



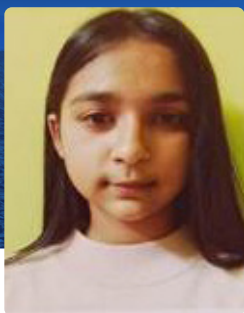
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CLIMATE MATTERS

Eastern Innovations to Combat Climate Change: South Korea's Hydrogen Economy and the Path to Sustainability



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Introduction

The Intergovernmental Panel on Climate Change (IPCC) has declared that fossil fuels, including natural gas, are responsible for about 75 per cent of global greenhouse gas emissions. This further contributes to a shift in the climate whereby changes in temperature disrupting weather patterns, results in more frequent and extreme weather events like hurricanes, droughts, and heavy rainfall which is a rampant issue that has disrupted the natural environment globally. To cope up with this shift in climate pattern, the United Nations (UN) has proposed the United Nations Sustainable Development Goals (UN SDG) as mentioned in its 'Goal no.13' that includes global cooperation to address the importance of climate change and to raise funds and invest for climate projects through entities like the Green Climate Fund which aims to create a sustainable and resilient future.

South Korea's Path to building a Sustainable Hydrogen Infrastructure

While the west has attempted to combat climate change concerns with conventional means of green energy, the east has a different approach to answer the question. China at present follows a system of almost entirely electric public transportation in major cities. Japan has introduced a system of harnessing kinetic energy from people walking on the floors of train stations, which in turn is converted into electricity to run the train stations; the Shibuya and Tokyo stations being the prominent examples. Similarly, in the midst of this environmental crisis, South Korea has played a significant role in this global endeavour, introducing its Hydrogen Basic Strategy in 2019, building upon the Master Plan for Eco-Friendly Hydrogen Economy of 2005. The current objective is to produce "green hydrogen"; grey hydrogen, which is derived from natural gas through a process that emits carbon dioxide (CO₂) (Cho, A., Kim, H., & Park, S. 2024). In contrast, blue hydrogen is produced from natural gas imported onshore, with the CO₂ emissions captured and stored using Carbon Capture

and Storage (CCS) technology. As such, "green hydrogen", which is generated entirely from renewable energy through electrolysis sources and is expected to constitute the majority of the country's hydrogen production in its initial phases (Cho, A., Kim, H., & Park, S. 2024). By shifting from fossil fuels to alternate sources of energy like hydrogen, particularly green hydrogen, South Korea has attempted to lower its carbon emissions significantly thus reducing greenhouse emission which the country plans to reduce by 40% by 2030. The plan generally includes developing a hydrogen economy that diversifies energy sources, relying less on coal and gas which are the major contributors to pollution and climate change. South Korea is thus investing heavily in hydrogen production, storage, and fuel cell technology, which not only enhances domestic energy security but also positions the country as a leader in the emerging global hydrogen market. This initiative encourages the adoption of hydrogen fuel cell vehicles, reducing air pollution and greenhouse gases from the transportation sector as well. To combat these challenges the government aims to introduce hydrogen fuelled vehicles like buses, taxis and trucks and by 2040, they aim at increasing the number of hydrogen fuelled vehicles around 6.2 million, of which 3.3 million will be exported and 2.9 million will be for domestic demand (Cho, A., Kim, H., & Park, S. 2024). There will be availability of 2.75 million passenger cars, 80000 taxis, 40000 buses, 30000 trucks and 1200 hydrogen fuelling stations all for domestic demand (HyResource, 2024). The Hydrogen Economy Roadmap of Korea is expecting to have a hydrogen supply of around 1.9 million tons per annum by 2030 and over 5 million tons by 2040 (Republic of Korea (South Korea) - HyResource, 2024).

The government has also taken a significant step by passing the Hydrogen Economy Promotion and Hydrogen Safety Management Law. They also initiated a hydrogen economy committee which will mitigate issues like industry promotion, distribution and

safety. Moreover, three cities will be selected where the use of hydrogen fuelled vehicles will be promoted which are termed as hydrogen cities. In 2020, the Korean New Deal was presented to further extend its support for hydrogen powered vehicles. In November 2020, the government had announced various new policies and goals to flourish the development of the hydrogen industry like establishing liquified hydrogen plants, building seventy liquefied hydrogen fuelling stations by 2030, developing advanced technologies etc. In addition to that, a fund worth 500 billion Won was raised by the Korea H2 Business Summit, a body which has major prominent companies like Hyundai motor, SK and POSCO to promote the development of the hydrogen industry. Furthermore, the South Korean government had announced 240 billion won to be funded for the advancement of six hydrogen cities - Pyeongtaek, Namyangju, Dangjin, Boryeong, Gwangyang and Pohang in January 2023 (Macquarie Group, 2022). During the same month, the government made a crucial decision to import hydrogen from Malaysia and the United Arab Emirates. In Malaysia, the hydrogen would be hydro electric power generation based and in UAE, it will be produced using solar power. Moreover, South Korea is exploring innovative methods to produce hydrogen, including harnessing energy from footsteps. This approach involves using piezoelectric materials that generate electricity when subjected to pressure, such as from walking. The generated electricity can then be used to produce hydrogen through electrolysis. This method not only promotes renewable energy but also offers a unique way to utilise everyday activities for sustainable energy production. It's part of a broader strategy to enhance the country's hydrogen economy and reduce reliance on fossil fuels.

Conclusion

It is to be understood at the onset that the issue of climate change and global warming was a result of Europe's actions over the years, primarily during the Industrial revolution, when mass production of goods in factories caused immense damage to the environment. However, the entire world at present suffers the consequences of climate change, especially the global south which is considerably underdeveloped when compared to the west. These third-world countries are more often than not, ill-equipped to match the pace at how the west improves and innovates technology and infrastructure to combat climate change. The east in this regard, have emerged as innovators in this field. Their development of transportation vehicles that use alternate sources of energy, unlike the west's reliance on electric energy sources, exemplifies a shift towards sustainable transportation that goes beyond conventional approaches. However, despite such advancements, a large portion of the world continues to face significant problems in meeting international emission norms like Euro - 5. This situation demands that such technologies are shared more widely with the world, so that each

country can combat the changing climate, thereby inducing global cooperation. The hydrogen plan, in this instance, implemented by South Korea offers valuable insights for worldwide climate action as it highlights the need for robust policy frameworks and government commitment in stimulating research and investment in hydrogen technology. This innovative initiative by South Korea demonstrates how a comprehensive and collective approach can effectively advance climate goals worldwide.

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