

Side-by-side towards net-zero?

Why Japan and South Korea should collectively boost funding for hydrogen-based steelmaking,
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IN the global effort to decarbonize, the steel industry has emerged as a major polluter, accounting for around 7-8% of global carbon emissions.

All major economies are now trying to amplify public support for the development and implementation of innovative technologies to decarbonize steelmaking, such as hydrogen-based steel production. The strides taken by the EU and US are particularly notable, with significant portions of public subsidies directed towards steel decarbonization, with the latest announcement from the US Department of Energy (DOE) having allocated \$1.5 billion to six iron and steel projects under its Industrial Demonstration Programme.

In East Asia, however, Japan and South Korea lag behind other major economies in their progress toward steel decarbonization due to the lack of public subsidies, effective

policies and steelmakers' commitment to achieving net-zero. In particular, both countries face major challenges in effectively allocating and scaling public subsidies, with a large proportion of subsidies in both countries continuing to support fossil fuel-based steelmaking; South Korea, in particular, is allocating a significantly inadequate amount to drive any meaningful change in the steel industry.

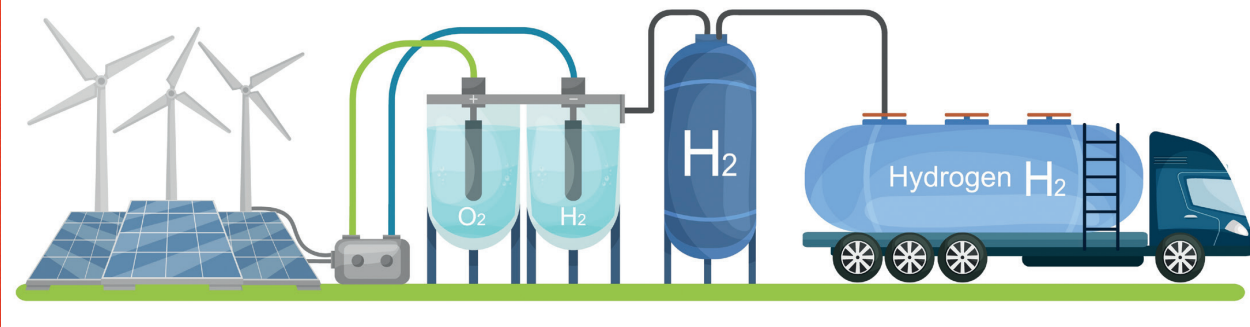
Efforts to reduce emissions in the steel sector are primarily twofold. The first involves enhancing existing blast furnace processes that are more carbon-intensive to achieve partial carbon reduction. The second approach entails transitioning to cleaner technologies with a greater impact on reducing carbon emissions. Among these, hydrogen-based direct reduced iron (H2DRI) stands out for its potential to lead to carbon neutrality by using hydrogen to extract oxygen from iron ore. If it is

powered by electricity from clean energy sources and uses green hydrogen, its emissions intensity nearly vanishes, earning the label of 'fossil-free' steel, as used by companies such as SSAB in Sweden.

The Japanese government provides a significantly higher amount of subsidies for the steel sector than South Korea, reaching JPY 449.9 billion (KRW 4 trillion, USD 2.9 billion), which is more than double the original amount of JPY 193.5 billion proposed in 2023. Like its neighbour, the funding is divided between two different types of decarbonization technologies: COURSE50 and DRI-electric arc furnace (DRI-EAF)-based primary iron making. However, much of this support is flawed, as COURSE50 involves upgrading blast furnace facilities through hydrogen use and CCS, effectively prolonging the use of blast furnaces.

Given that H2DRI-EAF technology can

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reduce emissions intensity by over 90% compared to conventional blast furnaces and is endorsed by global organizations such as the IEA, it is promising that 37% of Japanese government funding is directed towards developing this high-impact decarbonization route. This is notably higher than the 10% funding allocated for HyREX in Korea.

Additionally, earlier this spring, the Japanese government approved a bill allowing a tax credit of up to JPY 20,000 (KRW 178,000, USD 130) per ton of low-carbon steel production to steelmakers. However, the classification of green steel products eligible for support remains undecided, leaving producers uncertain how to leverage this benefit. Officials familiar with the matter have indicated that the production method eligible for the subsidy is mainly EAF, with blast-furnace products reliant on mass-balance set to be excluded from the coverage.

While South Korea's leading steelmaker,

POSCO, has been promoting its home-grown hydrogen-based steelmaking technology, HyREX, the South Korean government's level of public subsidies, with the modest allocation of KRW 26.9 billion (JPY 3 billion, USD 19.7 million), or 10% of the total, for HyREX technology development and implementation, falls significantly short of what is necessary to drive substantial change and remains behind the scale of finance seen in other leading economies including Japan.

Under a new national policy aimed at facilitating the low-carbon transition of the steel industry, the South Korean government has pledged an overall sum of KRW 268.5 billion (JPY 30.5 billion, USD 196.3 million). However, at this level of government support, low compared to its peers, the bulk of funding remains misdirected towards low-impact technologies.

While it is clear that transitioning to H2DRI technology is imperative

for decarbonizing the steel industry, approximately 90% of public subsidies in South Korea and 63% in Japan are currently directed at technologies that involve prolonging the use of high-emitting blast furnace processes.

Global competitors, such as the EU and the US, are leading in decarbonizing the steel industry, investing significantly more than Japan and South Korea to align with a 1.5°C scenario. Given that the steel industry is a major driver of both the Japanese and South Korean economies, the governments must work with industry to support the most effective initiatives. Otherwise, they risk losing global competitiveness. Both governments must urgently double down on public subsidies supporting H2DRI-EAF technology, the most impactful proven pathway, to ensure economic competitiveness and help the East Asian nations achieve sufficient carbon emissions reductions in alignment with the Paris Agreement. ■