# Port of Antwerp

Power-to-methanol demonstration project

Oiltanking

HELM PROMAN METHANOL

Vlaamse Milieuholding

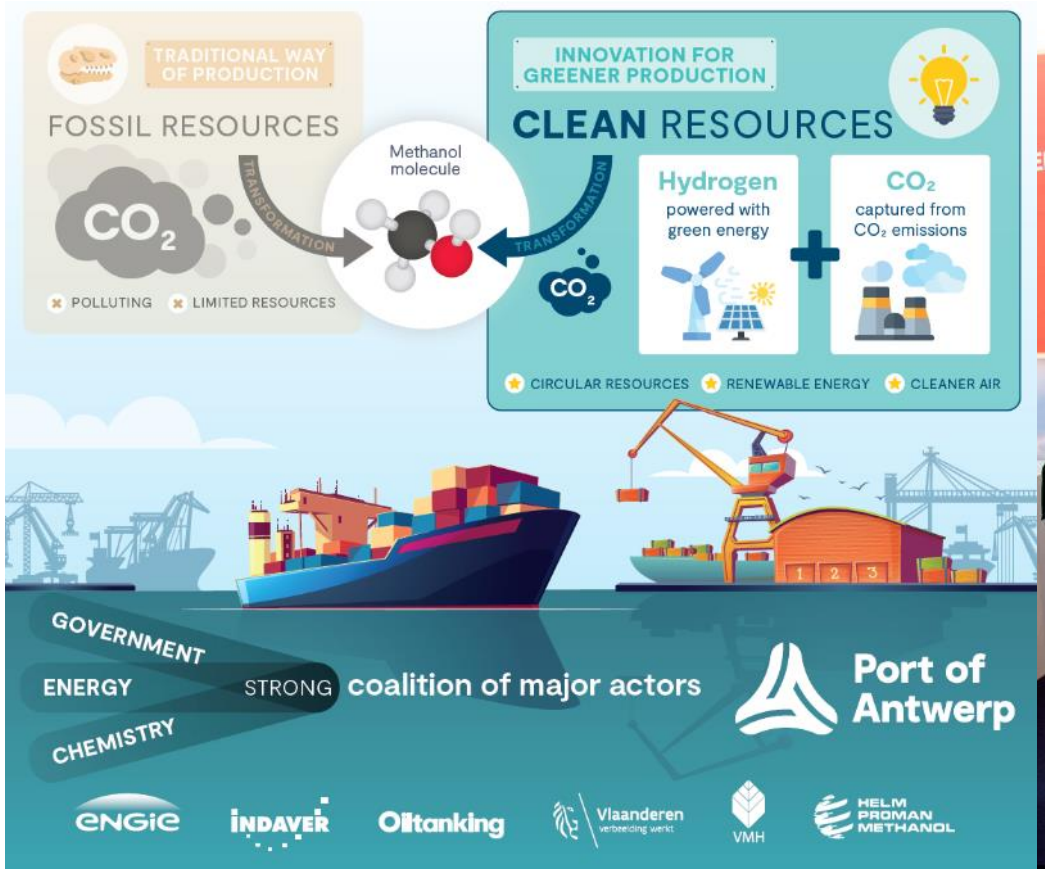
ENGIE Electrabel

Port of Antwerp

INDAVER

# First application with green hydrogen

## Power-to-Methanol demonstrator



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# Main demonstration drivers

## Learning by doing:

how process efficiency copes with operational flexibility
how synergy with industrial waste stream can increase viability

## Proving: how flexibility can lead to viability

Using energy market flexibility to mitigate energy costs
amortising the cost impact of flexibility by waste hydrogen synergy

## Showing: how CCU-based-molecules can enable transition in energy, chemistry and fuels

RED II CCUfuel lighthouse project
In support of climate action plans

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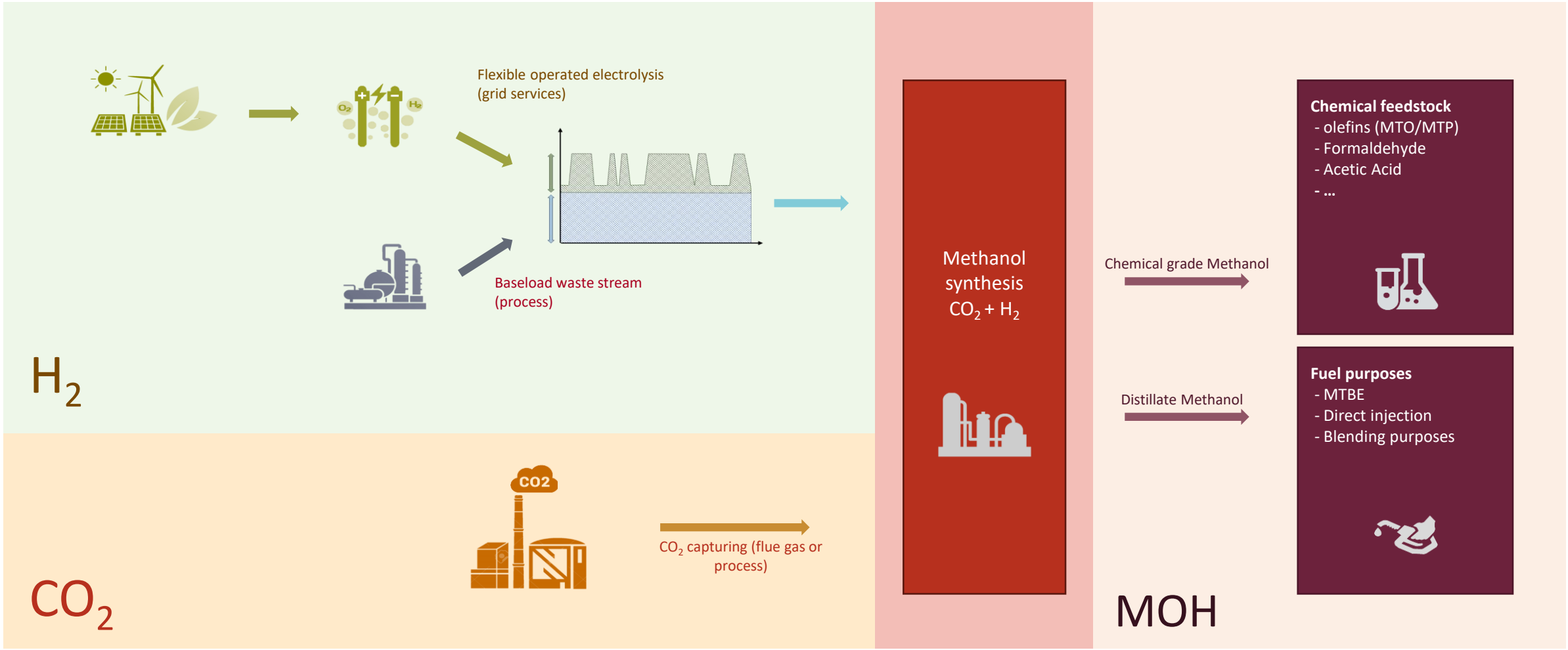
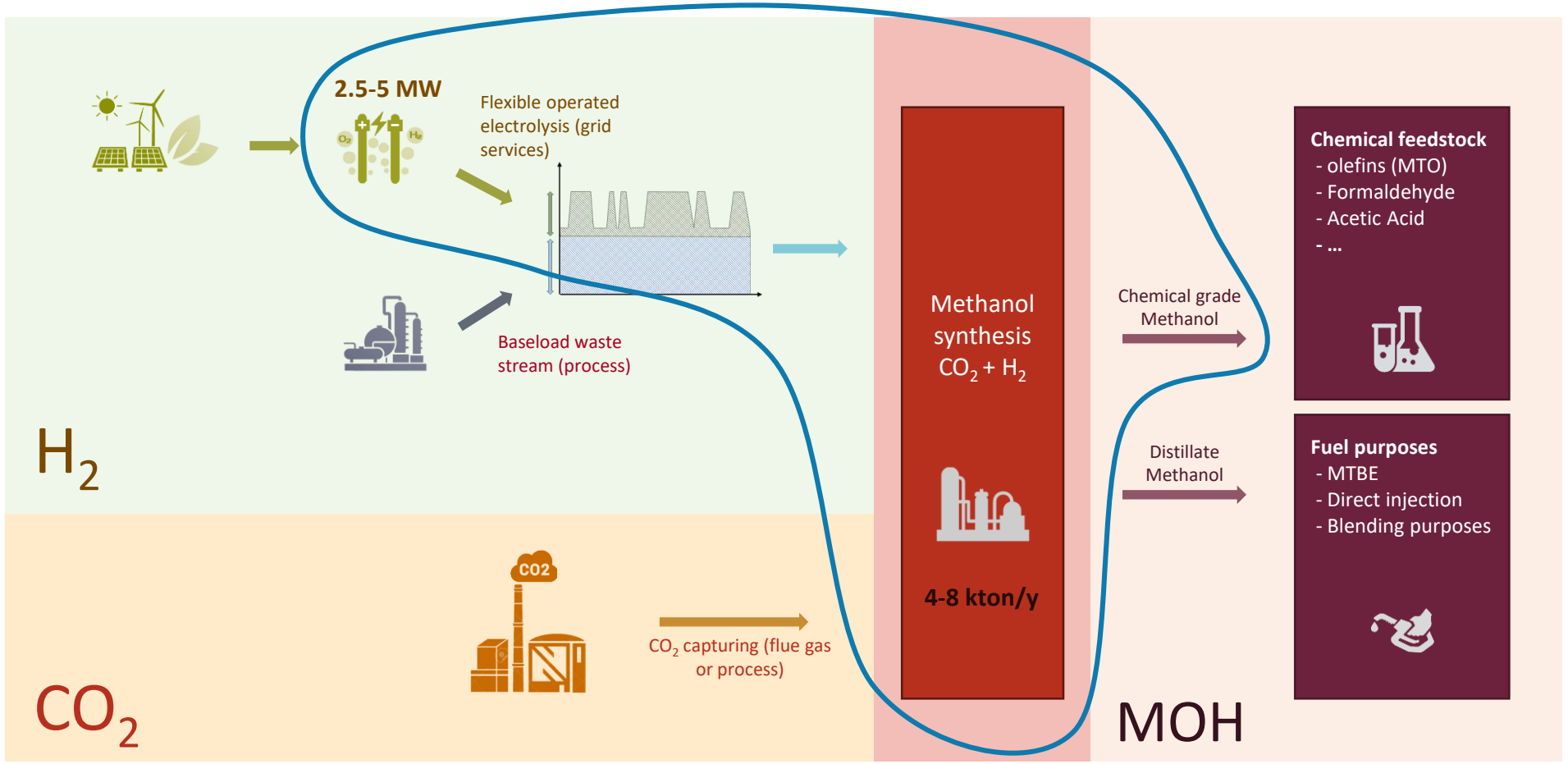
# High level concept



# High level concept

## Scope, size & costs




### Scope

In scope (Capex)
- ✓ Electrolyser
- ✓ Synthesis reactor
- ✓ Distillation

Out of scope (Opex)
- x Renewable energy production
- x CO2 capturing
- x Waste stream Hydrogen

### Size

- 2-5 MW electrolyser
- 4-8kton synthesis

### Costs

- *investment reactor & distillation ± 6-9 M€*
- *invest. Electrolyser 2-4 M€*
- *investment BoP 1-4 M€*

➔ *total: 10-17 M€*

➔ *Expected subsidy rate of 40% due disadvantage of scale*

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# GHG reduction potential

## Which markets will be targeted?

**Market 1: low impact transport (e.g.: shipping)**
**RED II framerwork to valorise green methanol!*

*If 100% green H2 input and 100% green energy used for process for a 8 kton installation. -> direct impact on GHG emissions!

**Pilot**

11.200 ton CO2

8.000 ton MOH

- 11.200 ton CO2

**Market 2: low impact chemistry (e.g.: methanol to olifins)**
**valorise methanol in niche markets and 'volunteering' companies?*

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# GHG reduction potential?

## RED II -> methodology?

RED II Fuel cat.

Main scope

PtM demo case relevance

Art. 27 Energy funnel

GHG reduction benchmark

GO book&claim

Refunobio's

### H2 options:

1. from electrolysis based on RE cfr RED II art, 27 funnel
   → LCA GHG burden: renewable and thus 0? or other allocation basis
2. from chlorine electrolysis (grid mix RE-part)
   → LCA GHG burden: renewable and thus 0? or other allocation basis
3. from dehydrogenation (renewable propane/ethane)
   → LCA GHG burden: energy based/value based/mass balance…?

Additional/lost renewable electric energy

General in terms of sites, CO2

NA to spare hydrogen basis?

### $CO_2$ options:

Direct connection/ grid mix/ additional grid volumes → delegated act

captured CO2 from industrial point sources:

- Non-ETS:
  - A large scale waste incinerator, with two options: a ca 55% bio-waste household waste stream or a dedicated B-wood incinerator;
- ETS:
  - A gasification process with biogas-production
  - And ethylene oxide process with existing Carbon capture-installation
  - A post-combustion process source

70% threshold

Delegated act

Relevant

→LCA:Captured atmospheric/fatal CO2 thus LCA GHG burden: 0?

→'Emitter stays accountable' principle, so the 'Utiliser' received booked CO2

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# Timeline

| | |
|---|---|
| Q2-Q4 2019 | Pre-FID: contractual framework, subsidy calls, Financial risk analysis |
| Q4 2019: | or |
| 2020: | FEED, permitting, procurement |
| 2021 | Construction |
| 2022 | Commissioning |
| 2023 | Producing CCUfuels |

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