

Pioneering the Future of Sustainability





PURPOSE

Pioneering the future of sustainability

MISSION

To help maintain the UAE's leadership in the global energy sector while supporting the diversification of its economy and energy sources for the benefit of future generations

VISION

To make Abu Dhabi the benchmark for knowledge and collaboration in the advancement of renewable energy, clean technologies and sustainable development

More than a Decade of Impact

2006



- Masdar Initiative launched

2008



- Masdar City breaks ground
- World Future Energy Summit is launched in Abu Dhabi

2009



- First Zayed Future Energy Prize awards ceremony

2013



- Masdar inaugurates **Shams 1** in Abu Dhabi, the UAE's first large scale solar power plant with a capacity of **100MW**

- Renewable Energy Water Desalination Programme announced

- Masdar inaugurates **London Array** with a capacity of **630MW**

- Launch of **Abu Dhabi Sustainability Week**

2011



- Three concentrated solar power plants, **Gemasolar, Valle 1 & 2**, begin operating in Spain. The plants have a combined capacity of **120MW**

2014



- Masdar inaugurates the **Siemens Middle East** headquarters in Masdar City

2015



- Masdar inaugurates headquarters of the **International Renewable Energy Agency (IRENA)** in Masdar City

2016



- DEWA appointed Masdar & EDF to build **800MW** third phase of the **Mohammed bin Rashid Al Maktoum Solar Park** in Dubai

2018 Year of Zayed



- The Zayed Future Energy Prize evolves into the **Zayed Sustainability Prize**



- Launch of the **200MW** first stage of the third phase of the **Mohammed bin Rashid Al Maktoum Solar Park**

2017



- Inauguration of **402MW Dudgeon Offshore Wind Farm** in the UK
- Launch of the **UAE-Caribbean Renewable Energy Fund**
- Masdar launches **Emirates Waste to Energy Company** with Bee'ah in Sharjah, with a capacity of 30MW.
- Masdar, with Equinor, launches **30MW Hywind Scotland**, the world's first floating wind farm

- **Batwind**, the world's first battery connected to an offshore wind farm is launched at Hywind, Scotland

2019



- Inauguration of **158MW Cibuk 1 Wind Farm** in Serbia
- The EDF Renewables-Masdar consortium is awarded the **Dumat Al Jandal (400MW) wind project** in Saudi Arabia



- Masdar inaugurates three major solar projects in the Caribbean as part of the **UAE-Caribbean Renewable Energy Fund**
- Won the **100MW Uzbekistan Scaling Solar PV Project**
- A consortium of EDF Renewables, Masdar and Green of Africa wins Morocco's landmark **Noor Midelt Phase 1 hybrid solar power plant**

Masdar Clean Energy Around the World



-  WIND FARM
-  SOLAR FARM
-  WATER TREATMENT
-  ROOFTOP PV
-  HIGH EFFICIENCY LED LIGHTS
-  DESALINATION PLANT
-  WASTE-TO-ENERGY

International and Middle East

- | | | | | |
|---|---|--|--|---|
| <p>1.  ENGLAND, UK
London Array and Dudgeon Offshore Wind Farms</p> <p>2.  SCOTLAND, UK
Hywind Scotland Floating Wind Farm Batwind Energy Storage System</p> <p>3.  SPAIN
Gemasolar and Valle 1 & 2</p> <p>4.  MOROCCO
Solar Home Systems Noor Midelt Phase 1 project</p> <p>5.  MAURITANIA
Sheikh Zayed Solar Plant and Rural Electrification Programme</p> <p>6.  SERBIA
Ćibuk 1 Onshore Wind Farm</p> | <p>7.  MONTENEGRO
Krnovo Onshore Wind Farm</p> <p>8.  EGYPT
PV Plants and Solar Home Systems</p> <p>9.  JORDAN
Tafila Onshore Wind Farm and Baynouna Solar Plant</p> <p>10.  OMAN
Dhofar Onshore Wind Power Project</p> <p>11.  AFGHANISTAN
Solar Home System, Rooftop PV</p> <p>12.  SEYCHELLES
Port Victoria Onshore Wind Farm</p> <p>13.  PALAU
Palau Solar and Water Treatment</p> | <p>14.  POHNPEI
Pohnpei Solar Plant</p> <p>15.  TUVALU
Tuvalu Solar Plant</p> <p>16.  NAURU
Nauru Solar Plant</p> <p>17.  HONIARA
Solomon Islands Solar Plant</p> <p>18.  VANUATU
Vanuatu Solar Plant</p> <p>19.  KIRIBATI
Kiribati Solar Plant</p> <p>20.  MAJURO
Marshall Islands Solar Plant</p> <p>21.  FIJI
Fiji Solar Plant</p> | <p>22.  TONGA
Tonga Solar Plant</p> <p>23.  SAMOA
Samoa Onshore Wind Turbines</p> <p>24.  UAE-CARIBBEAN RENEWABLE ENERGY FUND PROJECTS
16 Caribbean Island Nations</p> <p>25.  GERMANY
Solar Energy Plant</p> <p>26.  SAUDI ARABIA
Dumat Al Jandal Wind Farm</p> <p>27.  UNITED STATES
Rocksprings and Sterling Wind Farms</p> <p>28.  INDIA
Hero Future Energies</p> | <p>29.  UZBEKISTAN
Navoi Solar plant</p> <p>30.  AUSTRALIA
East Rockingham</p> <p>31.  INDONESIA
Cirata floating solar</p> |
|---|---|--|--|---|



 WIND FARM	 HIGH EFFICIENCY LED LIGHTS
 SOLAR FARM	 DESALINATION PLANT
 WATER TREATMENT	 WASTE-TO-ENERGY
 ROOFTOP PV	 CARBON CAPTURE, UTILISATION AND STORAGE

United Arab Emirates - Middle East

ABU DHABI

1.  **SHAMS**
CSP Plant
2.  **ABU DHABI GOVERNMENT**
Solar Rooftop Programme
3.  **UM AL ZUMOOL**
Off-grid PV Plant
4.  **MURAWAH ISLAND**
PV Plant
5.  **AL MUSSAFAH**
Al Reyadah Carbon Capture, Use, and Storage (CCUS) Project

6.  **SEA PALACE**
Solar Rooftop Project
7.  **DESALINATION PILOT PROJECT**
8.  **AL AIN DIWAN**
Lighting Efficiency Project
9.  **AL JARNAIN ISLAND**
PV Plant
10.  **CROWN PRINCE COURT**
Solar Rooftop Project

11.  **ABU DHABI FUND FOR DEVELOPMENT**
HQ Solar Rooftop Project
 12.  **MASDAR CITY**
PV Plant & Rooftop Solar PV
- ### DUBAI
13.  **MOHAMMED BIN RASHID AL MAKTOUM SOLAR PARK**
Phase 3
 14.  **BAB AL SHAMS**
Solar PV Plant

SHARJAH

15.  **SHARJAH WASTE-TO-ENERGY FACILITY**

RAS AL KHAIMAH

16.  **RASHID ABDULLAH OMRAH HOSPITAL**
Solar Rooftop Project



Masdar City to be the first “**4 Pearl**” community in Abu Dhabi, based on the emirate’s mandatory sustainability guidelines



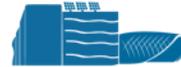
Continued growth will eventually see up to **50,000** people living at Masdar City



40,000 people will work, research and study at Masdar City



Masdar City buildings designed to be at least **40%** more energy and water efficient than conventional city buildings



Uses power generated by a **10MW** solar PV farm as well as rooftop solar panels



40% reduction in embedded carbon in building materials achieved

CO₂

Buildings are **constructed with low-carbon** cement and other locally-sourced and verified materials



2 million+ passengers have experienced the city’s pioneering sustainable mobility network



90% of construction waste reused or recycled

Synthetic Fuels

The UAE is well positioned to produce hydrogen sustainably

Growing Demand for Hydrogen



- Global momentum in the development of new markets for sustainable and decarbonized fuels
- Sustainable hydrogen required to decarbonize sectors difficult to meaningfully reduce carbon dioxide emissions (such as steel, fertilizers, aviation, shipping, etc.)
- In addition to its primary uses today in the production of ammonia & methanol, hydrogen can be easily converted to these compounds to be used as transportable fuels that support a variety of other industrial applications

High Potential for the UAE

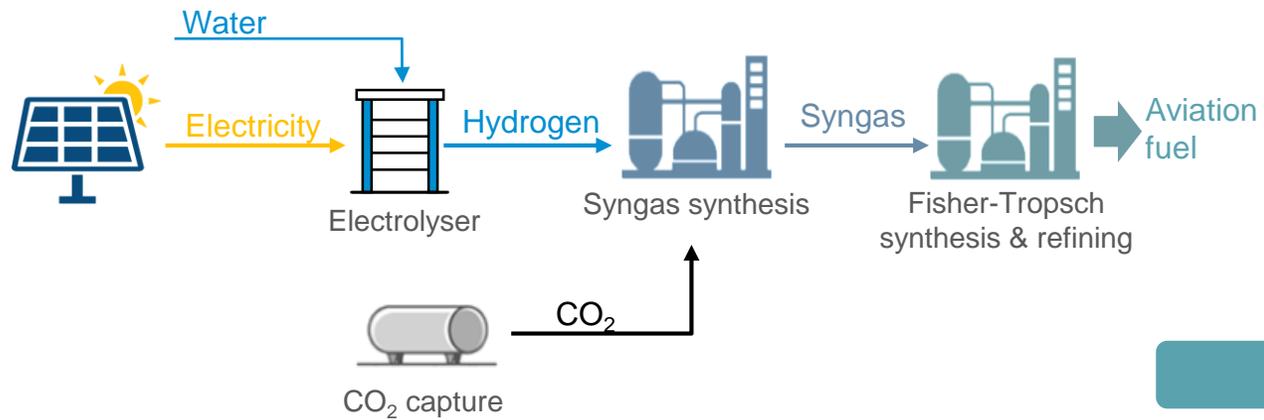


- Uniquely positioned to produce Green hydrogen due to low cost solar resources and abundant space vs. other countries
- Also well positioned to produce Blue hydrogen due to the relatively large volume gas resources
- Ability to capitalize on existing industrial infrastructure to continue generating profits from exports of fuels and related products in a decarbonized world
- Can leverage the available know-how in the petrochemical and renewable energy industry
- Can also benefit of the buildup of key competencies and increase the number of highly skilled workers & professionals in forward-focused hydrogen-related industries

Green hydrogen can support The UAE's position as an energy supplier in a decarbonized economy

Conversion technologies : Power to Liquid

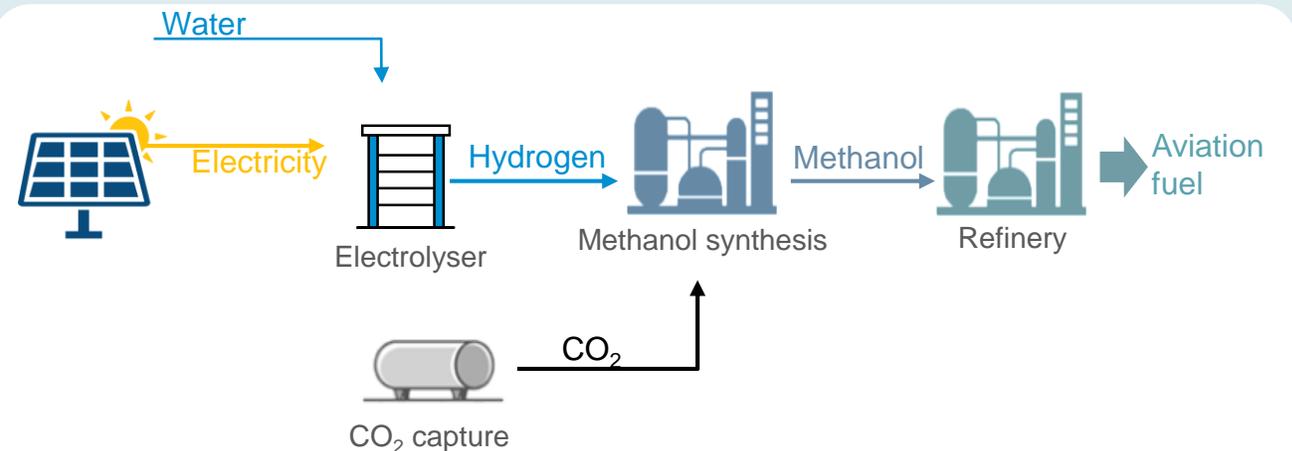
Fisher - Tropsch Route



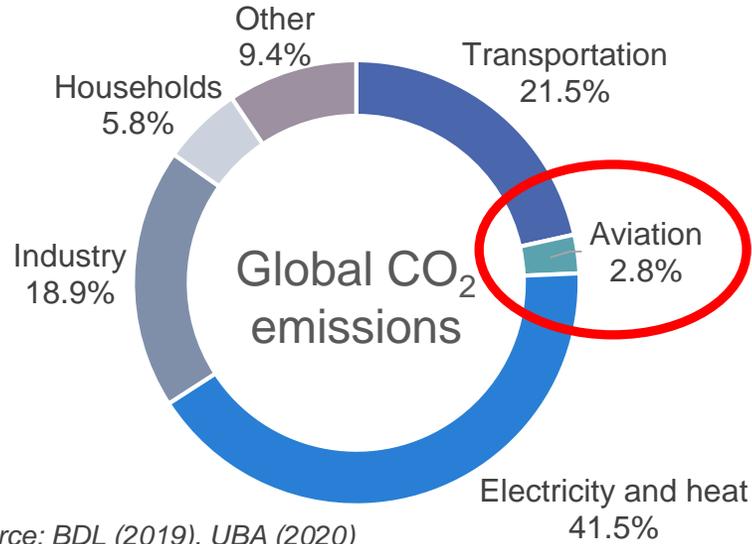
Can only be carried out using CO not CO₂

The methanol is converted to synthetic liquid fuels via olefin synthesis, oligomerization and hydrogenation

Methanol Route



Can be carried out using CO or CO₂



Source: BDL (2019), UBA (2020)

Aviation sector responsible for ~2% of global anthropogenic CO₂ emissions

Rapid Growth => Global aviation emissions increase by 3 to 5% per year

In 2020, global aviation emissions are around 70% higher than in 2005

Global aviation fuel consumption at 343 billion liters in 2018

➤ **There is no time to waste to address the emissions from the aviation sector**

Aviation industry worldwide is moving towards decarbonization

Aircraft technology improvements

Operational improvements

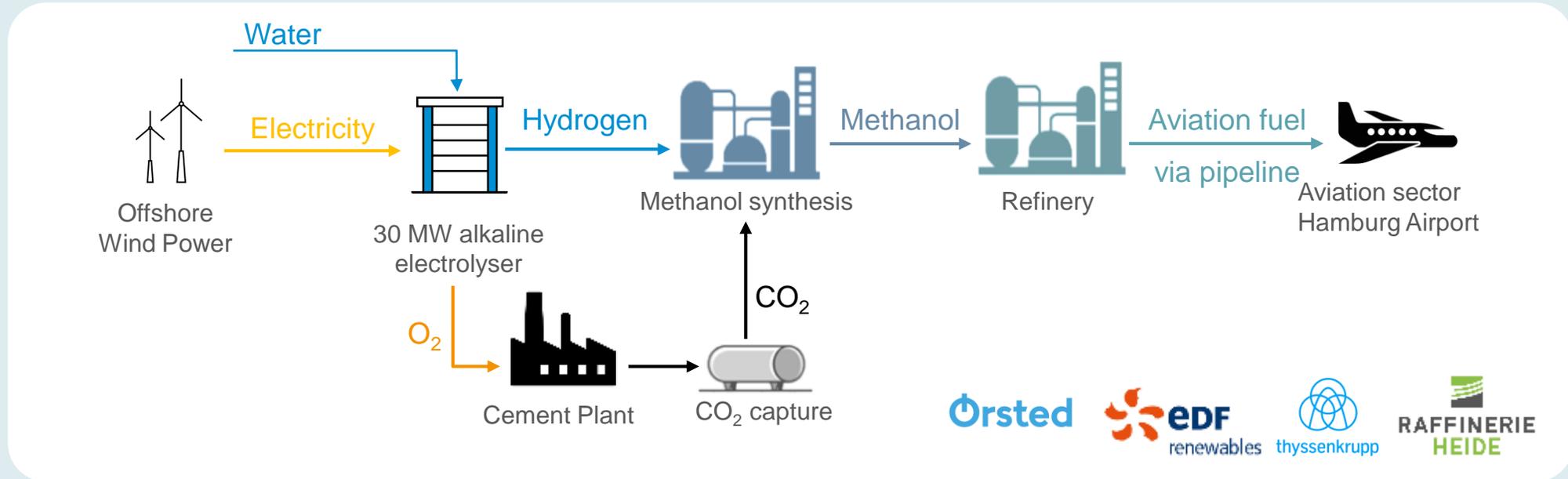
Market based measures (CORSIA)

Sustainable aviation fuels

➤ **UAE is a major player in the world aviation and is in prime position to be a worldwide leader in the abatement of aviation emissions**

Global initiatives on sustainable aviation fuels

Westküste 100 project – Schleswig-Holstein, Germany



Ten-year plan split into two five-year stages:

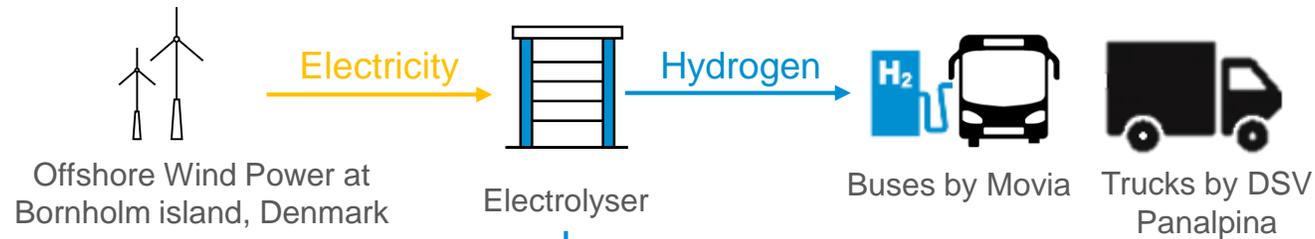
Stage 1: 30 MW electrolyser capacity by 2025 for green hydrogen production for oil refinery at site

Stage 2: Scale up to 700 MW electrolyser capacity for the production of carbon-neutral synthetic kerosene

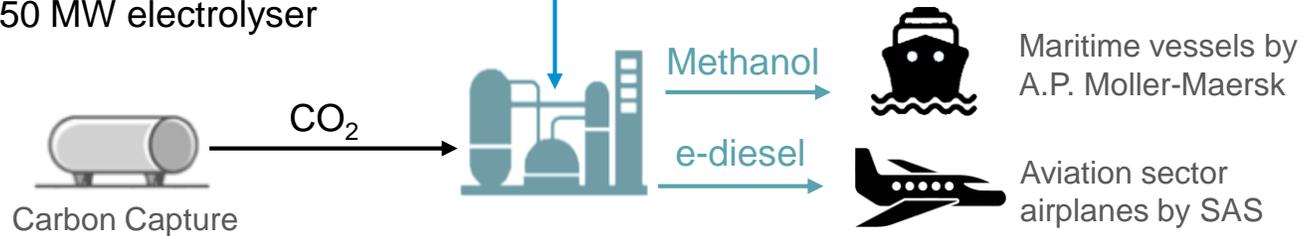
Project awarded €30M grant from the German government

Industrial-scale sustainable fuels production project – Denmark

Stage 1 – Operational by 2023 : 10 MW electrolyser



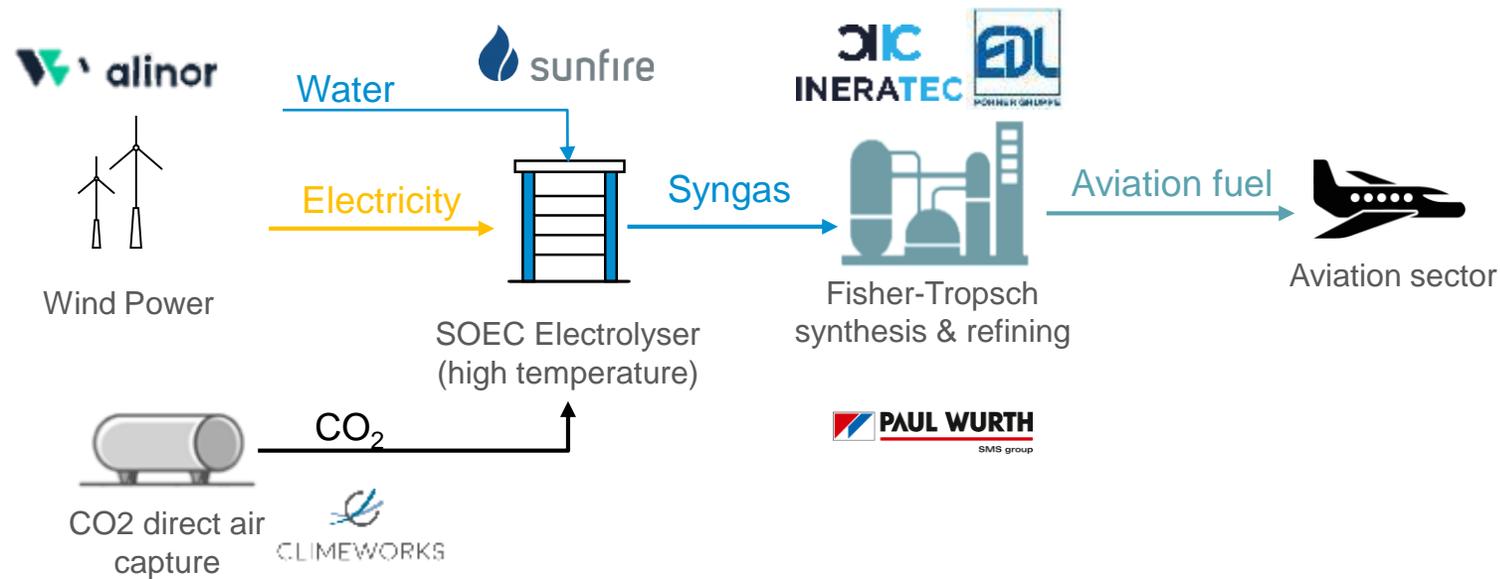
Stage 2 – Operational by 2027 : 250 MW electrolyser



Stage 3 – Fully scaled up by 2030 : Offshore wind potential will be fully developed and electrolyser capacity will be upgraded to 1.3GW

➔ Copenhagen Airports, A.P. Moller - Maersk, DSV Panalpina, DFDS, SAS and Ørsted will take the investment decision for Stage 1 in 2021 based on the feasibility study

Norsk e-Fuels project – Porsgrunn, Norway



Phase 1: Demonstration plant production capacity of 10 Million litres of sustainable kerosene.

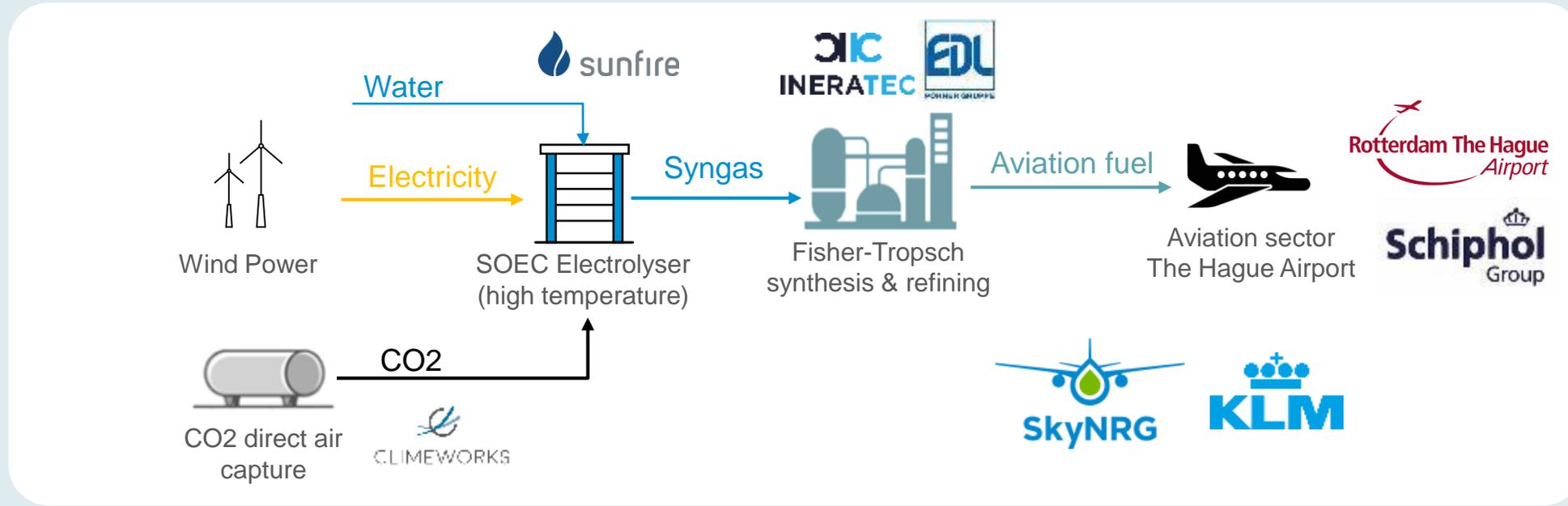
The start of construction is expected for 2021 and the first production for 2023.

Phase 2: Scale up to 100 Million litres production by 2026

Phase 3: Export renewable fuels from Norway to the European market by 2030

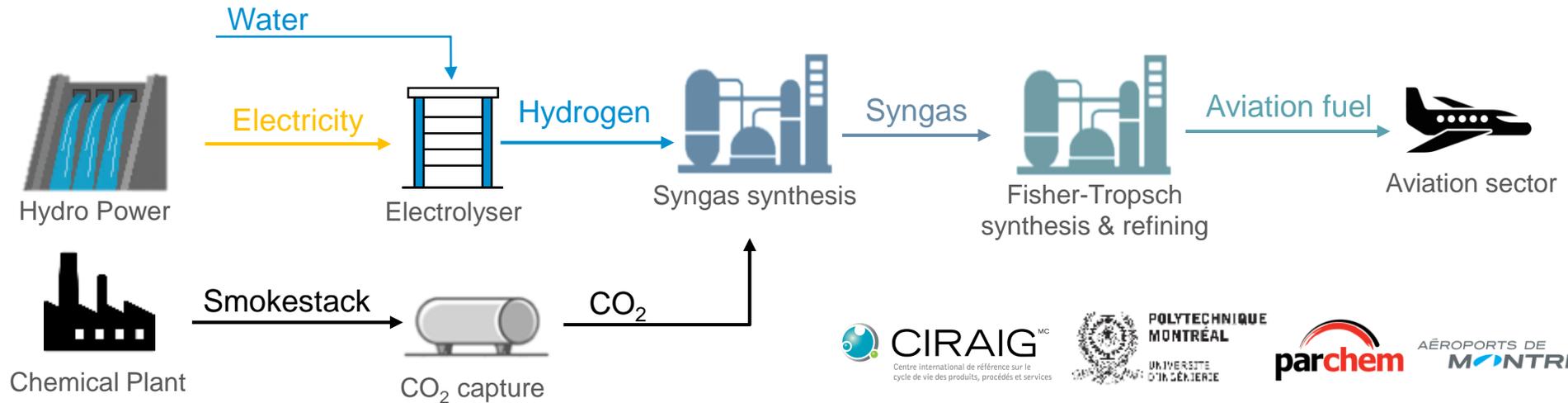
The resulting Kerosene would be blend up to 50% into operational planes fuel

DSL-01 project – The Netherlands



- Commercial-scale sustainable aviation fuel production of 100,000 tonnes per year (1,000 litre/day)
- KLM committed to the development and purchase of 75,000 tonnes per year for a 10-year period
- The sustainable fuel to be produced is estimated to have 85% lower carbon footprint than conventional jet fuel
- Project scheduled for 2022

SAF + Consortium project – Montreal, Canada



- Pilot project production is expected in 2021
- SAF+ kerosene is estimated to have an 80% lower carbon footprint than conventional jet fuel with a blending capacity of up to 50% with conventional kerosene.
- Air Transat signed an offtake agreement to purchase significant portion of the produced fuel by this project.
- Project financing comes from a mix of public funding and equity investment.

Power-to-Liquid is a promising solution for low emission aviation

Thank you