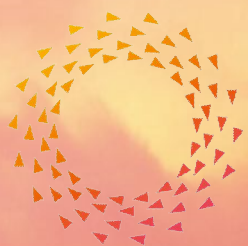


GHG EMISSION REDUCTION POTENTIAL BY VARIOUS P2X OPTIONS

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**NEO
CARBON
ENERGY**

WP workshop

11.1.2016

Rationale

- The goal of LCA approach is to study:
 - Is it possible to reduce GHG emissions via P2X routes?
 - What are the main sources of GHG emissions from various P2X options?
 - Is it possible to improve P2X routes from GHG perspective?
 - To create a tool for GHG emission reduction calculations for various P2X industry cases.

Markets

	Potential	3 MW wind mills
Neste NEXBTL production in Porvoo	16 800 000 kg	140
CH4 vehicle use in Finland	1600 LDV 65 MDV+HDV	11
CH4 vehicle use in EU	1 125 000 LDV 20 000 MDV+HDV	4 800
HELEN Vuosaari power plant NG consumption	951 000 000 m ³ n	2 900
Global ammonia production	120 000 000 t	170 000

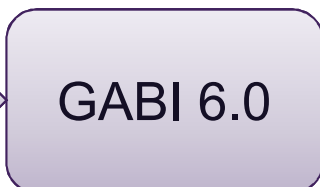


Approach

SCREENING PROCESS



CASE STUDIES

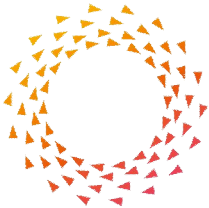


GENERAL
FINDINGS ON
ASPECTS
AFFECTING GHG
EMISSIONS

DETAILED
PROCESS
SIMULATION FOR
DIFFERENT
SCENARIOS

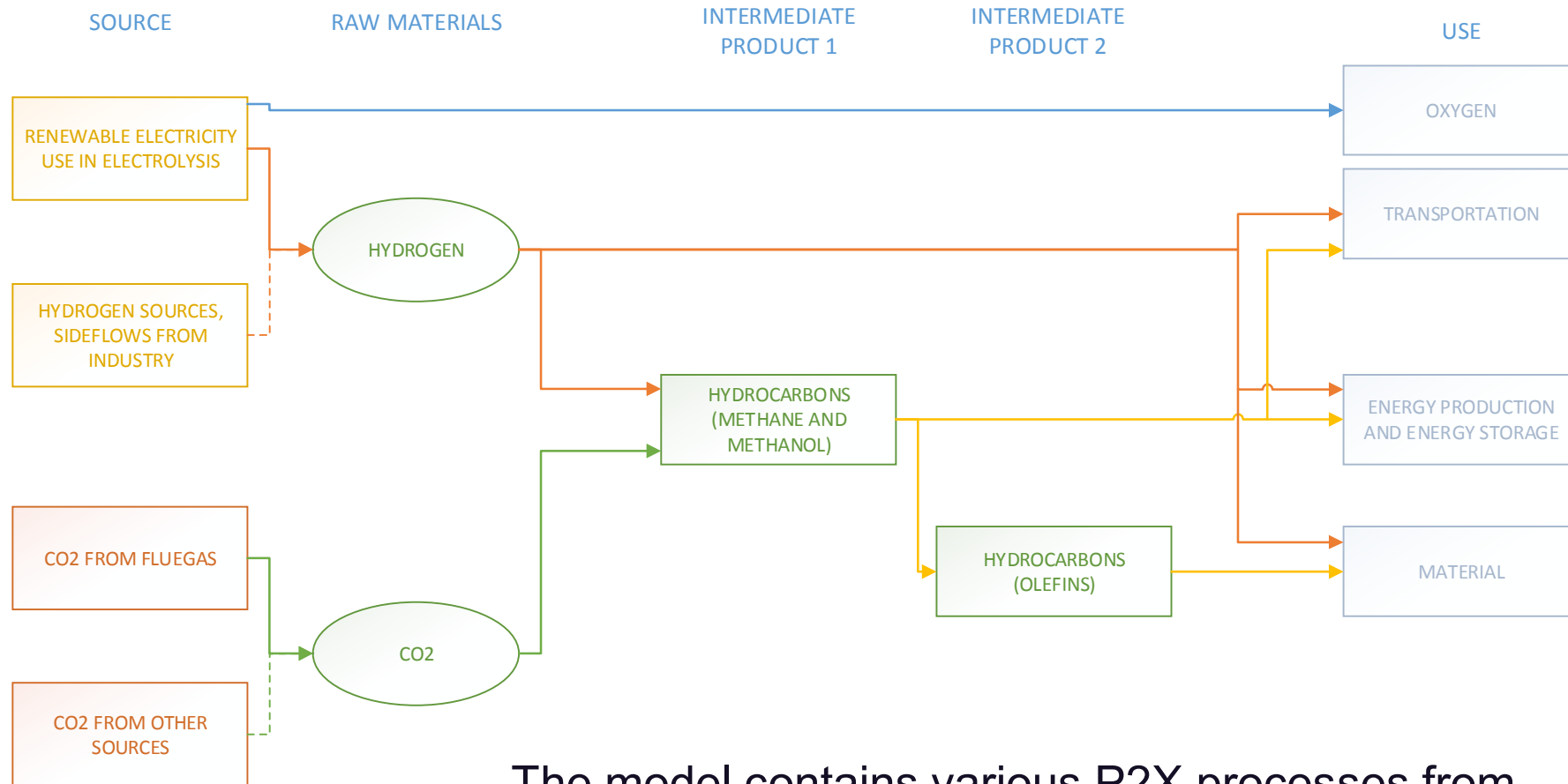
GENERALIZING
RESULTS TO
REPRESENT
ANNUAL
PERIOD

DETAILED
GHG
EMISSION
MODELLING
FOR
DIFFERENT
SCENARIOS

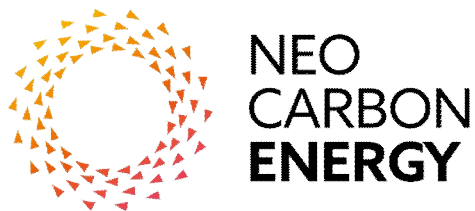


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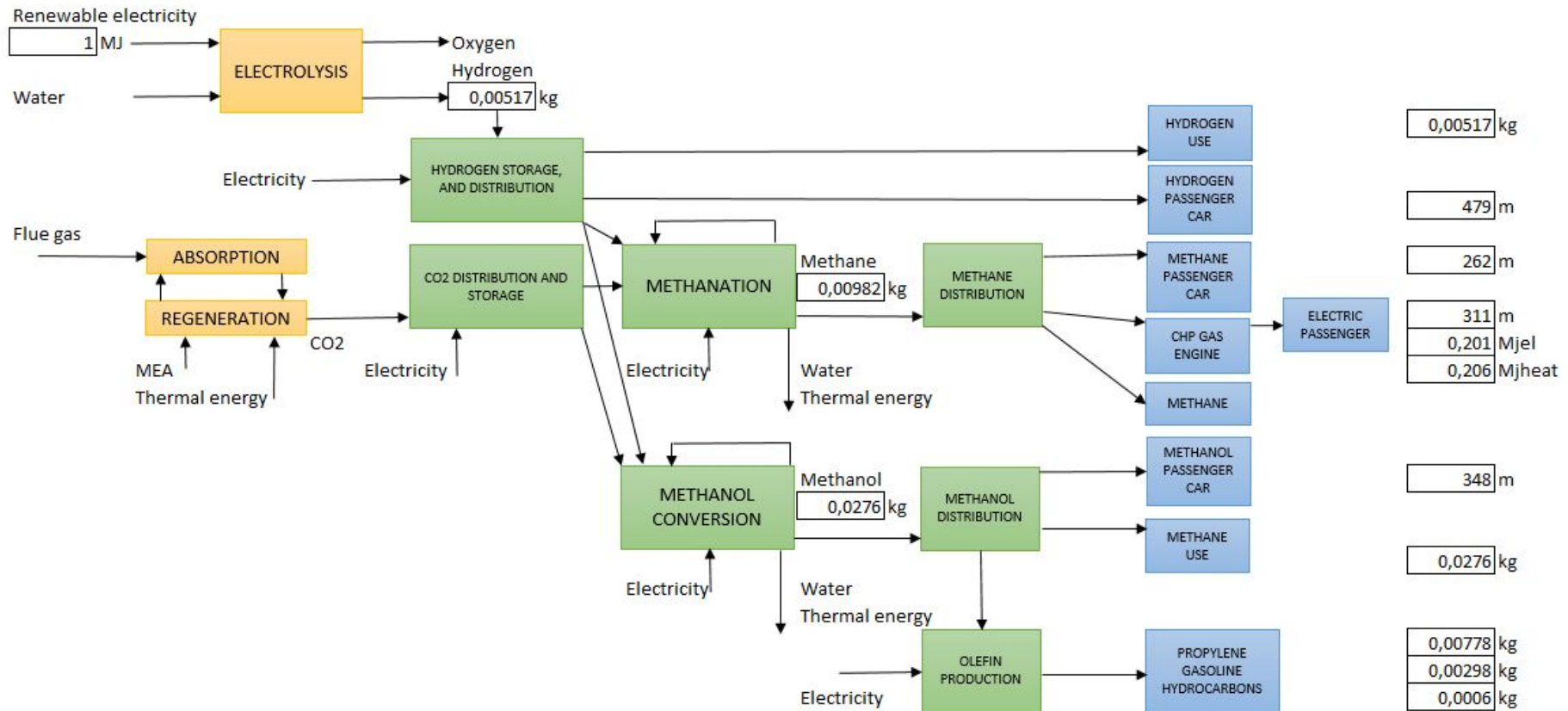
Screening process



The model contains various P2X processes from renewable electricity and CO2 to various energy and material uses.

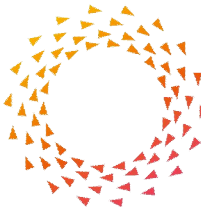
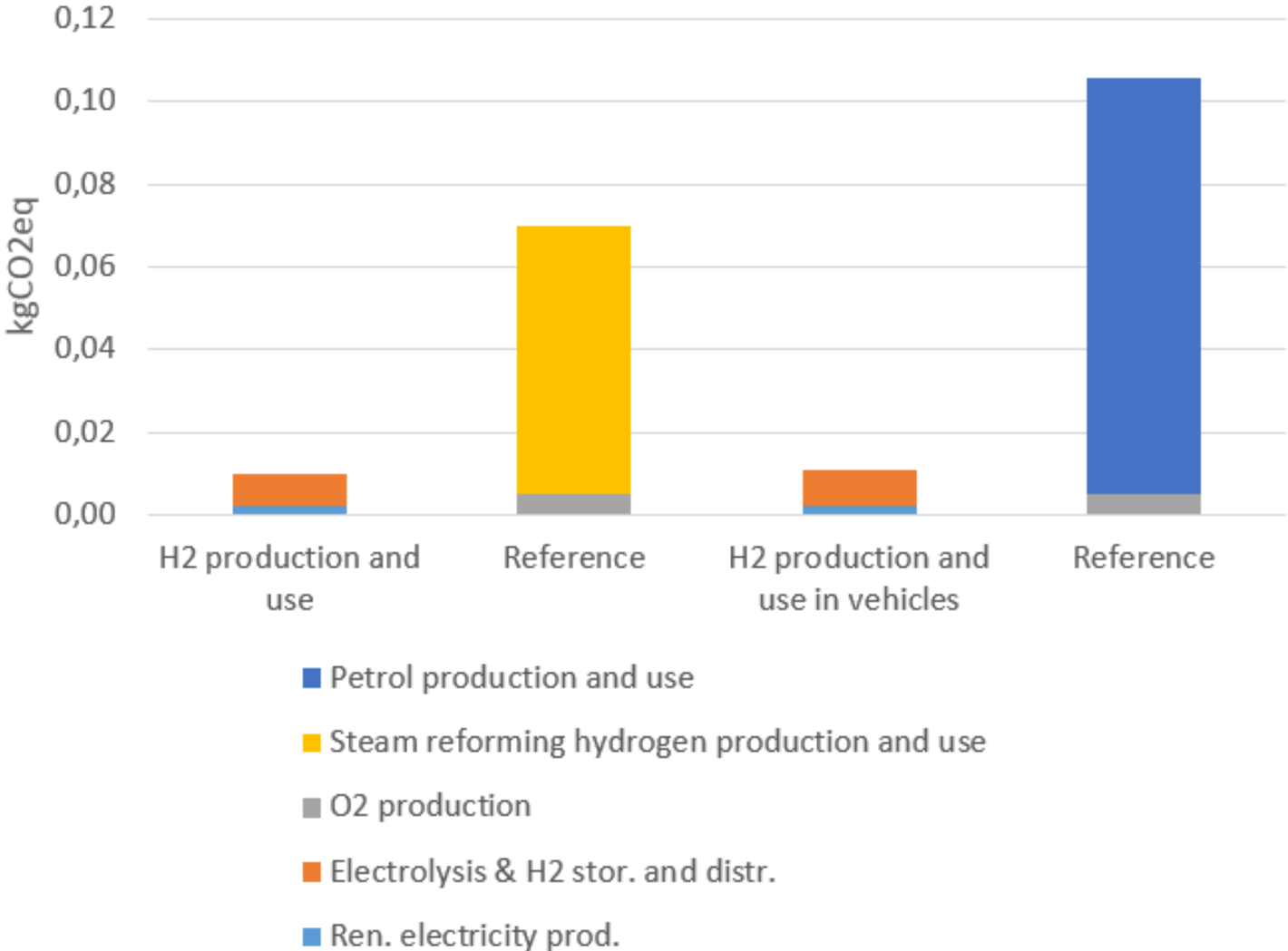


Material and energy balances



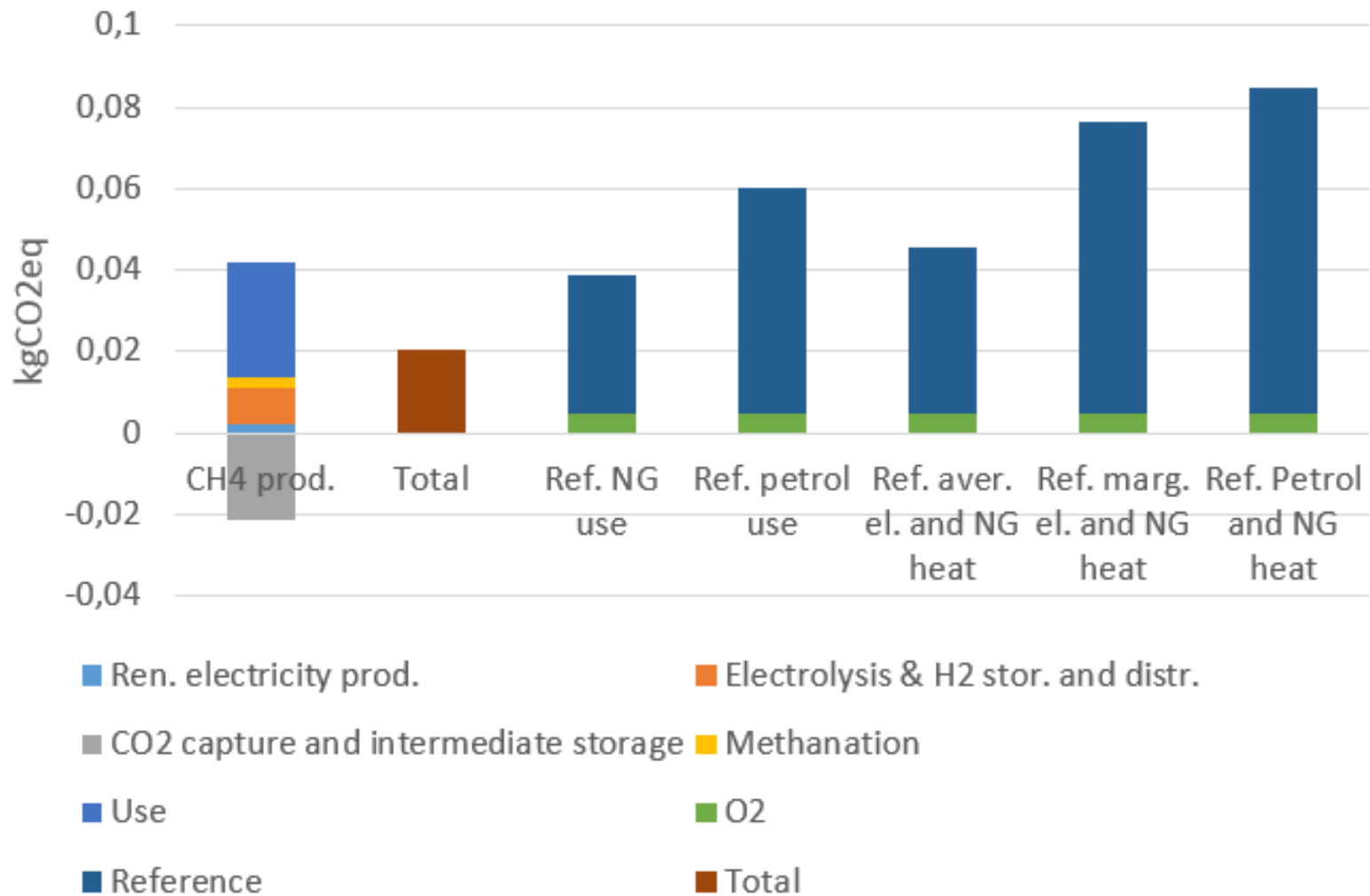
GHG emissions 1/3

- GHG emissions from hydrogen production and use



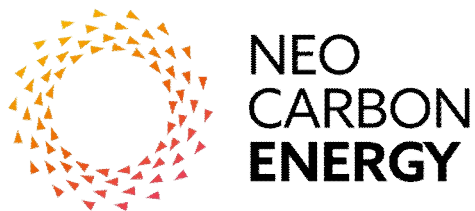
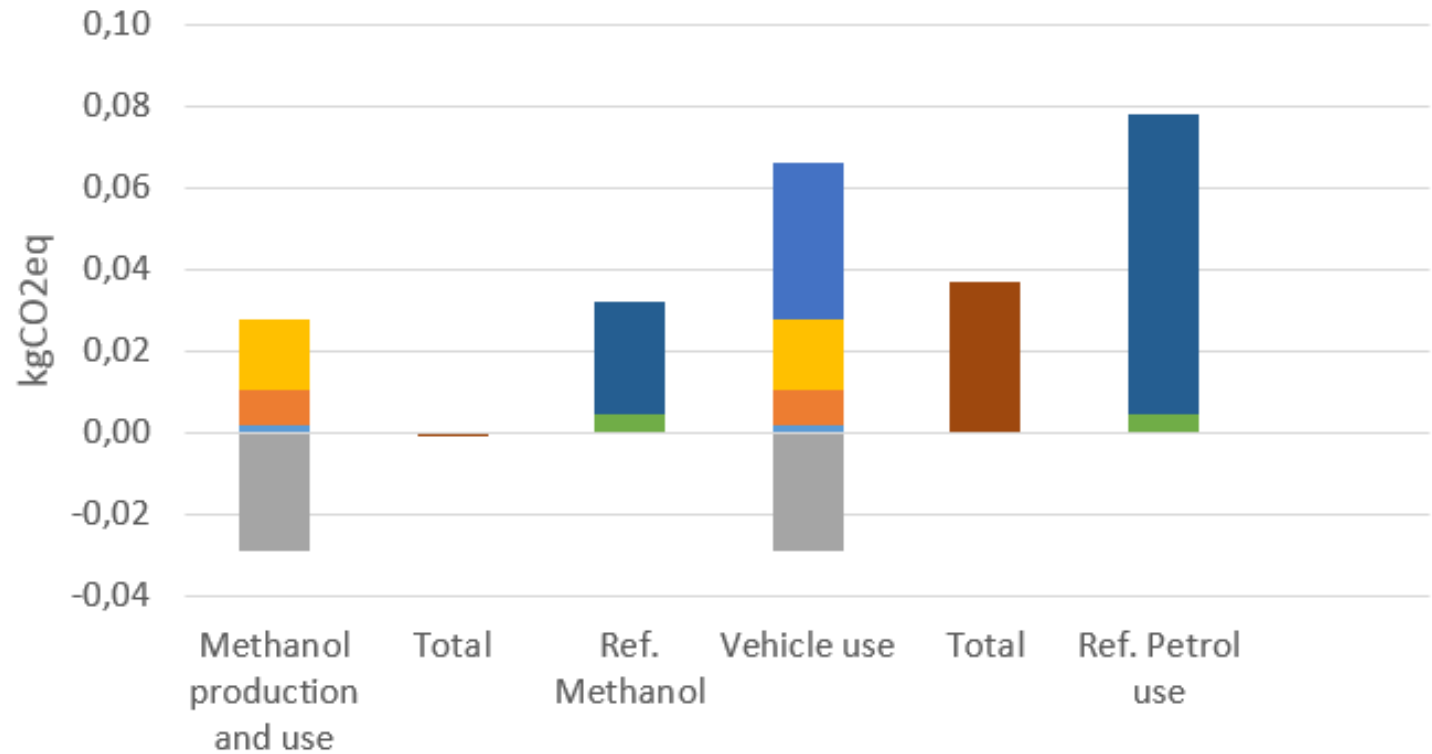
GHG emissions 2/3

- GHG emissions from methane production and use



GHG emissions 3/3

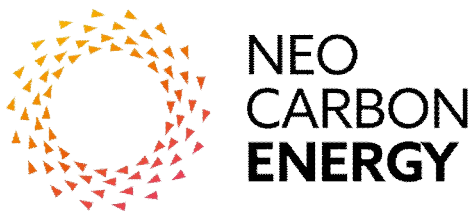
- GHG emissions from methanol production and use



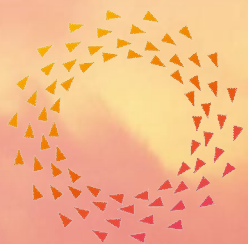
- Ren. electricity prod.
- CO2 capture and intermediate storage
- Use
- Reference
- Electrolysis & H2 stor. and distr.
- Methanol conversion
- O2
- Total

Discussion and conclusions

- GHG emission reduction are quite obvious with P2X processes
- Transportation use and chemical use lead to highest GHG emission reductions
- From a global perspective CO₂ source does not have a significant role
- There are various factors along the life cycles that have effects on the results
- Material use enables CO₂ storing
- Screening model enables rapid GHG emission calculations for different industry case studies
- Products from P2X have significant global demand
- How to meet new GHG reduction targets?



WP3: NCE REPORTING



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NCE reporting

- Scientific Journal paper will be submitted during spring 2016

