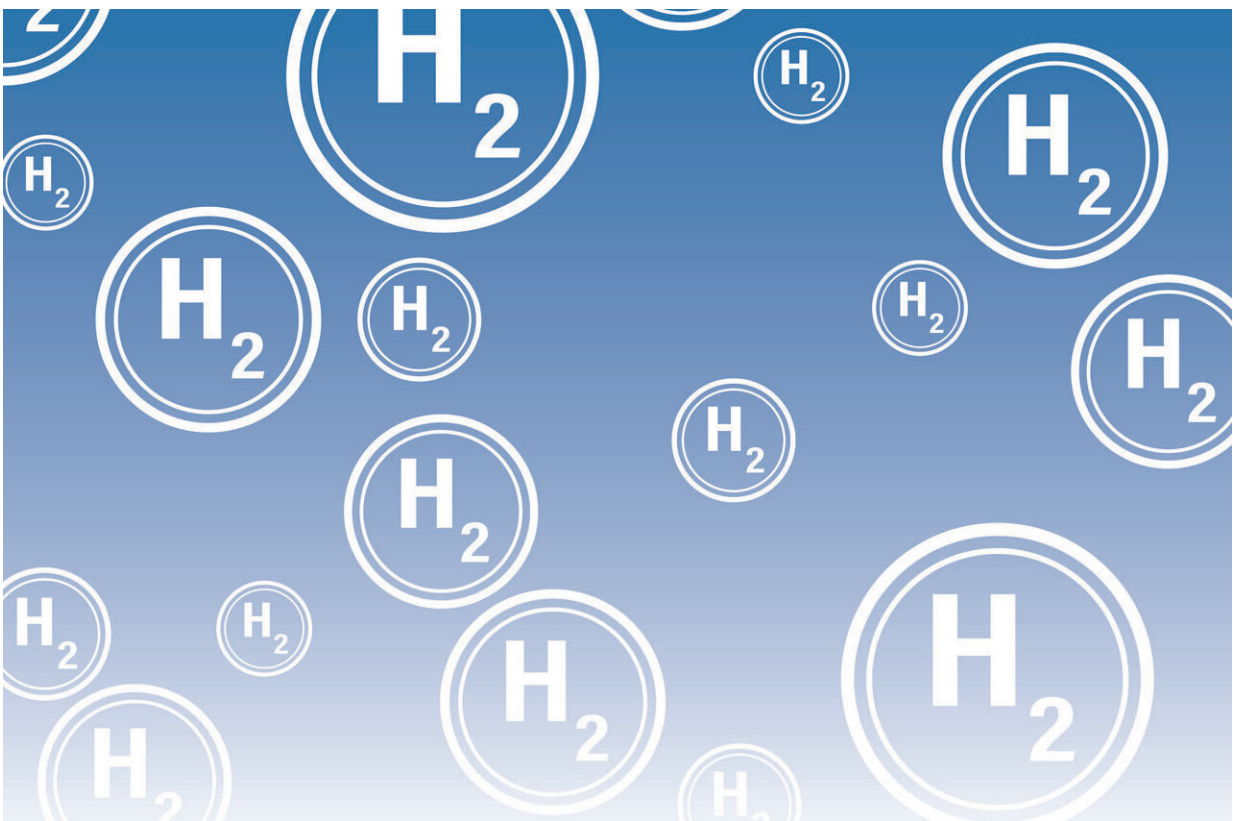


South Africa's green hydrogen hub: EU grants not nearly enough to get industry going, say chemical engineers

September 11 2024, by Bruce Douglas Young, Craig McGregor



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South Africa is poised to become a major player in the global energy transition, thanks to its vast renewable energy resources (sun and wind)

and its plans for green hydrogen production.

Green hydrogen is produced through [electrolysis](#), where renewable electricity splits water into hydrogen and oxygen. Unlike gray hydrogen, which is derived from fossil fuels, green hydrogen emits [no greenhouse gases](#)—only water vapor. It is seen as a good alternative to fossil fuels in sectors that are hard to electrify, such as heavy industry, aviation and long-haul transportation.

We are [chemical engineers](#), with over five decades of combined experience in the [petrochemical industry](#), who have researched the potential for [green hydrogen commercialization](#) in South Africa.

The European Union's [recent pledge of €32 million \(R628 million\)](#) in grants to support South Africa's green hydrogen industry shows that the country's potential is being recognized. However, our research shows that it is not enough. Getting a green hydrogen industry started will need more than this grant.

Green hydrogen production is expensive, costing between US\$5 and US\$8 (R89-R143) per kilogram—around [five times the cost](#) of hydrogen derived from fossil fuels.

It is also three to five times more expensive than oil. If green hydrogen is to be cost-effective enough to compete with fossil fuels, the green hydrogen industry will need government subsidies and incentives for manufacturers. It will also need supportive government regulations, such as carbon taxes or a requirement to use sustainable chemicals such as green ammonia for fertilizer made from green hydrogen.

Apart from this, substantial international investments will be needed to mitigate the risks, such as cost overruns, that come with building huge green hydrogen projects. In fact, South Africa's future green hydrogen

industry depends on government-backed support from the global north, through mechanisms like [sovereign guarantees](#)—a promise by a government to cover the financial obligations of a project if it fails to meet its debt repayments—or [equity stakes](#)—partial ownership, sharing in both the profits and risks.

European Union grants

The European Union has provided two grants, totaling €32 million (R634 million). The first is a R490 million grant to help set up a regional green hydrogen hub in the southern Africa region.

The European Union, and South Africa's ministries of Trade and Industry and Electricity and Energy, [say this grant aims to](#) "leverage R10bn in private and public sector finance across the hydrogen value chain". In other words, this grant is expected to entice investors to inject funds into green hydrogen production, transportation, storage and downstream industries (including green steel and airplane fuel).

A second EU grant of R138 million is supposed to attract additional funding to boost the state utility Transnet's ports, railways and pipelines. This is so that green hydrogen can be exported efficiently.

South Africa's [green hydrogen commercialization strategy](#) aims to produce one million tonnes a year of green hydrogen by 2030, rising to seven million tonnes a year by 2050.

If it does this, by 2050 the green hydrogen industry could [potentially contribute R75 billion annually](#)—6.5% of South Africa's gross domestic product. It could generate R24 billion in tax revenue, and create up to 370,000 jobs.

The European Union grants are a step towards this. But they pale in

comparison to the estimated R410 billion (approximately €20 billion) needed to produce one million tonnes of green hydrogen by 2030. We calculate that the new grants represent less than 0.2% of the investment needed to get this done.

There is a vast financial gap that must be addressed. South Africa does not have the funds to set up a green hydrogen industry. The entire one million tonnes a year of green hydrogen that South Africa aims to produce by 2030 is entirely dependent on global north subsidization.

We believe that the European Union grants will cover early stage studies to assess the feasibility of setting up the green hydrogen industry, rather than any capital investments.

Green hydrogen risks

Green hydrogen industries depend on megaprojects: renewable energy infrastructure, [electrolysers](#) and water sourcing systems. Each megaproject typically [costs over US\\$1 billion \(R19 billion\)](#).

The green hydrogen industry will also depend on an international supply chain so that the product can be exported. This supply chain will need pipelines and ports as well as long term agreements with importing countries.

Megaprojects [carry well-known risks](#)—they frequently exceed their initial budgets by 20%-30%, and deadlines are often extended by years.

Unanticipated delays, equipment failures, or the need for additional infrastructure could dramatically increase costs. This would leave South African project developers struggling to cover the money they'd invested in the projects. Investors could also be left with stranded assets if the demand for green hydrogen failed to materialize because of competition

from other energy technologies, regulatory changes, or slower-than-expected adoption.

The European Court of Auditors [recently called for a "reality check"](#) on green hydrogen, warning of these high costs, infrastructure bottlenecks and over-optimistic expectations surrounding the hydrogen market.

If the global north subsidizes or buys shares in these projects, it could reduce financial risks for South African developers. However, the likelihood of cost overruns and schedule delays is extremely high. These will be pioneering megaprojects and they could be value destructive—where their returns will be below the cost of capital.

The European Union hopes to import 10 million tonnes per annum of green hydrogen by 2030. We believe the EU should bear the risks and use subsidies to pay for this.

Solutions

South Africa experienced frequent power cuts between 2007 and 2024 that hampered economic growth. Critics of green hydrogen argue that renewable energy should be used domestically before being channeled into producing green hydrogen for export.

As green hydrogen researchers, we believe that South Africa can set aside renewable energy for local consumption while expanding green hydrogen capacity at the same time.

South Africa will also have to make sure that local communities benefit from the green hydrogen industry.

As global interest in green hydrogen accelerates, the real test will be setting up the right partnerships to drive both economic development and

the world's energy transition.

South Africa could become a global leader in green hydrogen. The €32 million [grant](#) from the European Union is very welcome because it highlights the importance of international collaboration in addressing the climate crisis. However, there is a real danger that the global south could shoulder most of the risks involved in developing the green [hydrogen](#) industry while global north consumers benefit from the product.

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