IMPULSE PAPER

Fuel cell vehicles to boost European competitiveness and the Green Deal

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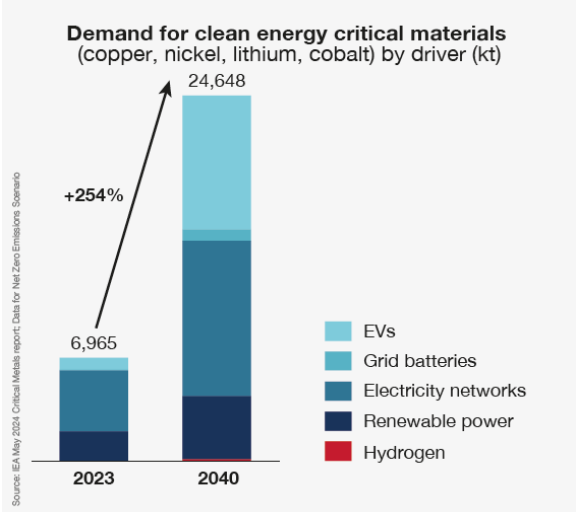
A timely rollout of fuel cell electric vehicles (FCEVs) alongside battery electric vehicles (BEVs) must be an EU climate priority to achieve stronger industrial competitiveness and secure critical raw materials supply.

Three ways that FCEVs increase Europe's supply chain resilience

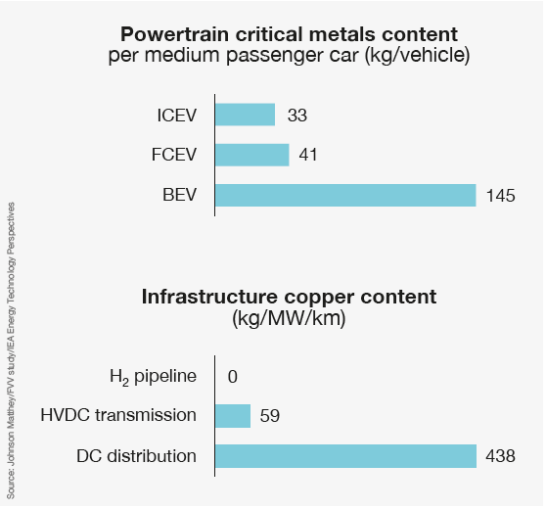
1. FCEVs, used in combination with BEVs, will address CRM supply gaps

BEVs are crucial for decarbonisation and deliver greater energy efficiency of the road vehicle fleet. But on their own they will not be enough to meet vehicle decarbonisation targets.

Battery-electric vehicles have to date received the most public support in Europe to replace combustion engines. However, as volumes grow, supply chain challenges are becoming more evident. The supply of many critical raw materials (CRMs) is dependent on China, and the International Energy Agency has forecast global supply gaps in certain key materials for batteries, anticipating lithium deficits and tight market conditions in nickel and cobalt[i].



The rising demand for certain critical materials needed for clean energy technologies is likely to face supply gaps. (Source: IEA)



The metal requirements both for vehicles and infrastructure for BEVs are significant and higher than for FCEVs (Source: IEA/JM/FVV)

Infrastructure growth also faces raw material risks. While existing electricity infrastructure supports the relatively low numbers of BEVs on the road today, very substantial investments are needed to support high BEV uptake together with renewables. The required additional infrastructure imposes a financial risk, but also a significant risk of copper shortages. However, hydrogen distribution infrastructure can synergistically complement BEV recharging infrastructure with far lower copper intensity and mitigate supply risks.

Thus, the solution cannot be BEVs **or** FCEVs, it must be BEVs **and** FCEVs, in sensible proportions. This need not entail any significant sacrifice of energy efficiency[ii], yet will greatly reduce the risk that decarbonisation goals will be derailed by shortages of certain metals.

2. FCEVs capitalise on existing technology and infrastructure to maintain a competitive advantage

European, Japanese, and US car manufacturers and supply chain companies today offer market-leading technology for fuel cell vehicles. If these countries invest in their home-grown technology, this will strengthen their industrial strategies and create jobs.

However, China is rapidly catching up, as it recognises the benefits of FCEVs for its industrial and energy policy. While Europe is currently ahead, there is a growing risk that it will find itself depending on China for fuel cell vehicle technology in the future – much as it is today for BEVs.

Unless Europe acts now to maintain and advance its lead in hydrogen technology – which is cheaper than trying to catch up to Asia, as seen with the BEV market – the continent risks losing a great competitive advantage. Fuel cell technology must quickly become an option alongside BEVs in both heavy-duty and the light-duty vehicle segments.

More broadly, creating a mass-market for FCEVs in the EU by 2030 will increase the demand for clean hydrogen at greater scale: it will help to build cost-effective and clean hydrogen supply to decarbonise energy intensive sectors, such as heavy industry and aviation.

In the long term, an **appropriate mix of fuel cell and battery-electric powertrains** will:

- **Reduce exposure of supply chains** and their overreliance on China, capitalising on existing European strength in PGM processing and recycling.
- **Strengthen the domestic European automotive industry** and clean hydrogen supply chains.
- Use combustion vehicles as a **stable source of recycled platinum and iridium** for decades.
- Contribute to Europe's **climate goals and industrial transformation**, by leveraging existing platinum group metal (PGM) supply chains and recycling infrastructure.

3. FCEVs will secure the supply of essential iridium for the energy transition

Iridium is a minor by-product of PGM mining and does not drive mining investment decisions, and it is only mined if there is enough demand for platinum. Iridium, however, is critical for two crucial clean energy technology applications:

- Iridium is necessary to produce clean hydrogen at scale via proton exchange membrane **(PEM) electrolysis**. While several technologies support electrolysis in the hydrogen market, PEM is best suited to renewable power generation. PEM electrolysis will be highly cost-efficient for large-scale economies.
- Iridium is necessary for battery-electric vehicles: it is used as an anode material in the **production of copper foils** via electrodeposition; these copper foils are used as current collectors in lithium-ion batteries.

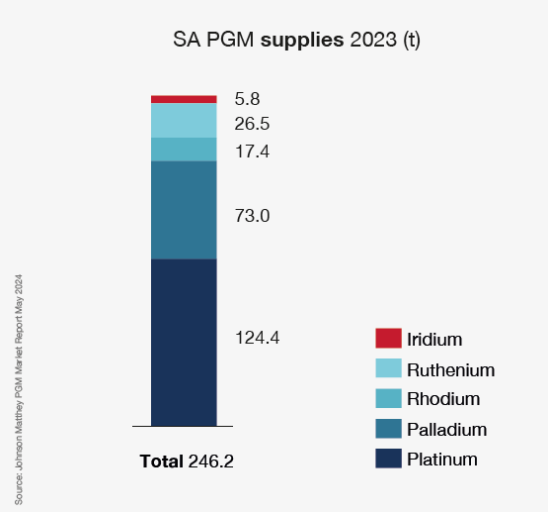
The supply of iridium is important for both scaling clean hydrogen production and deploying BEVs. Securing iridium for the energy transition is a challenge, as supply is not readily available. Increased

efficiency of use and more recycling of iridium are the short-term fix to low iridium supply. However, this will become more challenging if the primary source of iridium starts declining.

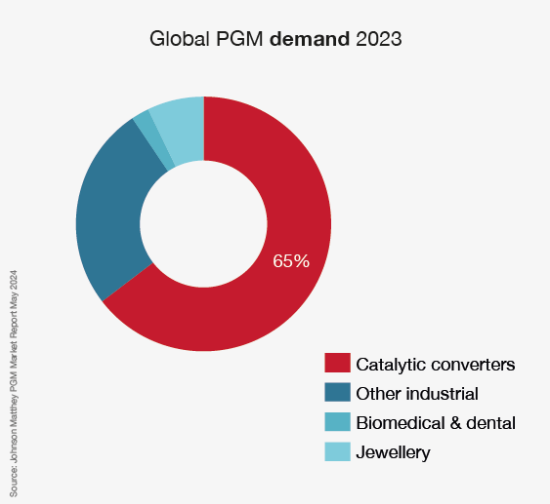
Iridium is almost entirely produced as a minor by-product of PGM mining in South Africa, and iridium demand does not drive mining investment decisions. **Platinum demand must be stimulated** to incentivise the sustaining capital expenditure for PGM mining,

As it stands, investment in PGM mining is depressed, anticipating a decline in the catalytic converter market but with no compensating rise in a new market yet on the horizon. Consequently, future iridium availability is at risk, increasing the overall cost of the energy transition – and with negative implications for the semiconductor and medical sectors too.

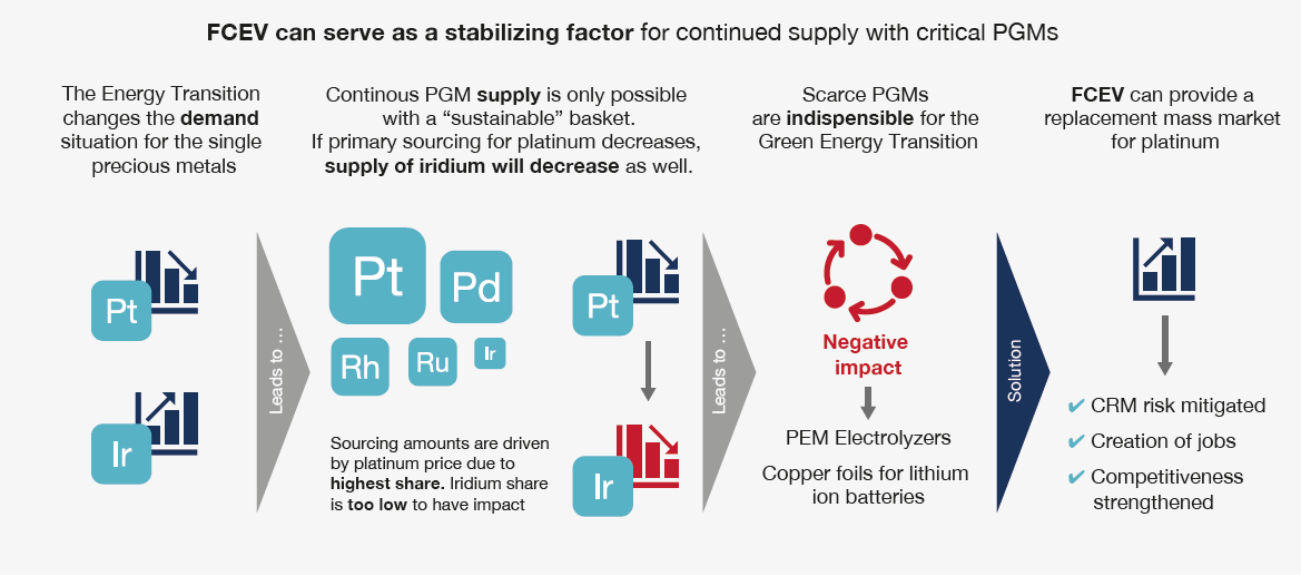
An emerging mass market for platinum would compensate for the expected decline in demand for that metal in combustion-engine vehicles, **stabilising PGM mining investment** and securing future supply of iridium and the other PGMs. But it must be a significant market, requiring sizeable amounts of platinum – ideally a consumer mass market similar to that of catalytic converters. That market is FCEVs, comprising a large share in commercial vehicles and a small share in passenger cars, playing a supporting role to BEVs.



Iridium is a minor by-product of PGM mining and does not drive mining investment decisions. (Source: JM)



A high share of PGM demand today is in catalytic converters for combustion engine vehicles, which use platinum, palladium and rhodium, but this market is facing a policy-driven decline. (Source: JM)



Call to action: support fuel cell vehicle deployments to deliver on the European Green and Industrial Deals

Success is only possible by timely action: the need for direct and flanking measures to sustain the FCEV market growth is urgent, across both commercial and passenger vehicle segments**.**

Mass-market FCEV deployments – across all vehicle segments – is the only way to meet energy and climate targets in Europe. Batteries alone will not be able to replace the internal combustion fleets: FCEVs are needed to fill the gap**. They play a supporting role to BEVs, but it is a necessary role**.

Urgent action is also required regarding the platinum group metals industry. PGMs are uniquely positioned as critical metals to serve the energy transition. With well-established mining operations, globally mature supply chains and recycling networks, and natural shifts in consumption away from fossil-fuel-based applications, **PGMs are ready for their new uses to start scaling up now**. But if the fuel cell market does not grow quickly enough to replace platinum demand, investment in replacement PGM mining capacity will decline and harm long-term supply of all these metals, including iridium.

The PGM industry is doing all it can to support the growth of fuel cell markets, recognising the importance of the hydrogen economy for Europe's future. Over the past years, the PGM industry has led research and innovation in hydrogen technology applications, and in particular:

- Developing ever more efficient catalysts for electrolysers and fuel cells, with intensive R&D allowing for a decreasing amount of PGM needed to achieve optimal performance, reducing the CO_2 footprint and capital costs.
- Investing in the value chain to produce PGM-containing parts for fuel cells and electrolysers at commercial scale.
- Recycling PGMs from these applications at high rates, and optimising recycling processes for electrolyser and fuel cell components for further sustainability gains.
- Investing in demonstration programmes to stimulate early deployments of fuel cell vehicles and prove their viability.
- Collaborating to discover and grow more new opportunities for PGMs in the energy transition, to ensure that the benefit of this group of metals is maximised and to help create a sustainable supply-demand profile.

However, we can't continue to do this alone: we need to see more policy support to drive commercial deployments of FCEVs and clean hydrogen infrastructure and sustain our continued investment.

The benefits of timely support for the FCEV market are clear. The risks of insufficient support are immediate: a slower energy transition in Europe, failing to reach 2030 climate targets, loss of competitiveness, local industrial presence and job losses, with an even greater dependency on foreign supply chains.

Let's act now to allow Europe to deliver its Green Deal with a coherent strategy that reduces raw material shortages and competitiveness risk.

Our industry's key recommendations to EU policymakers:

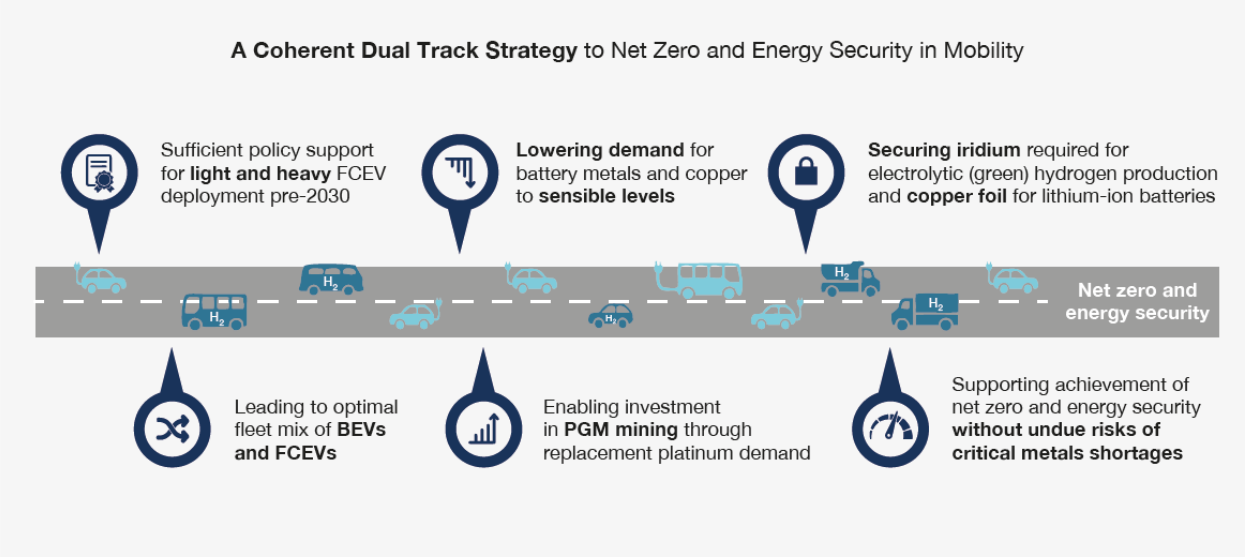
Policymakers are urged to provide a truly level playing field for FCEVs and BEVs and implement a considered dual-track strategy for mobility in Europe:

1. **Unlock commercial-scale deployments across Europe**
   To allow vehicle market participants to opt for FCEVs if desired, FCEVs must be competitive. But they have not yet achieved equivalent economies of scale to battery vehicles. More generous subsidies for FCEV producers and sales are currently necessary, relative to BEVs. In parallel, selected fleet deployments across Europe, whether passenger cars (e.g. taxis or local government fleets), light commercial vehicles, buses or trucks, will act to bring down FCEV costs *and* create offtake for clean hydrogen producers.

2. **Seed hydrogen infrastructure**
   The regulation on Alternative Fuel Infrastructure (AFIR) target for 600 hydrogen refuelling stations by 2030 must be attained as fast as possible, with urban nodes and corridors that support the targeted fleet deployments to be prioritized in the rollout.

3. **Help bridge the cost gap**
   There is a gap between the price of clean hydrogen production at present and the cost at which it becomes convenient for the transport needs of citizens and industry. National authorities should consider bridging that cost gap until the market becomes self-sustaining, as more vehicles on the market will in turn spur the deployment of hydrogen production capacity.

We emphasize that this is not an anti-BEV strategy, it is a complementary strategy that supports BEV uptake and ensures that the overall system can be optimized to address decarbonisation, energy efficiency, raw materials constraints, and industrial competitiveness, with minimum sacrifice.



[i] Global Critical Minerals Outlook 2024 – Analysis - IEA

[ii] Greener, Faster, Cheaper: A Combination of Battery and Fuel Cell Electric Technology Is Key to Successfully Decarbonising Global Transport | Hydrogen Council