Silyzer 200 PEM electrolyser in Werlte, Germany.
Picture credit: Siemens Energy

ENERGY SECURITY

The urgent need for energy independence could ultimately provide a significant boost to platinum demand

Global energy prices, which were already rising due to strong demand caused by the post-pandemic economic recovery, have surged to record highs and remain volatile following Russia's invasion of Ukraine. Countries are now looking at ways to pivot away from reliance on Russia's oil and gas as quickly as possible. Many members of the European Union (EU) are particularly exposed, with in aggregate roughly 40 per cent of EU gas and 27 per cent of EU crude oil coming from Russia.

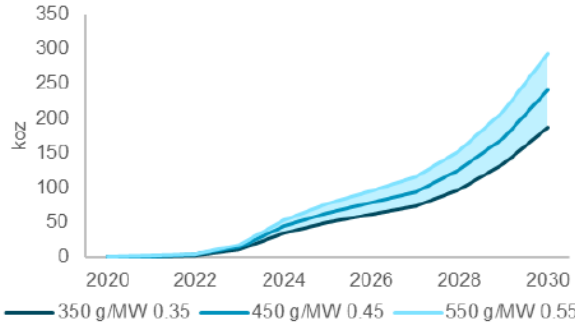
In response, the European Commission (EC) has announced its 'REPowerEU: Joint European action for more affordable, secure and sustainable energy' plan, stating that the case for a rapid clean-energy transition under the European Green Deal has never been stronger and clearer. Under the initiatives set out under RePowerEU, the EU believes that terminating its overdependence on fossil fuels from Russia can be achieved well before 2030.

Among other actions, REPowerEU calls for the creation of a 'Hydrogen Accelerator' to develop integrated infrastructure, storage facilities and port capacities. The EC estimates that, with the right investment, green hydrogen could replace between 25 and 50 billion cubic metres per year of imported Russian gas by 2030. This would require a doubling of the 5 million tonnes of green hydrogen production already targeted for 2030 under the European Green Deal, bringing the new target to 10 million tonnes. It is expected that the balance would come from imports of green hydrogen.

Realistically displacing 31 billion m^3 of Russian natural gas supply to Europe requires 115 GW of electrolyser capacity

Bm^3 NG	Energy (MW)	Mt H2	Required electrolyser capacity	
25	958	7	45	93
31	1,187	9	56	115
50	1,915	15	91	186
68	2,620	20	124	255
	Capacity factor >		100%	49%

Platinum demand for 115 GW of installed electrolyser capacity with 50:50 PEM/alkaline for varying platinum loadings



Source: WPIC Research, Bm3 = billion cubic metres, 49% capacity factor similar to 12 month UK offshore average and the same as captive renewable to hydrogen production reported in China

World Platinum Investment Council

Last month, the UK government revealed its own 'British Energy Security Strategy', which is designed to wean Britain off expensive fossil fuels while achieving greater energy security in the long-term. Among other measures, the report includes strengthened targets for low-carbon hydrogen production capacity build-out, doubling the government's target to 10 gigawatts by 2030, with at least half of this coming from green hydrogen.

Significant platinum demand growth

Green hydrogen is a zero-emissions, sustainable fuel made by using renewable energy – primarily wind and solar – to power electrolysis that splits water into its constituent parts. Platinum, in conjunction with iridium, is used as a catalyst in proton exchange membrane (PEM) electrolysers that use polymer electrolyte, one of the two leading electrolysis technologies available in the market. The other technology is alkaline electrolysis.

Clearly, electrolyser capacity will need to grow if the intentions of REPowerEU for green hydrogen production are to be met, and the EU is looking to install some 80 gigawatts of electrolyser capacity by 2030, up from a pre-crisis plan of 40 gigawatts.

However, this implies an optimistically-high capacity factor of 68 per cent for the renewable electricity used to power the electrolysers. Capacity is the amount of electricity a generator can produce when it is running at its maximum power output, while the capacity factor adjusts this to account for periods when a generator runs below maximum output, for example when there is no sun or little wind.

Using a more realistic renewable energy capacity factor of 49 per cent, it is estimated that even the installation of 80 gigawatts of electrolyser capacity would, in practice, produce only around 6.3 million tonnes of green hydrogen each year, some way short of the amount targeted by the EC to replace Russian imports by 2030.

In fact, electrolyser capacity would need to reach nearer 115 gigawatts, which has the potential to produce enough hydrogen to displace approximately 30 billion cubic metres of Russian gas imports when powered using renewable energy.

The electrolyser capacity required to achieve the intentions of REPowerEU could lead to a significant, incremental increase in platinum demand. Taking a scenario where 115 GW of 100 per cent renewable-powered electrolyser capacity is installed, and assuming that the two major electrolyser technologies – PEM and alkaline – have an equal market share in 2030, incremental annual platinum demand of around 240 koz could by then be required by the EU alone.

What is more, the scale of green hydrogen production envisaged would undoubtedly have a positive impact on hydrogen infrastructure in general, accelerating the commercial adoption of fuel cell electric vehicles (FCEVs) and bringing forward the significant platinum demand associated with them. Depending upon the pace of FCEV adoption, it is estimated that, between 2033 and 2039, this could reach over 3 million ounces per annum, similar in size to the global demand for platinum in autocatalysts today*.

*WPIC Platinum Essentials, March 2022

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