DAURES GREEN HYDROGEN VILLAGE

www.daures.green

Republic of Namibia

GH2 NAMIBIA

Federal Ministry of Education and Research

SASSCAL
Southern African Science Service Centre for Climate Change and Adaptive Land Management
WWW.SASSCAL.ORG

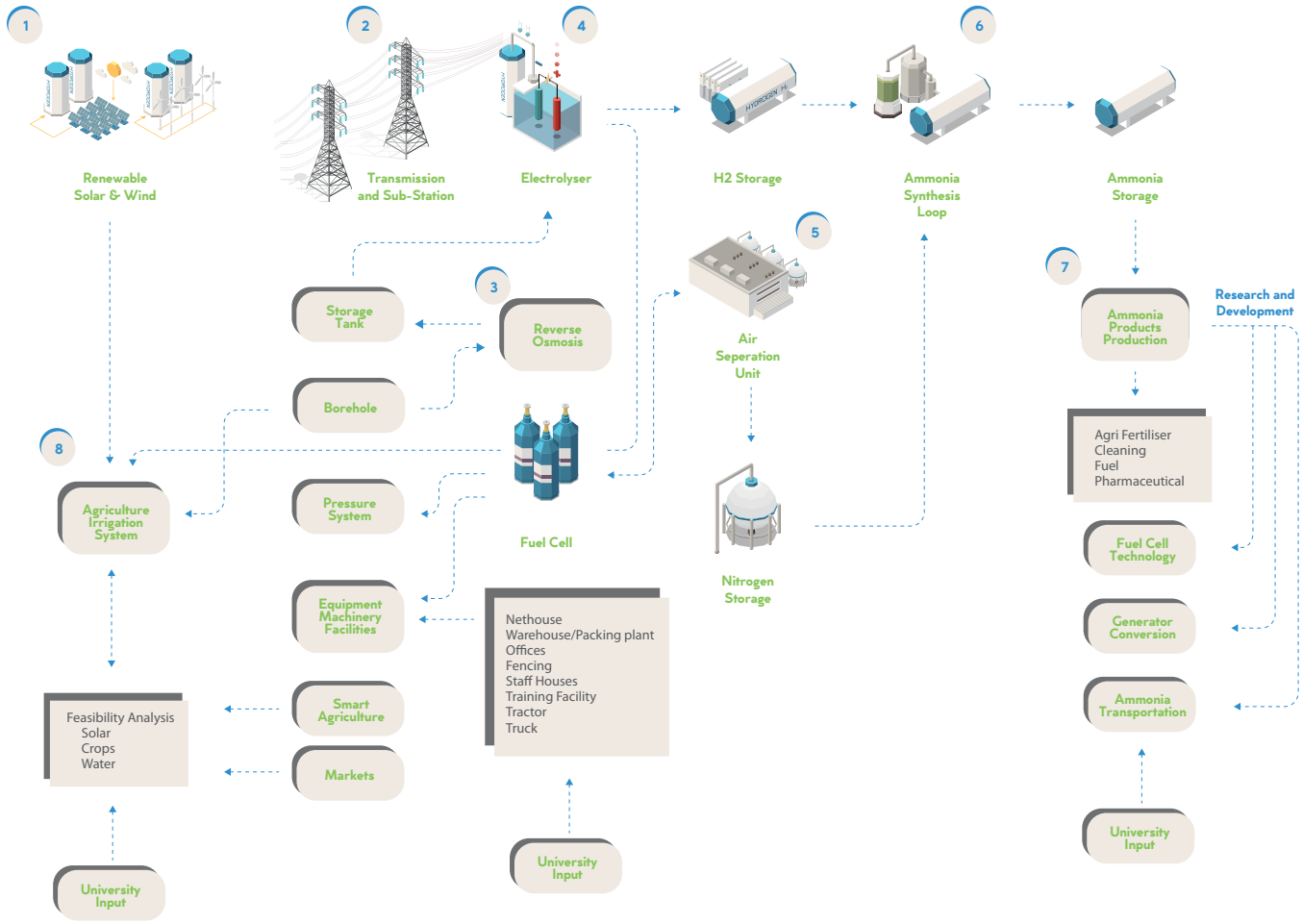
NAMIBIAN GREEN HYDROGEN, TODAY.

PROJECT OVERVIEW

The Daures Constituency is the largest constituency in Namibia with a population of approximately 11,350 people. Over 80% of the residents survive under 1 US$ per day. The Daures Green Hydrogen Village (DGHV) will be Africa's first Net Zero village. In Its first phase, the village will employ over 100 Namibians during construction and over 50 permanent Namibian's in a modern carbon free estate.

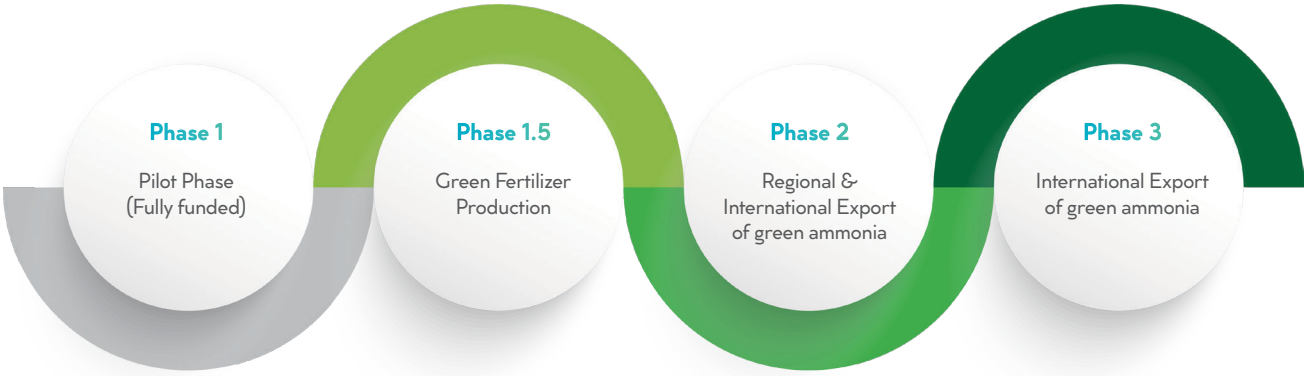
The Daures Green Hydrogen Village intends to achieve the below:

1. Sustainable production of green hydrogen and ammonia from renewable sources
2. Demonstration of green hydrogen applications and enablement of green hydrogen economy with ability to export green hydrogen and ammonia to potential offtakers
3. Sustainable production of Net Zero "green" agricultural produce from green houses that create local employment and partnership
4. Research opportunities for local and international students



PROJECT PHASING

- The water supply for the project in Phase 1 will be sourced from commercial boreholes. A 120 m3 Reverse Osmosis facility will be installed to ensure the water is treated to meet the agriculture and electrolyzer water quality requirements.
- Desalinated water for the subsequent phases will be piped to the project site to meet the hydrogen, ammonia, housing and agricultural water requirements.
- Possible energy carrier transport options include but are not limited to producing ammonia on site or piping hydrogen to the port of Walvis Bay and producing ammonia at the port.
- Nitrogen will be captured from the air using an air separation unit and combined with hydrogen through ammonia synthesis, before export.
- The project in it's 3rd and 4th phases, aims to trade liquid ammonia within the region through various ports and eventually export clean ammonia to support Europe's decarbonization ambitions.
- The project's feasibility study for phase 1 was conducted by Fitchner GmbH and a pre-FEED for the phase IV is available upon request.



2022 - 2024

Solar: 0.88 MW
Wind: 0.1 MW
Electrolysis: 0.25 MW
Hydrogen: 18 t/ year
Ammonia: 100 t/year

2024 - 2027

Solar: 6.7 MW
Wind: 5.1 MW
Electrolysis: 5 MW
Hydrogen: 602 t/year
Ammonia: 3,500 t/year
Ammonia Sulphate:
35,000 t/year

2029 - 2032

Solar: 420 MW
Wind: 590 MW
Electrolysis: 420 MW
Hydrogen: 121,000 t/year
Ammonia: 352,000 t/year

Beyond 2032

Solar: 840 MW
Wind: 1.18 GW
Electrolysis: 840 MW
Hydrogen: 240, 000 t/year
Ammonia: 700, 000 t/year

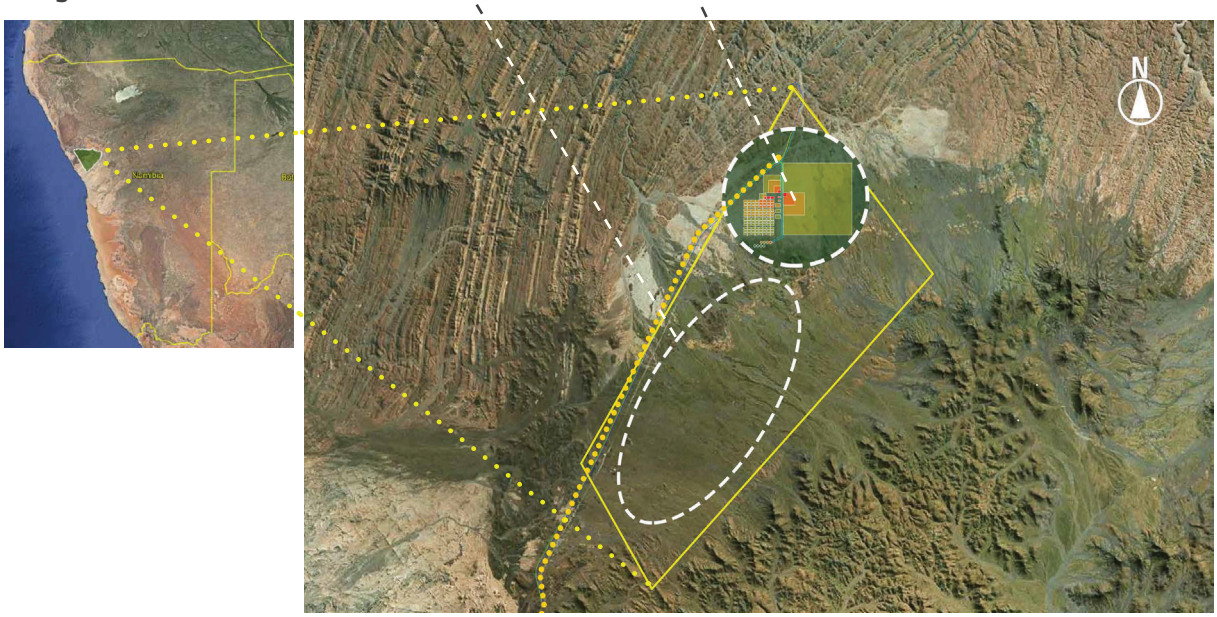
Above: Dâures Green Hydrogen Village in phase 4

SITE LOCATION & LAYOUT

Site is 15,000 hectares with potential to generate in excess of 1.0GW of renewable energy power

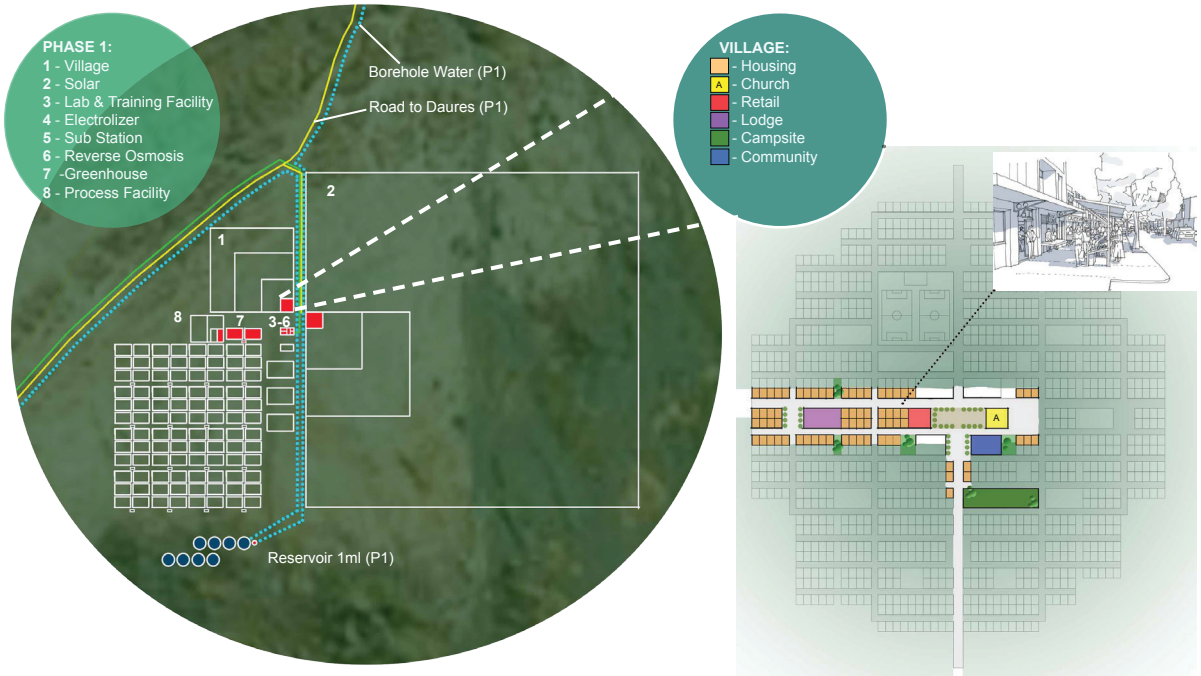
Solar, industrial, agricultural and training site

Wind generation area



PHASE 1 SHORT TERM VIABILITY & USE CASES

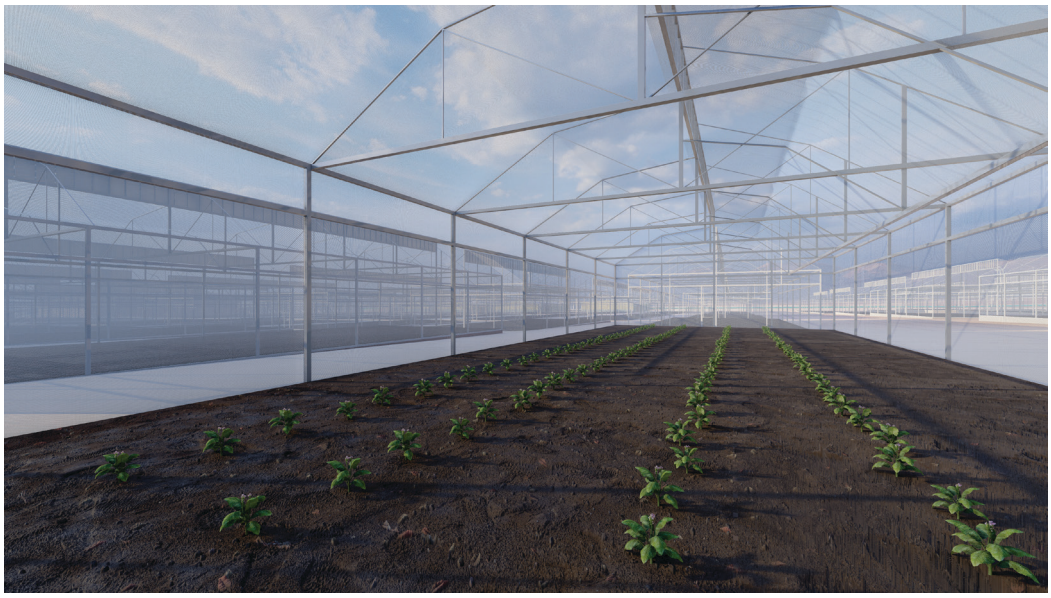
Solar: 0.88 MW | **Wind**: 0.1 MW | **Electrolysis**: 0.25 MW | **Hydrogen**: 18 t/year | **Ammonia**: 100 t/year



SMART AGRICULTURE

Climate-controlled greenhouse and a research nursery powered by renewable energy

- Greenhouses : 10 000 m2 of a butterfly-vent high-pressure fogging system and a 3-Bay Research & Development + Nursery Pad & Fan
- Anchor Crop : Tomatoes, other horticultural produce will be tested in nursery
- Production of Africa's first carbon free "green" Tomatoes
- Estimated annual production of 200-400t of tomatoes per year
- With employment opportunities for 30 – 50 Locals

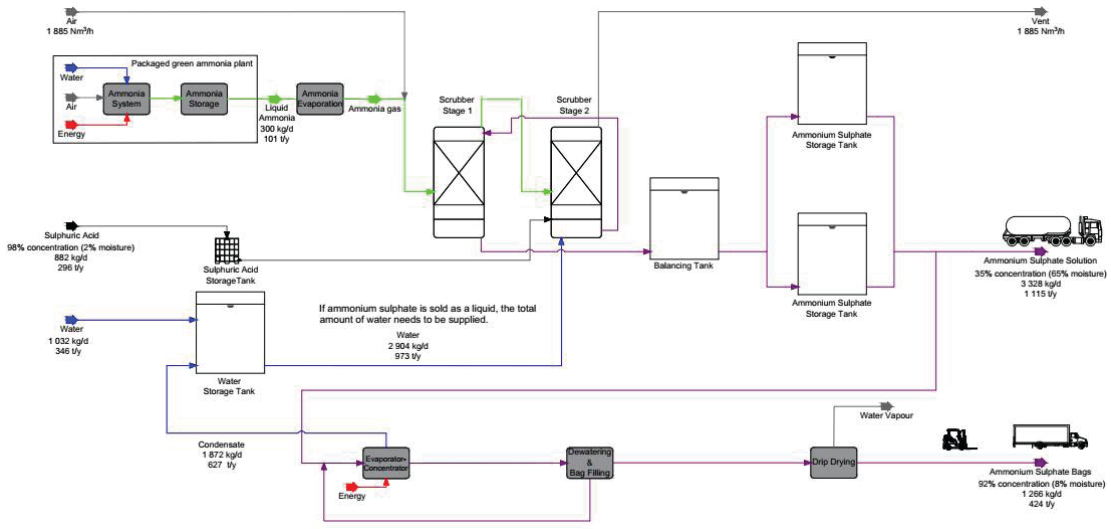


Above: Phase 1 green houses

FERTILIZER

Ammonium sulfate production

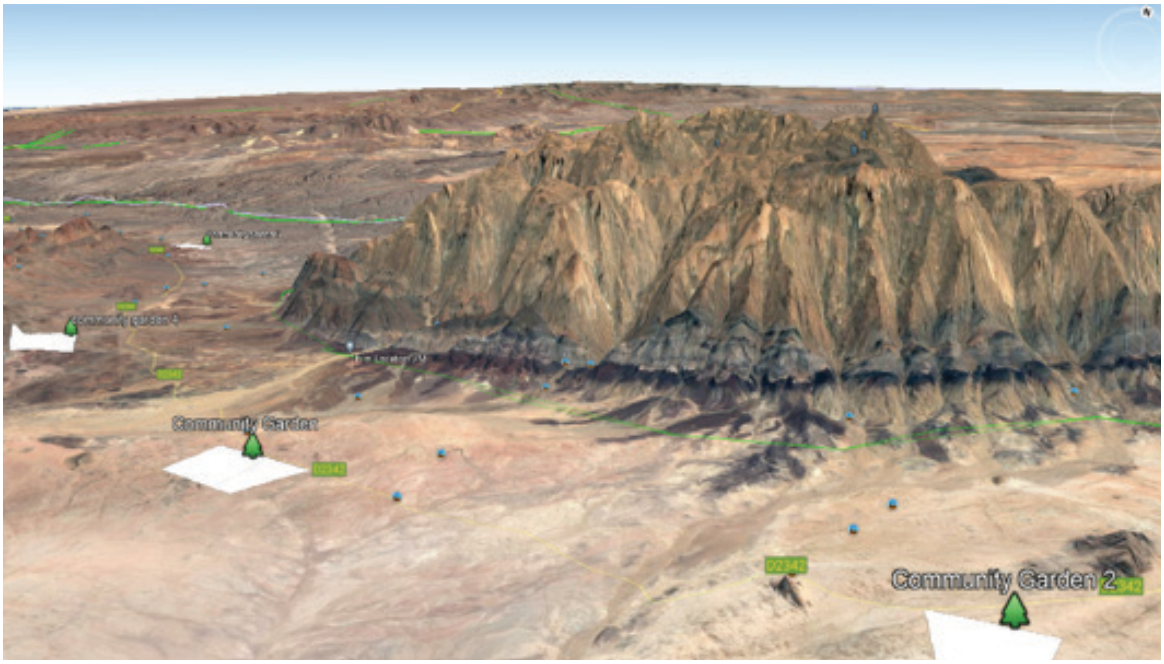
Through a feasibility study it was shown that it is technically and economically feasible to produce liquid and solid ammonium sulphate on site utilizing sulphuric acid from a local Namibian tin smelter.



Above: Block flow diagram of Ammonium Sulfate Production on-site

TRANSFORMING THE DAURES CONSTITUENCY

- Signed an MOU with World Food Program to develop a transformative food systems model for constituency
- We engage with communities within the constituency to possibly participate in a community garden program and schools for educational school gardens
- Boreholes powered by solar are to be installed at interested communities and connected to 2000 m2 drip irrigation
- Communities will be trained on horticulture and crop production, especially also tomatoes
- DGHV to enter into agreements with the successful communities to collect, purchase and on-sell the crops on an agreed frequency
- Industrialization component: We intend to set up a solar power tomato paste processing plant to add-value to local fresh produce
- Program intends to bring markets, sustainable jobs and food security to over 1000 people in the conservancy

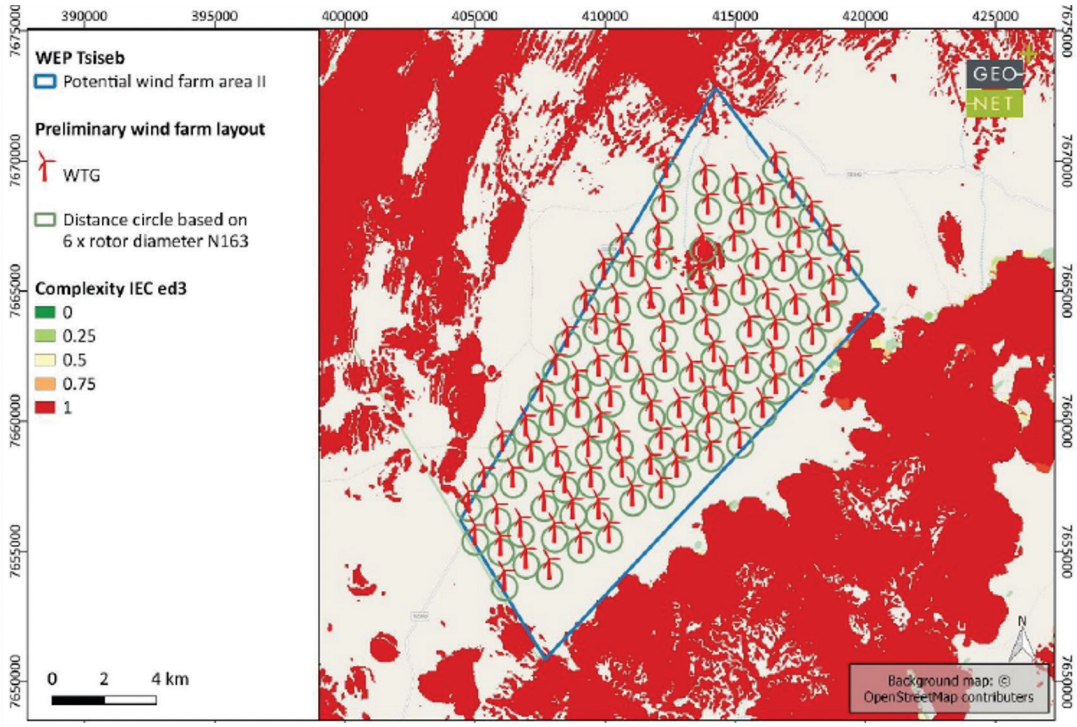


Above: Indicative community garden program

Above: Community drip irrigation schemes and tomato paste processing

WIND

- Optimized micro sitting of wind turbines (100 turbines, 5.9 MW turbines, 590MW) at a minimum distance of 6x rotor diameter.
- Optimization to 4x rotor diameter possible thus increasing wind energy profile to 150 turbines with energy potential of 885MW
- Exceptional Wind resources at a hub height of 120m
- Preliminary gross wind capacity factors between 50% to 57%



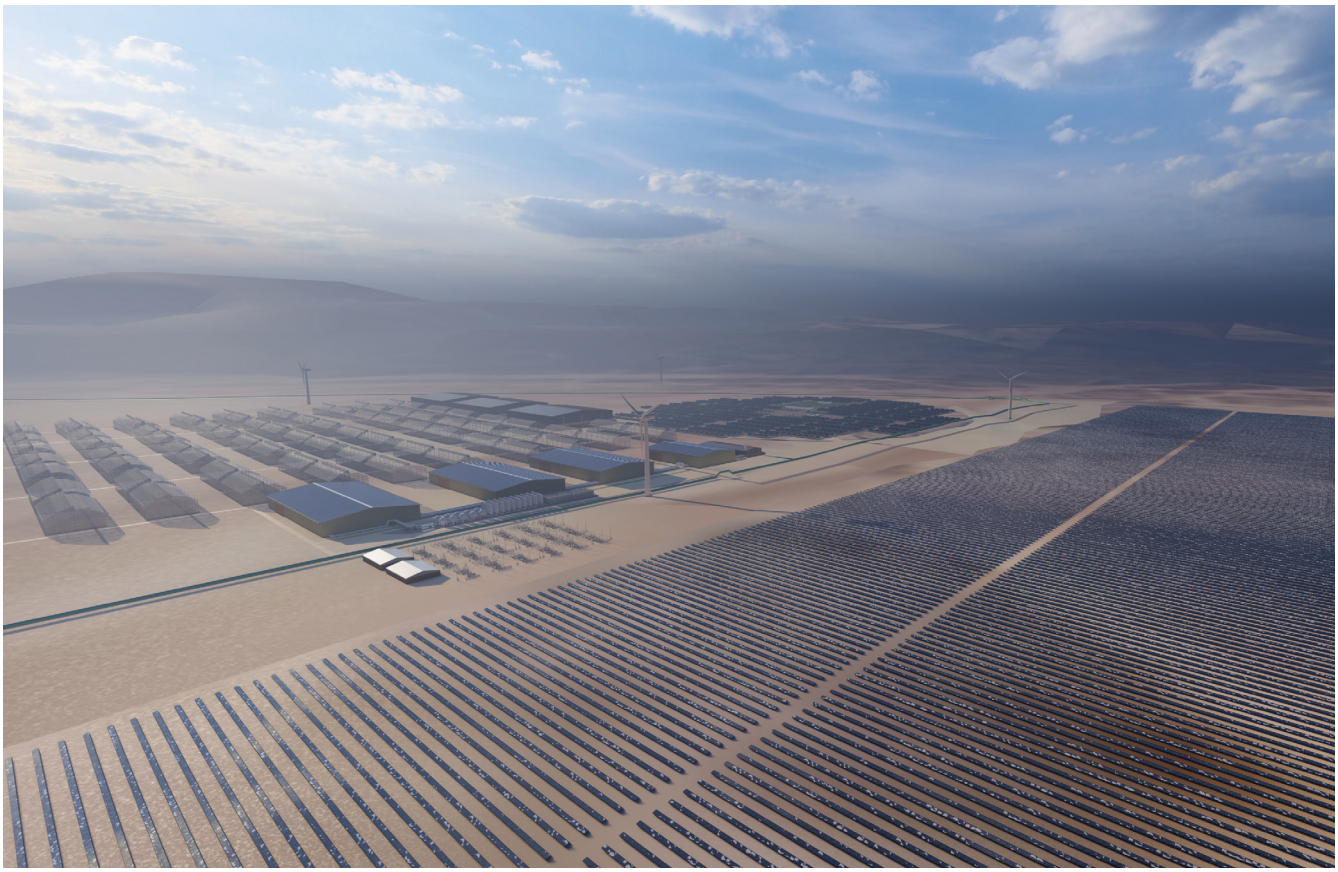
Above: Preliminary Phase 4 micro sitting

Above: MET Masts have been set up on site to record wind data at a height of 130 meters

SOLAR

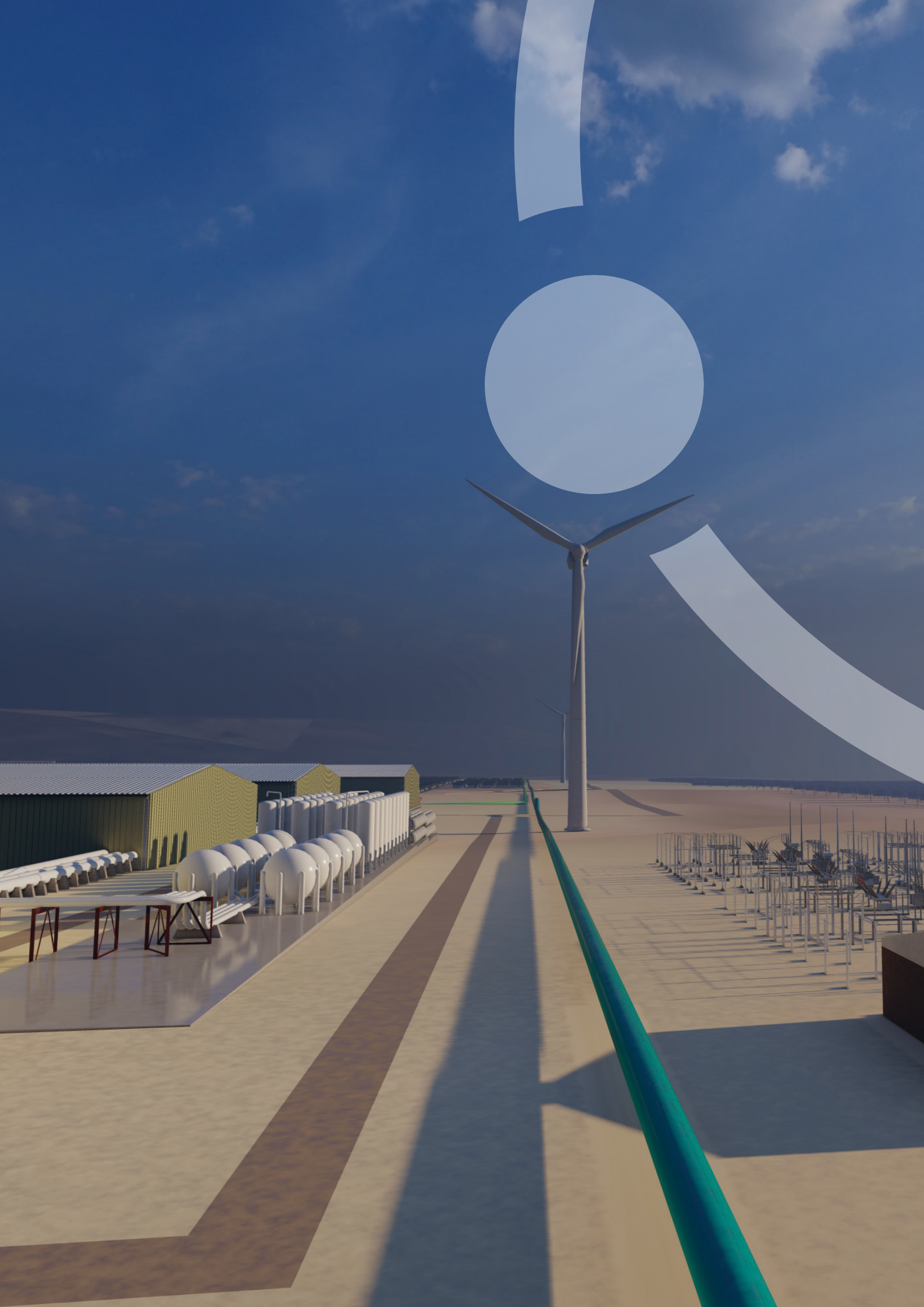
- 28 year time series used in solar analysis
- Analysis shows a GHI of 2443 and a DNI of 2873
- Solar site potential amounts to 420MW with further opportunities to optimize
- Solar studies conducted by Solargis

	TS	TMY P50	TMY P90	
Global Horizontal Irradiation	**2443**	2443	2325	kWh/m²
Direct Normal Irradiation	**2873**	2873	2533	kWh/m²
Diffuse Horizontal Irradiation	**547**	549	629	kWh/m²
Air Temperature at 2 m	**21.1**	21.2	21.2	°C



Above: Dâures Green Hydrogen Village in Phase 4

CONSTRUCTION HAS COMMENCED ON SITE



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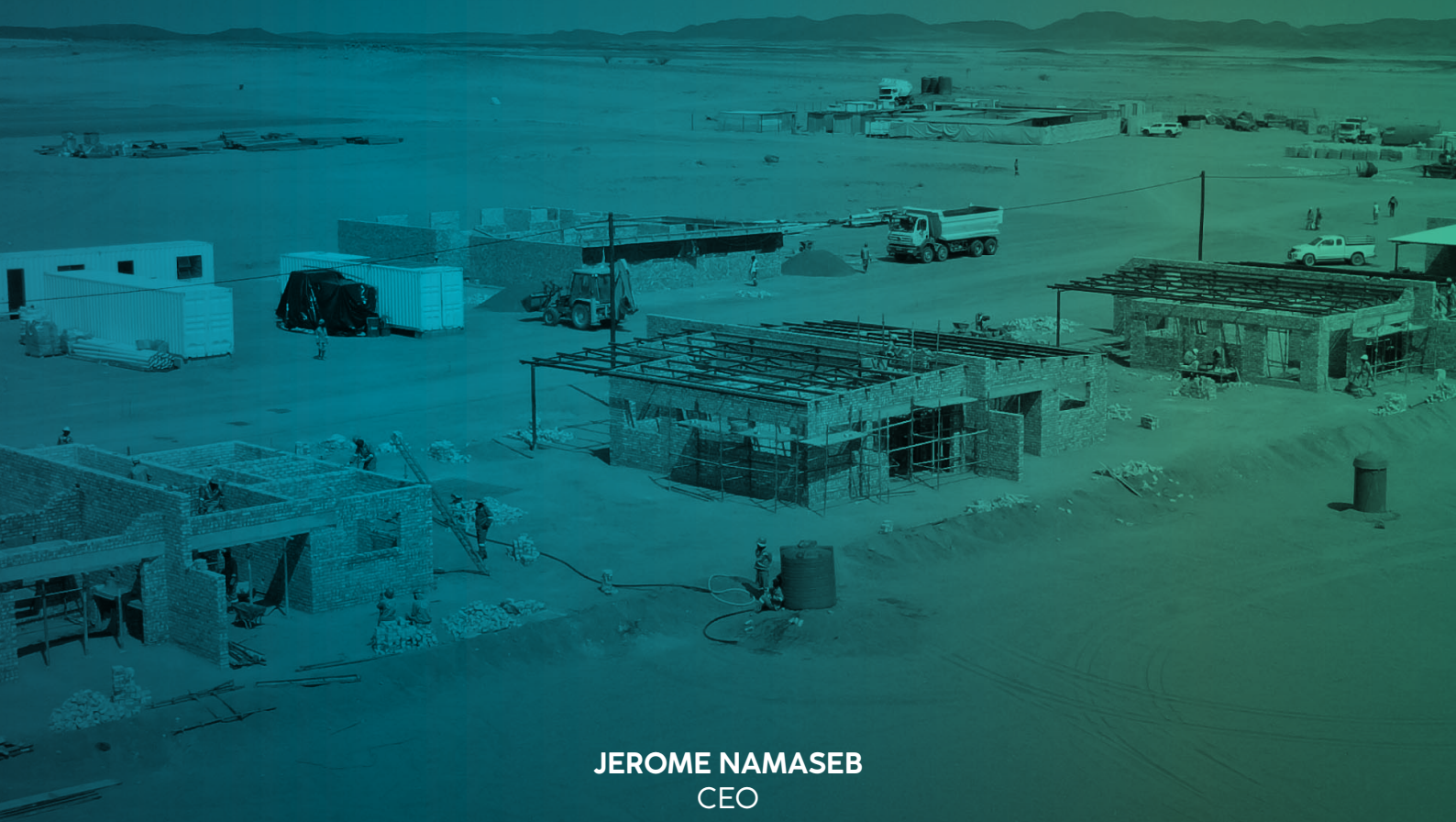

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