

The background is a composite image. At the top, a white airplane flies against a blue sky with white clouds. Below the sky, a city skyline with various skyscrapers is visible. In the foreground, there are green hills with several white wind turbines. A large, semi-transparent globe of the Earth is positioned on the right side of the hills. The bottom of the image shows dark, rippling water.

# Elektrobränsle för en fossiloberoende transportsektor

Augusti 2023

# St1 solving global energy challenges

**St1 Vision is to be the leading producer and seller of CO<sub>2</sub>-aware energy**

In the spirit of our vision, we research, develop, produce and invest to be able to provide our customers with CO<sub>2</sub>-aware energy while creating positive societal impact

Our operations are strengthened by strategic long-term partnerships in various areas

# The balance between direct- and indirect transport electrification



Aviation

Marine

Heavy-duty

Light-duty

Long range

Short range

E-FUELS



- Heaps of renewable electricity
- Technology ramp up
- Hydrogen

- Minerals and battery factories
- New fleet
- New charging infrastructure



BATTERIES

# Sustainable Aviation Solutions



- **Electricity**
- **Hydrogen**
- **BioJet**
- **EJet**



# Sustainable Aviation Solutions



The Hard to "De-liquify"

- 80% long/medium haul



Infrastructure

Military and Civil Defense / Energy Independence

-> The case for BioJet and EJet

# Advanced BioJet Östrand

# The E-Jet Game Changer Proposal

Develop partnership model between Vattenfall and St1 with a purpose to produce 1 000 000 m<sup>3</sup> of e-fuel:

- 850 000 m<sup>3</sup> Sustainable Aviation Fuel (E-Jet) in stepwise approach
- 150 000 m<sup>3</sup> e-diesel/naphtha

Hard to deliquefy sector and legislative measures driving SAF demand. E-Jet requirements due to biomass constraints

Future Upstream Demands:

- 2,7 Mtons/pa biogenic CO<sub>2</sub>
- 25 TWh H<sub>2</sub> from offshore wind power
- 400 turbines of 15 MW



# Vattenfall & St1 with a joint vision for the Swedish west coast



*Why*

Two thirds of Swedish carbon dioxide emissions today come from industry and transports. Electrification using fossil-free hydrogen offers huge potential



*What*

Vattenfall and St1 form a new partnership to produce one million cubic meters of fossil-free aviation electro fuel starting 2029 and gradually growing

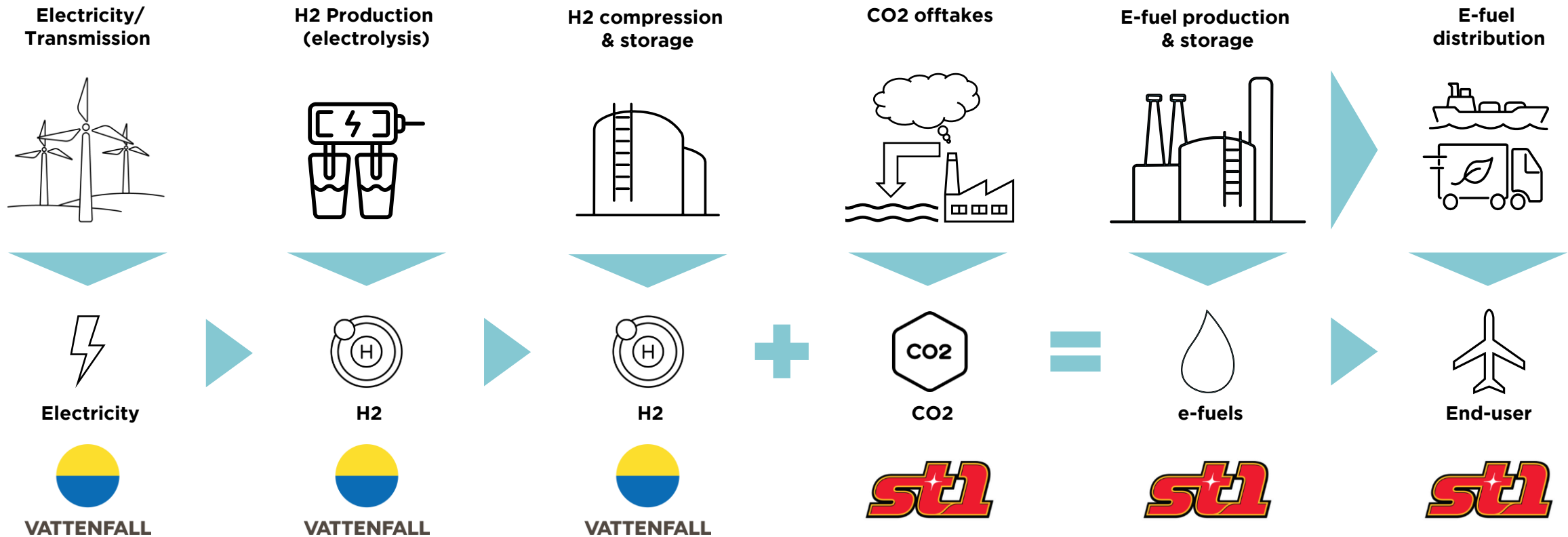


*How*

Joint feasibility study with the ambition to develop a fossil-free value chain for production of electro fuel through offshore wind



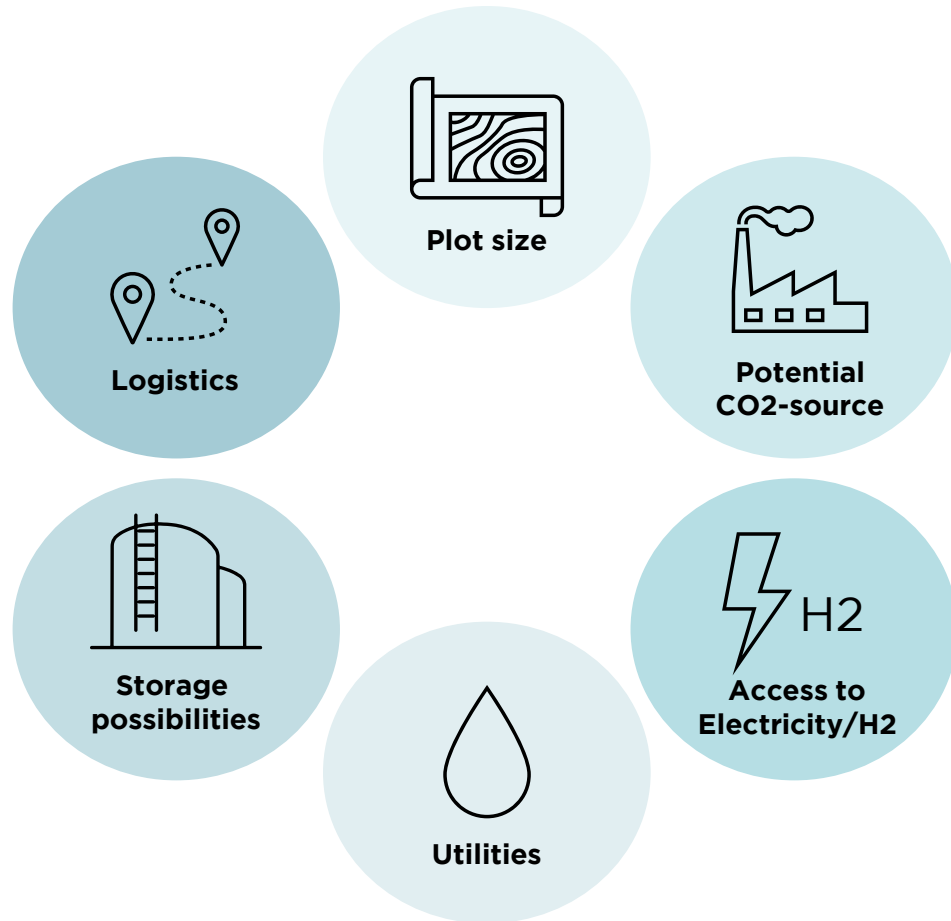
# The feasibility study aims to develop a fossil-free e-jet value chain



Vattenfall aims to develop an offshore wind power-based **hydrogen supply infrastructure** on the west coast of Sweden

St1 targets to **produce electro fuel**, primarily targeted for sustainable aviation fuel using fossil-free hydrogen

# Criteria for locations



# Några av de viktigaste förutsättningarna

- Partnerskap – Gemensamma värderingar
- Lagstiftning + Implementering av lagstiftning
- ”RÄTT” driv i politiken. En gemensam agenda??
- Starta upp stöd – Samhällskontraktet
- Medistödet – Samhällsdialogen
- Fortsätt och förbättrad teknisk utveckling – Uppskalning = utmaning eller möjlighet

# Regleringen behöver stödja fossilfri vätgas och elektrobränslen



- Elektrobränslen från fossilfri el
  - Förnybartdirektivet RED3 – definition elektrobränsle och definition och beräkning av CO2 värden
  - ReFuelEU Aviation – kvotplikt för flyget
- Regler för vätgasinfrastruktur



- Långsiktiga förutsättningar – nationell vätgasstrategi
- Havsbaserad vindkraft
  - Tillståndsprocessen
  - Minska investeringsrisken
- Kärnkraft
  - Möjliggör utbyggnad (i ett senare skede?)
- Tillståndsprocesser
  - övergripande parallella tillståndsprocesser måste ha en struktur
- Styrmedel som driver på efterfrågan av fossilfri vätgas och elektrobränslen - Samhällskontrakt