26. These strategies underscore our commitment to creating a hydrogen-powered future.

Focused on delivering performance-defining components for the hydrogen economy



Introducing major technical advancements in fuel cells

Our ongoing R&D activities are improving our process technologies and driving improvements in the next generation of products. A key way we do that is through optimisation of PGM content in our products to drive real value for commercial applications. Iridium can be deployed in fuel cell anodes as an effective key ingredient to improve durability and has properties that can handle fluctuations in the hydrogen supply. In 2023, we developed a new low iridium anode for fuel cells that required 90% less iridium than previous technologies. Not only does it translate to less iridium required for the product, but it also delivers three times the improvement in mitigating hydrogen supply instability. We continue to work closely with our customers to drive product efficiencies as we strive for even more significant improvements in PGM loading and durability in the next generation of products.