

## Namibia hydrogen energy storage

In our October episode of Project Features, Toni Beukes and Giuseppe Surace from Hyphen Hydrogen Energy joined us to discuss Hyphen's renewable ammonia project in Namibia. The recording is available on the AEA's website, and you can also download the speaker presentations.

Namibia has some of the best combined solar and wind resources globally, allowing for high-capacity, low-cost renewable ammonia production. Renewable ammonia projects in Namibia are being developed in two regions, in the Tsau Khaeb national park toward the south (close to Luderitz and Angra Point), and near Walvis Bay on the central Namibian coast. Namibia is also a stable democracy. This is highly relevant for investors, because the geopolitical situation determines the bankability of capital intensive, mega-scale projects such as renewable ammonia plants.

First announced in 2021, Hyphen Hydrogen Energy is developing its renewable ammonia project in the Luderitz Area. Hyphen Hydrogen Energy aims to produce a total of 2 million tons per year of renewable ammonia, developed over two phases. In 2021, Hyphen Hydrogen Energy secured two plots of land from the government, each on a 40 year lease. These plots of land are 2000 km<sup>2</sup> each within the Tsau Khaeb national park, known as the "Springbok" and "Dolphin" concessions.

A further 14,000 km<sup>2</sup> has been designated by the Namibian government for future renewable hydrogen and ammonia production, resulting a potential total ammonia production capacity of 9 million tons per year.

About three quarters of the current project structure is held by Nicholas holdings, with experience in infrastructure projects in South Africa and experience in raising capital, and Enertrag, which is a German renewable energy company. The Government of Namibia is an equity partner in the project for about a quarter of the project, while also receiving dividend for the land lease (around 10-12 million euros over the 40 year lease period).

Hyphen Hydrogen Energy aims to produce the 2 million tons of renewable ammonia from 3 GW of installed electrolyzers, fed by 3.5 GW solar (32% capacity factor, around 5000 hectares) and 4.0 GW wind (60% capacity factor, around 600 wind turbines). The electrolyzer plant is located centrally in the Springbok and Dolphin concessions, producing hydrogen about 70 km from the Luderitz port area.

Hydrogen will be sent to the port area by pipeline, while desalinated water is transported back from the port area to the electrolyzer plant in an adjacent pipe. Nitrogen purification from air and the ammonia production, storage and handling occurs in the port area. Electricity is also transported to the port area for the nitrogen purification and the ammonia production, storage, and handling. As shown to the left, these pipeline "spines" will run centrally through the two land concession areas, as well as through the future concession areas.



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The first phase with 1 million tons of annual renewable ammonia production is planned for the end of 2028 or early 2029. About 15,000 jobs are expected during construction, and, once operational, 3000 workers are expected to be required permanently. About 90% of the jobs are expected to be filled by locals, and the project aims for 30% local content in the supply chain.

FEED is expected to start toward the end of 2024 or in early 2025, with an aim for FID in 2026. The year 2025 will be devoted to offtake agreements and commercial discussions, with various offtake MoU's previously signed. The project is designed for export, with a main focus on export to Europe with RFNBO compliance (Renewable Fuels of Non-Biological Origin).

The total investment for the two phases is over ten billion USD, roughly equivalent to Namibia's current annual GDP. Also, the total electricity generation is roughly 9-10 times the current Namibian electricity grid, indicating the sheer size of the project. Thus, electricity will be supplied to the national grid infrastructure, decreasing reliance on electricity imports from South Africa. Also, fresh water will be supplied to the community in the Luderitz area, which is currently a water scarce area.

Presentations from the AEA Annual Conference are now available on the website. The presentations are organized by session and speaker within the conference schedule for your convenience.

Namibia's Blueprint for Green Hydrogen was published in August and various global green hydrogen convenings saw the establishment of a myriad of partnerships, all with the aim of turning Namibia's ambition into reality.

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