



# Gasdagarna 18/5 2022

## Per-Arne Karlsson

Vätgas – en färgglad och mångsidig energibärare

# 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



A complex digital collage representing energy and sustainability. In the foreground, a large, realistic water splash is at the bottom. Behind it, a green globe with a grid pattern sits on a grassy hill. Several white wind turbines are scattered across the hill. In the background, a dense city skyline with various skyscrapers is visible. The sky is a deep teal color with white clouds, a bright sun with lens flares, and a white airplane flying in the upper left. The title 'The Energy Context' is centered in white text.

# The Energy Context

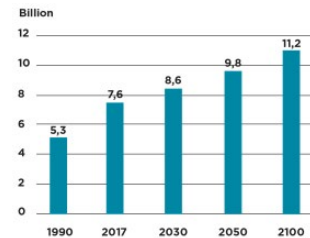


# The Global Energy Challenge



The global population is growing...

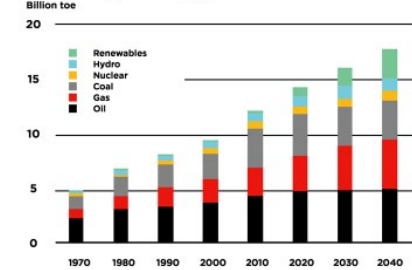
World population



Source: United Nations, World Population Prospects 2019 (Medium variant)

The higher the standard of living, the higher the energy consumption

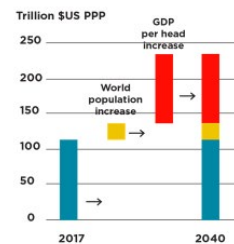
Primary energy demand - fuel



Source: BP Energy Outlook, 2019 Edition

And so are standard of living

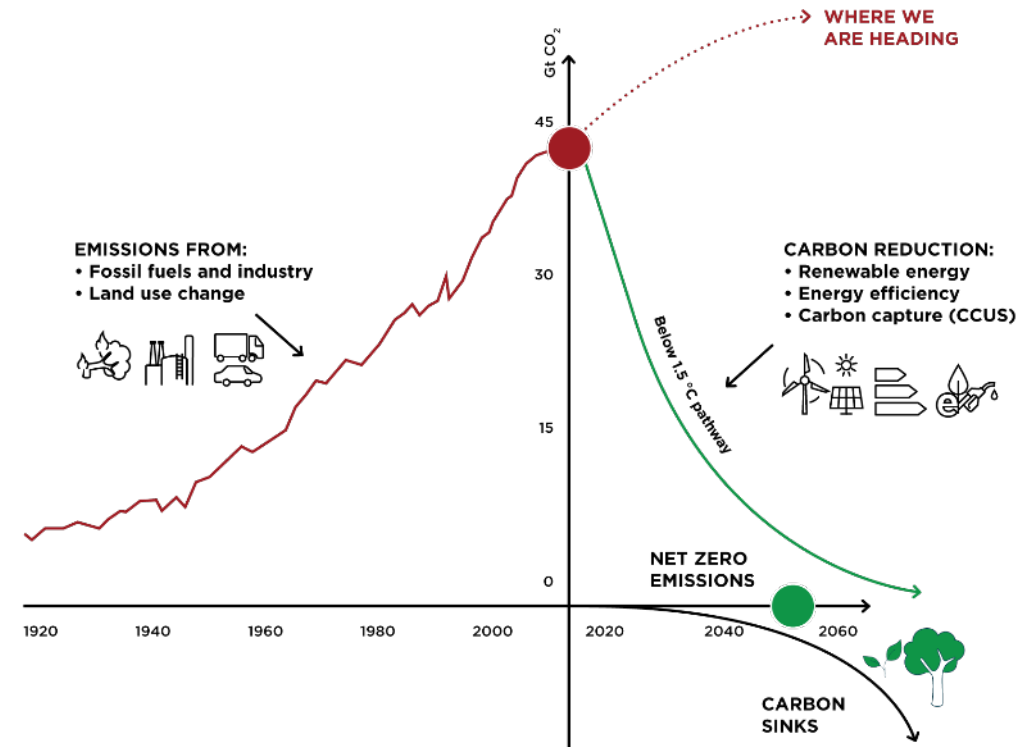
Increase in global GDP



Source: BP Energy Outlook, 2019 Edition

# Where we are going vs. where we should go

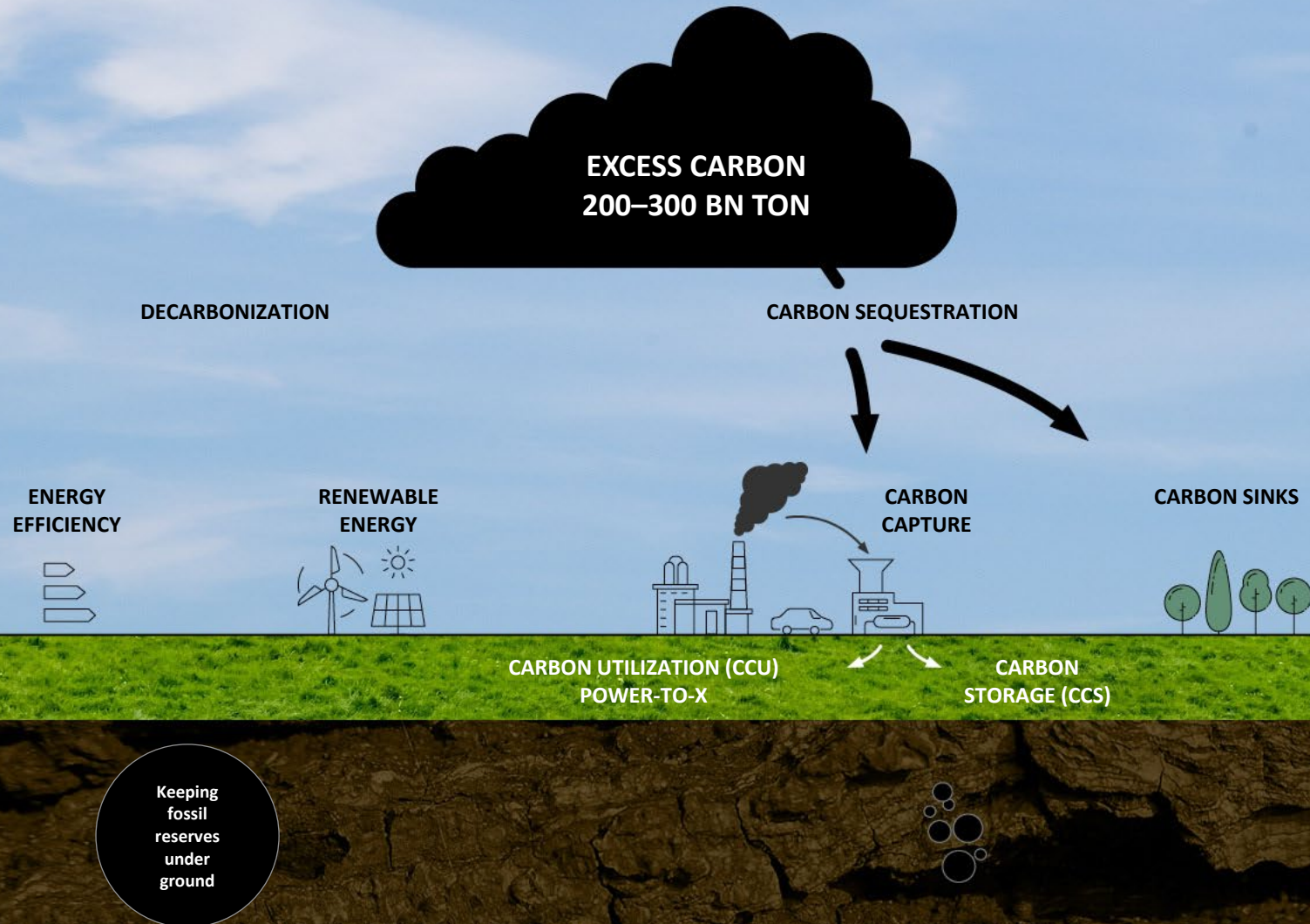
## ILLUSTRATIVE PATHWAY OF GLOBAL NET CO<sub>2</sub> EMISSIONS LIMITING GLOBAL WARMING TO 1.5 °C



Source: Global Carbon budget 2019, IATA SSP Database, SSP2-19 and SSP2-baseline scenarios

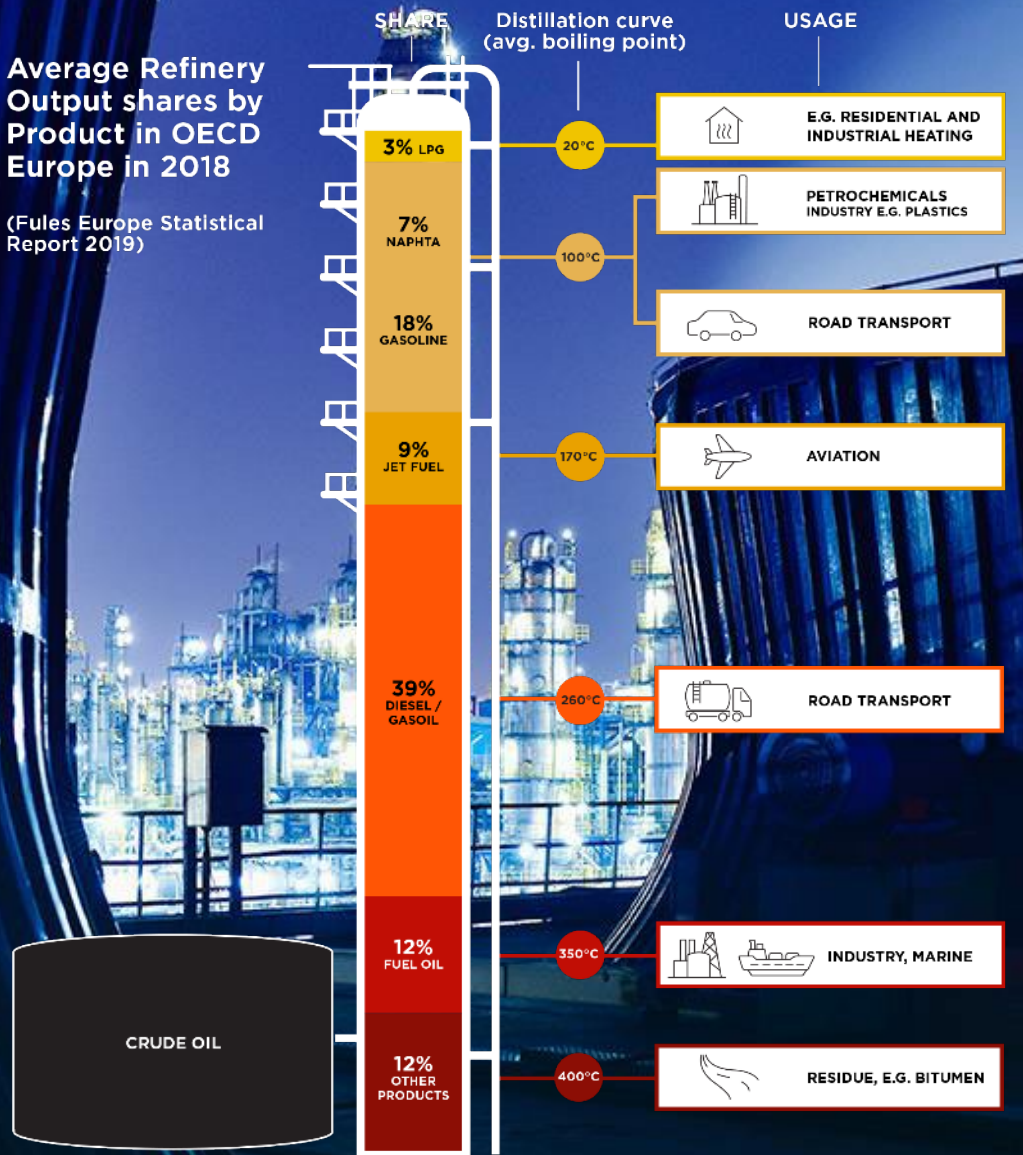


# Sustainable carbon cycle requires massive investments in



## Average Refinery Output shares by Product in OECD Europe in 2018

(Fules Europe Statistical Report 2019)



## Need for fossil phase out!

### Example Aviation: The Distillation Curve Challenge

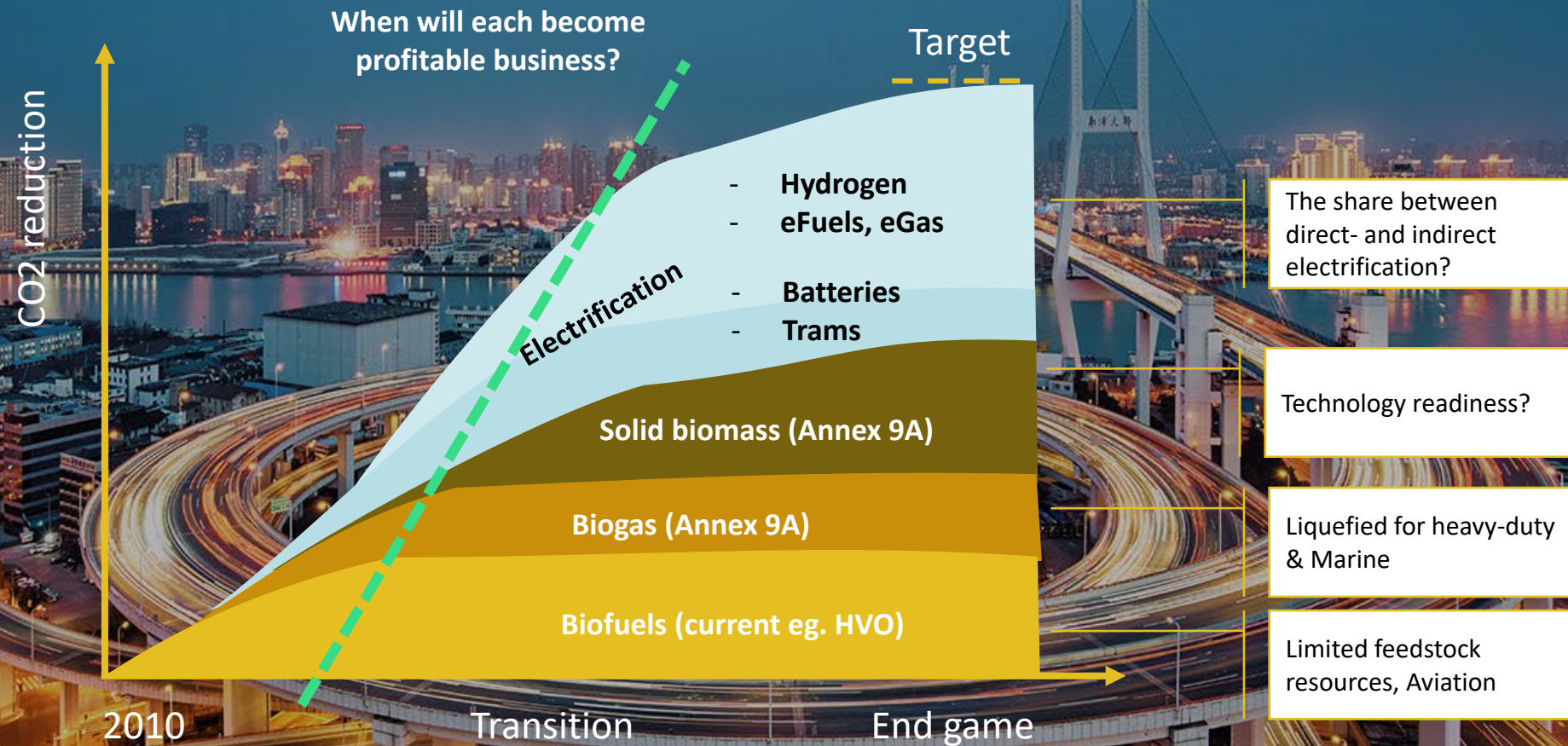
The demand on one oil product cannot be met without producing the others



# Multiple Solutions Needed



## Transport Energy Mix Transition





# The balance between direct- and indirect transport electrification



Aviation



Marine



Heavy-duty



Light-duty



Long range



Short range

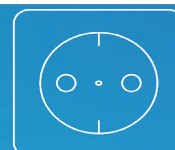


## E-FUELS



- Heaps of renewable electricity
- Technology ramp up
- Hydrogen

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



## BATTERIES

A question of energy efficiency!





The background of the slide is a complex digital collage. It features a green, rolling hill in the foreground with several white wind turbines. In the background, a dense city skyline with various skyscrapers is visible. A large, glowing globe of the Earth is positioned on the right side of the hill. The sky is a deep teal color with wispy white clouds, a bright sun or moon in the center, and a faint rainbow. An airplane is flying in the upper left sky. The bottom of the image shows dark, splashing water. The text 'The Company St1' is centered over the middle of the image in a large, white, sans-serif font.

# The Company St1



## Key figures

# Year 2021 in figures

## Market shares, %

### Finland

#### Petrol

22.9

#### Diesel

18.7

### Sweden

#### Petrol

20.3

#### Diesel

16.4

### Norway

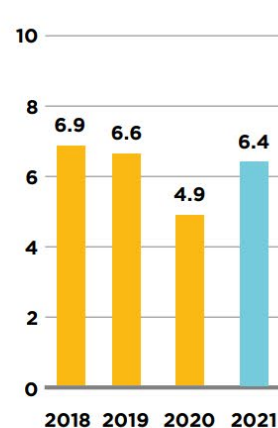
#### Petrol

16.7

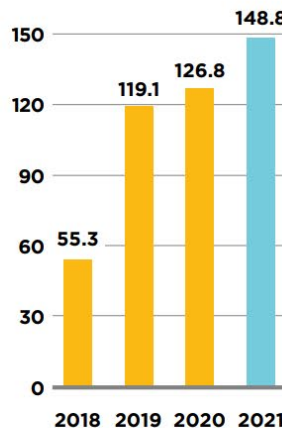
#### Diesel

17.1

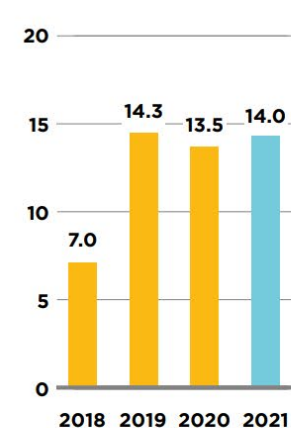
## Net sales, EUR billion



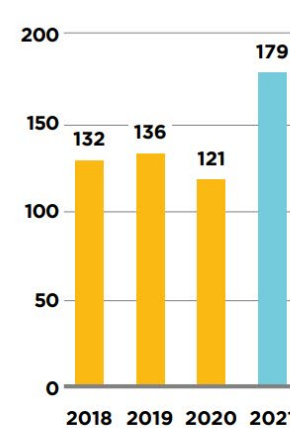
## Profit for the period, MEUR



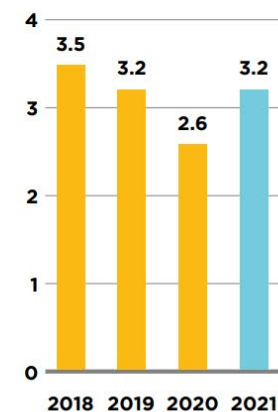
## Return on equity, %



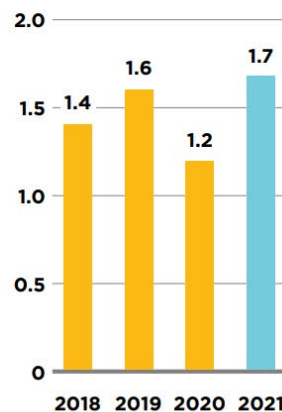
## Investments, MEUR



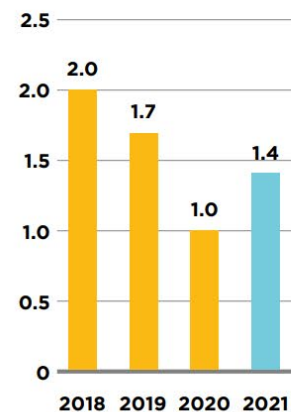
## Retail net sales, EUR billion



## Direct sales, net sales, EUR billion



## Supply & Logistics, net sales, EUR billion



## Renewable energy net sales \*

19%

2021

19%

2020

15%

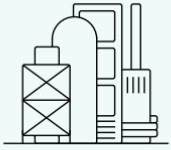
2019

\* Sold mainly through Retail and Direct Sales channels

### Gothenburg refinery

Throughput,  
million barrels

26



Utilization rate

81.5%



Operation of wind  
farms and related  
battery energy  
storage, MW

381



Excise & property taxes,  
MEUR

2,147



Income taxes,  
MEUR

42



R&D expenditure,  
MEUR

83



Personnel

1,052

(3/2022: 1,265)



Renewable energy  
investments, MEUR

87

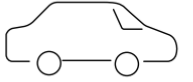
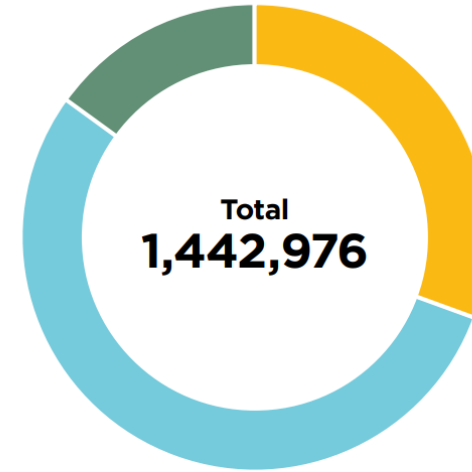


Biorefineries

100%

of the feedstock of  
our advanced ethanol  
production is waste

### CO<sub>2</sub>-reduction from use of biofuels, tons



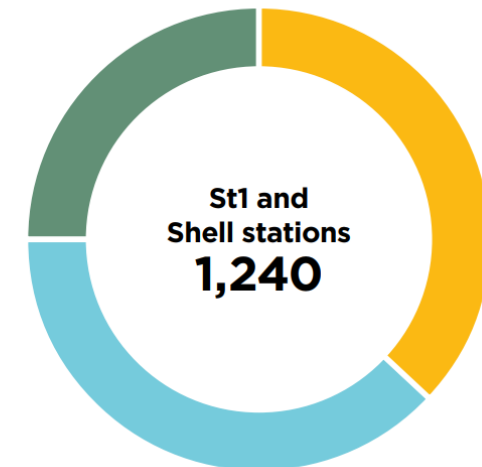
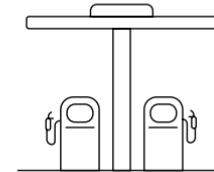
CO<sub>2</sub>-reduction  
equalled more than

698,034  
passenger cars\*

\* A car with an annual mileage of 13,600  
km and emissions of 152 g CO<sub>2</sub>/km

The average driven kilometres was adjusted  
to be in line with Statistic Finland's figure.  
Emissions 152g CO<sub>2</sub>/km corrected  
from previous year's 151g/CO<sub>2</sub>/km.

### Retail station network



Finland  
37%

Sweden  
38%

Norway  
25%



# Energy Sales



Serving daily more than 600 000 customers





# Energy Production



St1 strengthens waste feedstock business by acquiring Brocklesby Ltd in the UK

## St1 Wind Power

## St1 Biorefining

Advanced Ethanol

Renewable Diesel

## St1 Gothenburg Refinery

Capacity is 30 million barrels of annually

Energy efficiency with high heat recovery - district heating to 70 000 households

Most energy needs from own gas production

Refinery 2030 Transformation

## St1 Biogas

St1 Heat from the Ground



# St1 Nature Based Solutions

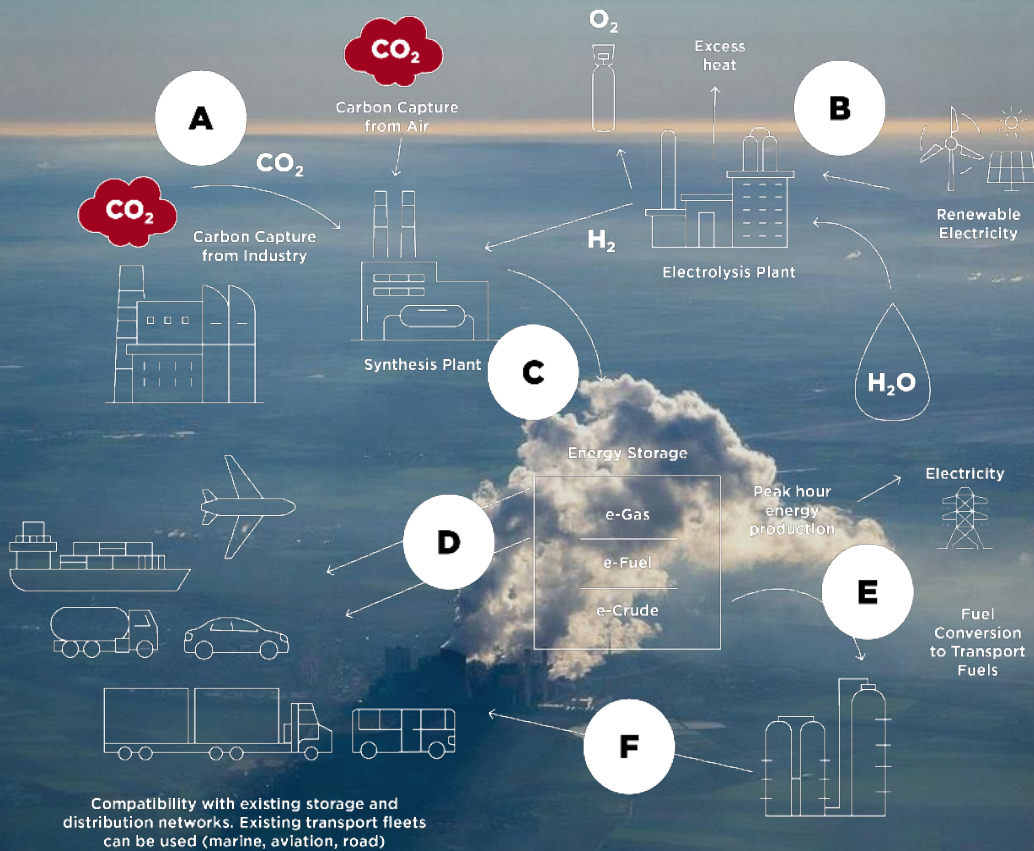


- St1 Morocco pilot - research in dry areas
- LIFE CarbonFarmingScheme
- NEGEM – negative emissions

*We are actively developing our own carbon capture programs*



# Power-to-X process

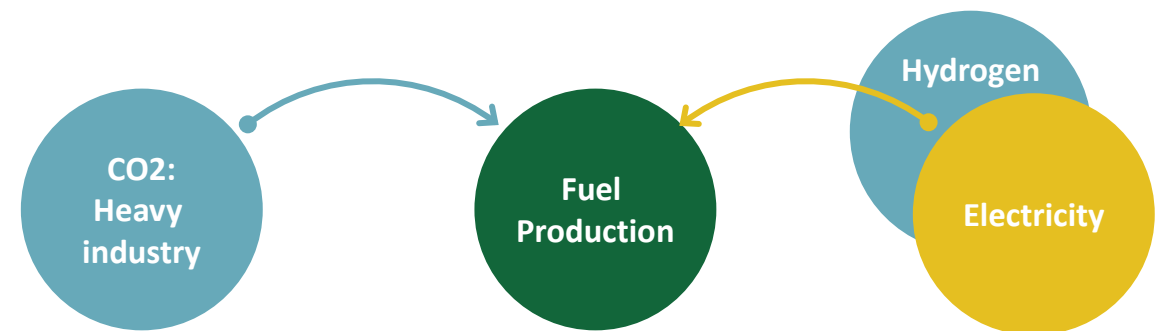


## Power-to-X challenges the energy and heavy industry sector to rethink business models

We have active cooperation and projects in synthetic fuel area to move towards first production.

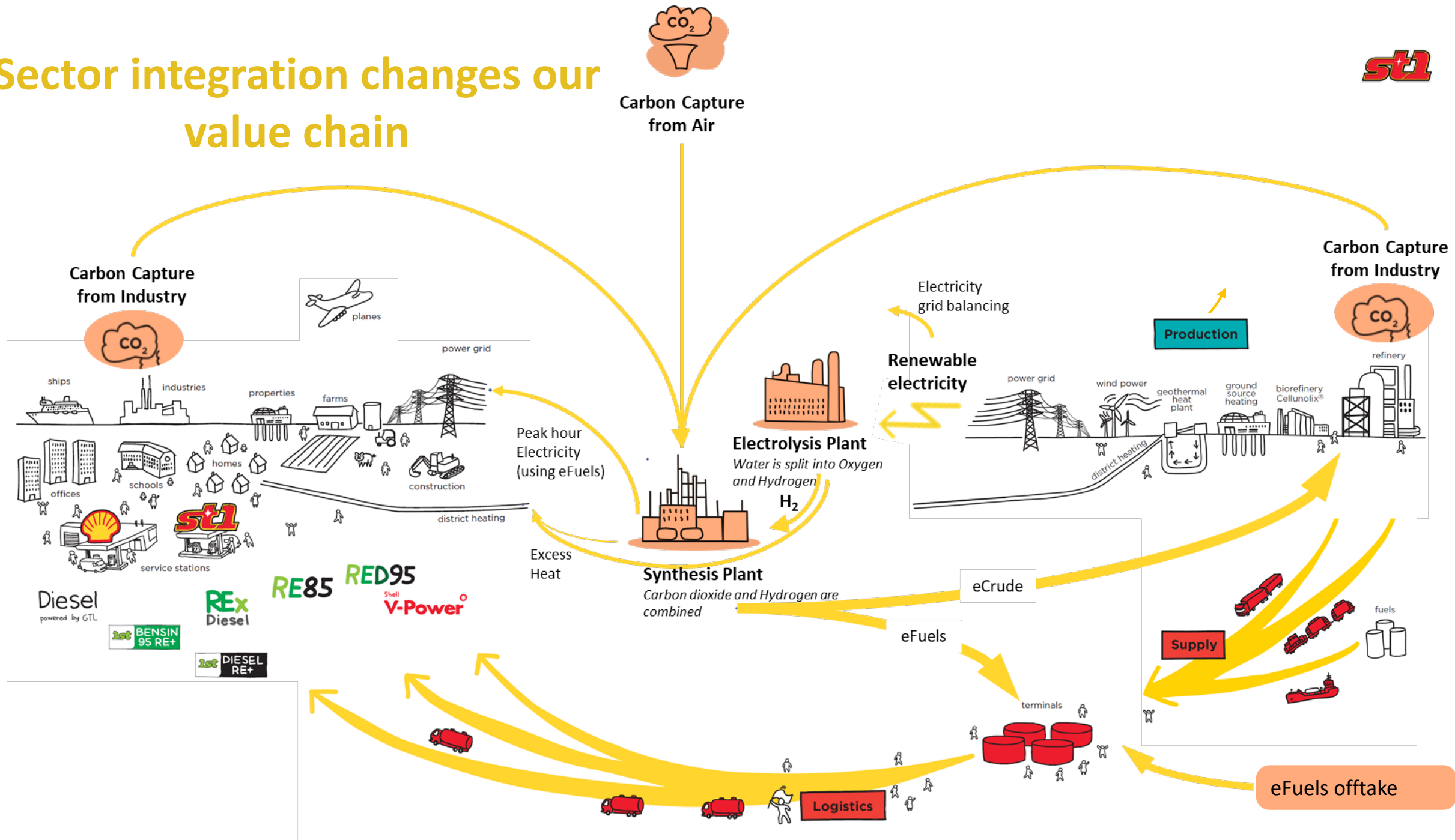
### Fundamentals:

- Transferring electricity in time & place
- Requires a lot of additional renewable electricity
- Enables capturing CO<sub>2</sub> and upcycling back into use as energy





# Sector integration changes our value chain





A composite image representing sustainable energy and urban development. It features a green hill with several white wind turbines. In the background, a city skyline with various skyscrapers is visible. A large, semi-transparent globe of the Earth is positioned on the right side of the hill. The foreground shows dark, rippling water. The sky is a deep blue with white clouds and a faint rainbow. A white commercial airplane is flying in the upper left corner. The text 'St1 Hydrogen Perspectives' is overlaid in the center in a large, white, sans-serif font.

# St1 Hydrogen Perspectives



# H2 Direct Transport Energy Carrier



# What is best for what?



HVO  
LPG  
H2  
Electric



Ammonia  
LPG  
H2  
E-methanol



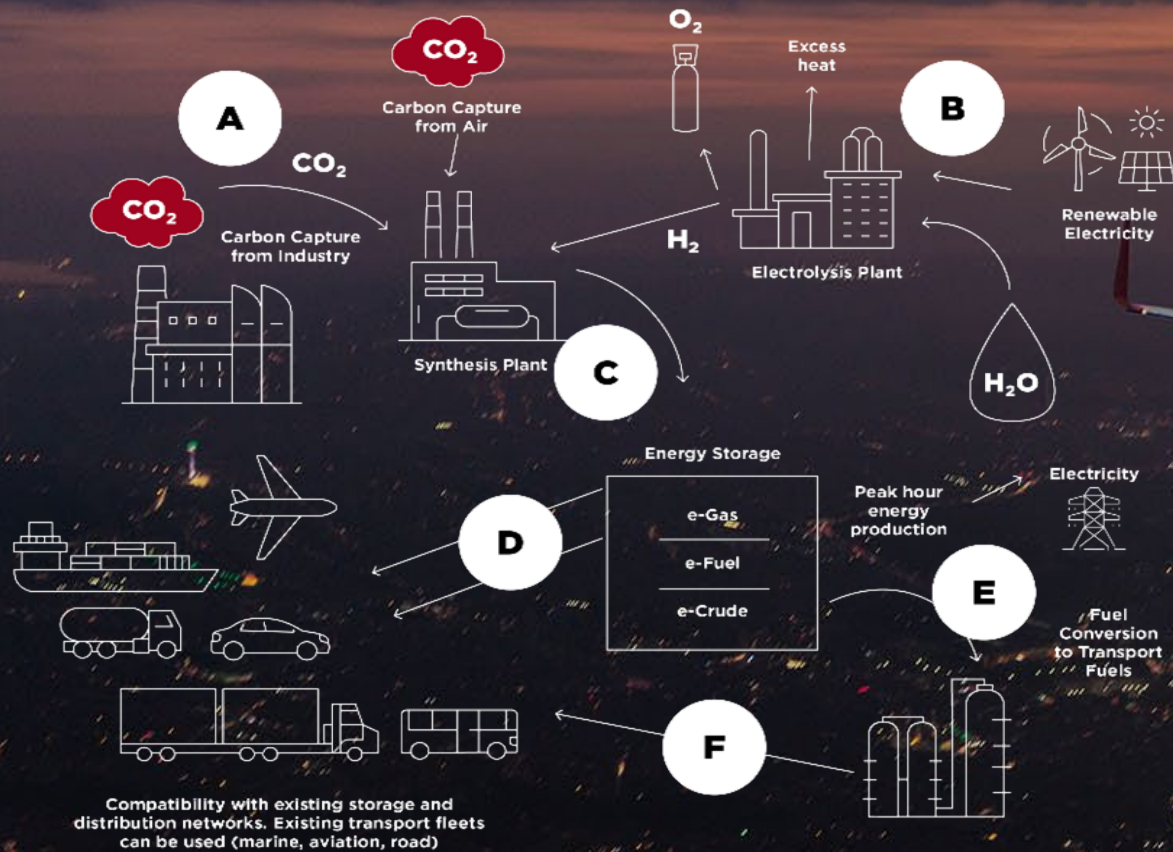


# H2 Feedstock – Future Upstream





# Power-to-X process



The hard to "de-liquify"!

- A** Carbon dioxide is captured from air or industrial sites by using carbon capture technologies
- B** Water is split into oxygen and hydrogen by using low-cost renewable electricity. Excess heat can be utilized in district heating networks.
- C** Carbon dioxide and hydrogen are combined into hydrocarbon products

- D** Synthetic hydrocarbon products are stored, thus providing converted solution for electricity storing. Fuels can be used for transportation
- E** e-Crude can replace fossil crude oil in refineries
- F** Refined fuel products for transportation



# H2 in Production



## St1 Wind Power

## St1 Gothenburg Refinery

Capacity is 30 million barrels of annually

Energy efficiency with high heat recovery – district heating to 70 000 households

Most energy needs from own gas production

Refinery 2030 Transformation

## St1 Biorefining

Advanced Ethanol

Renewable Diesel

H2 from steam reforming – replace natural gas with biogas

H2 from electrolysis and own wind power production



# H2 – Regulatory Challenges



# Key Challenges

- Definition green hydrogen
- Additionality green power
- Permit processes wind power
- Energy efficiency as a criteria
- Definition RFNBO and sustainable CO2
- Allowing for phasing in and phasing out



# Key Take Away's



Factfulness!

*Science based driven as opposed to views and opportunistic politics*

Media!

*Objective and balanced as opposed to sensational and deliberately biased*

No silver bullet!

*Multiple sustainable energy solutions needed as opposed to "one solution against the other"*

Technology Neutrality!

*Strict sustainable criteria as opposed to listed feedstock and technology constraints*

Compromises!

*Careful compromises as opposed to militant no negotiables*



Final words.....



H<sub>2</sub> – a colourblind and colourless gas with no colour  
*Let us focus on impact over time and not semantics*

H<sub>2</sub> – an escapeprone gas  
*Let us not let the opportunity escape us*



A composite image representing sustainable development and environmental stewardship. The scene features a vibrant green hill in the foreground with several white wind turbines. In the background, a dense city skyline with various skyscrapers is visible. A large, glowing globe of the Earth is positioned on the right side of the hill. The sky is a deep blue with wispy white clouds, and a white commercial airplane is flying in the upper left. The bottom of the image shows dark, rippling water. The overall color palette is dominated by greens, blues, and greys, with a bright, ethereal light source behind the globe.

Thank You!