Sustainable Energy Systems 2050
NORDIC ENERGY RESEARCH PROGRAMME

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CO_2 Electrofuels

Kick-off Event: Sustainable Energy Systems 2050

Radisson Blu Royal Hotel, Helsinki

October 12th, 2011

Claus Friis Pedersen

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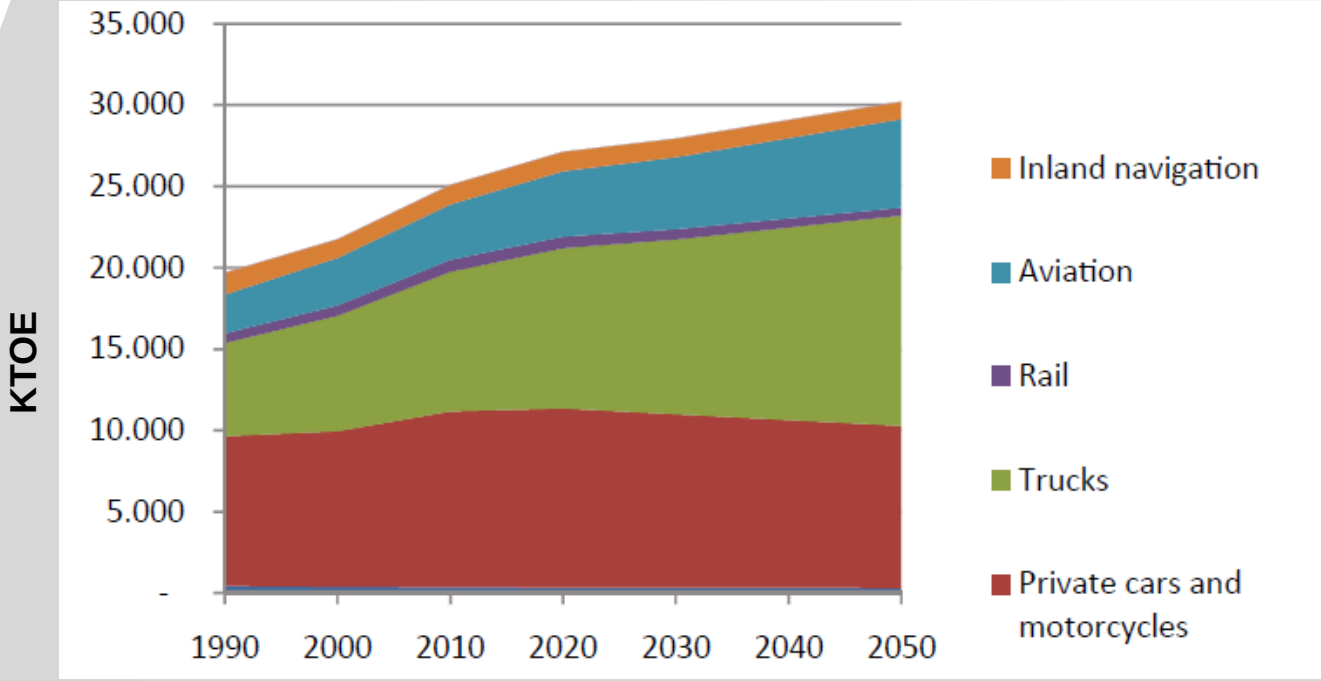
Future transportation energy demand

Nordic Energy demand by transport mode



"Foresight Analysis: Nordic Strategies for Renewable Transport"

Heavy transportation will account for the majority of the transportation energy demand

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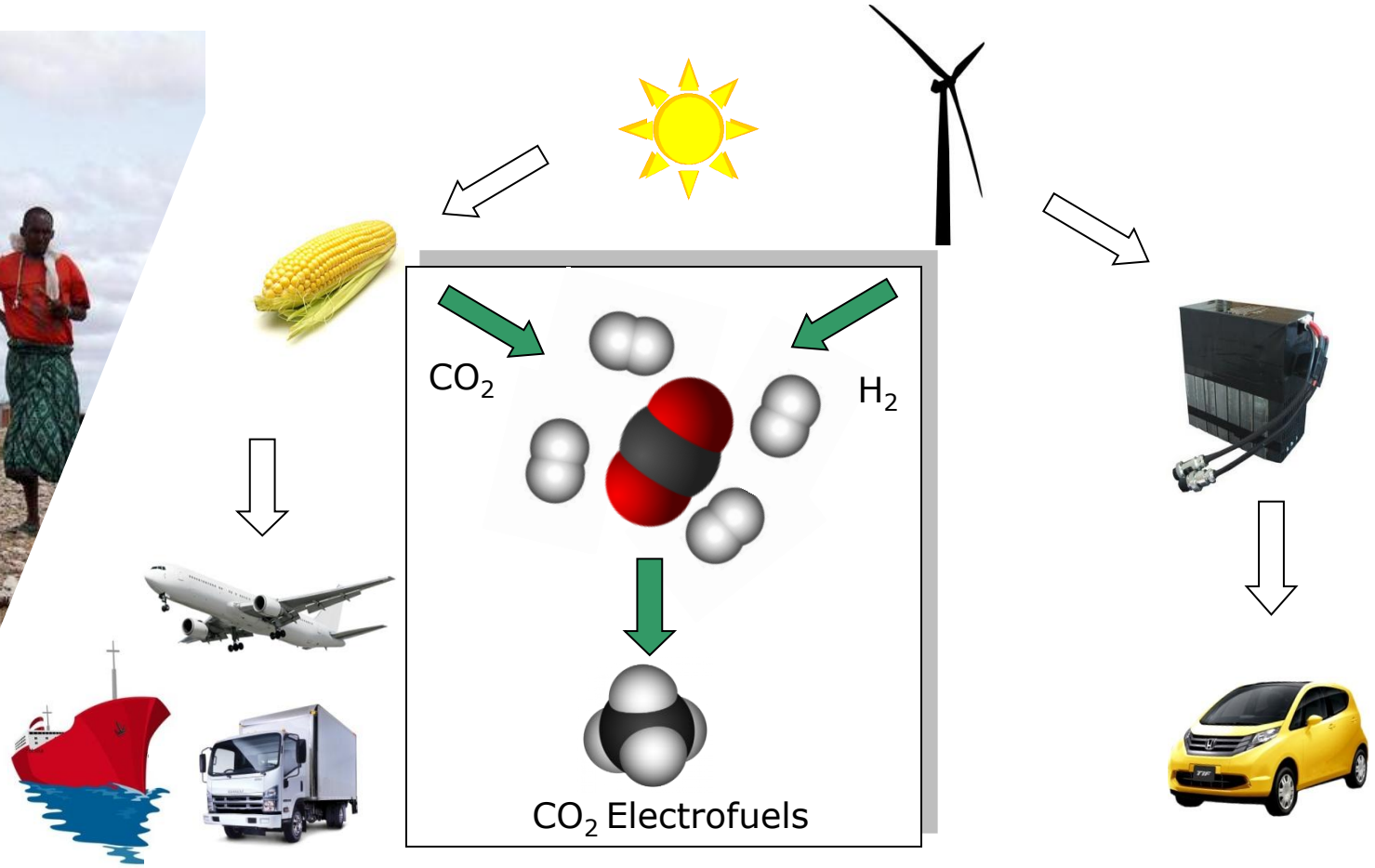

CO_2 electrofuels can double fuels produced from existing biomass

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The CO_2 Electrofuel

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VOLVO

e·on

CHEMREC
Energy to Succeed

Nýsköpunarmiðstöð Íslands

Olíudreifing

WÄRTSILÄ

SORPA
Flokkum og skilum

Ea Energy Analyses

HALDOR TOPSØE

DTU

Is CO_2 electrofuels a viable and competitive technology for the Nordic countries?

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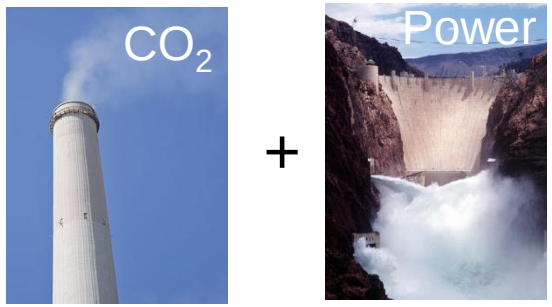
Project Background



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Further studies required on:

1. Reduction of electrolysis CAPEX & OPEX
2. Feedstock, electricity, CO_2, water & steam etc.
3. Synthetic fuel infrastructure (Methanol, SNG, DME)

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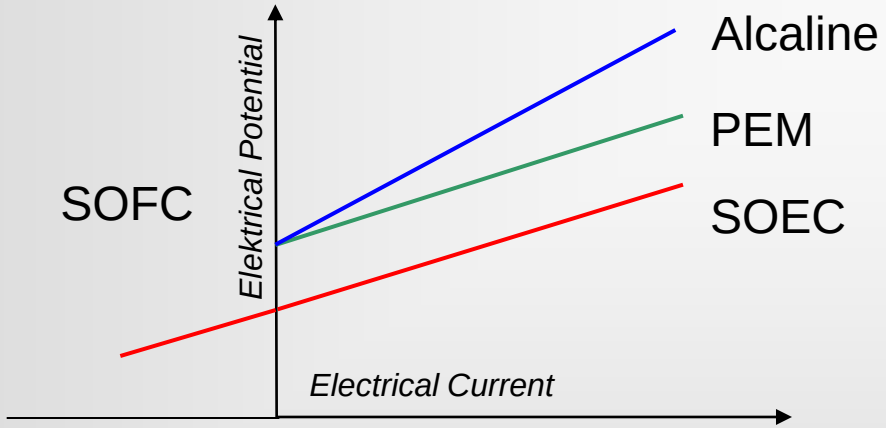
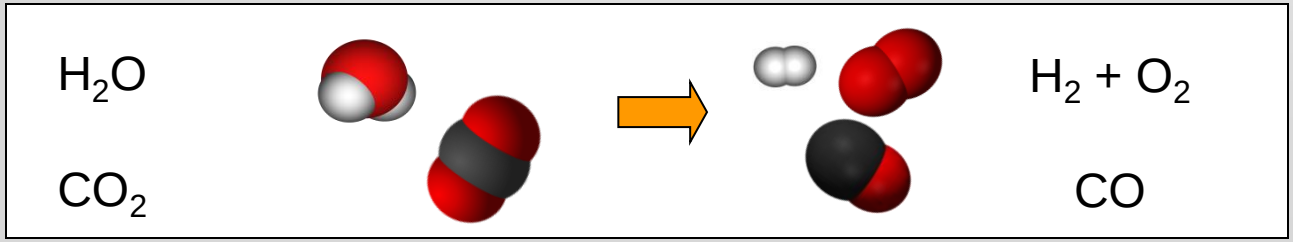
Electrolysis Cost reduction

1) Efficiency

2) SOFC & SOEC

3) H_2O & CO_2 Electrolysis





SOEC has a potential for up to 50% cost reduction

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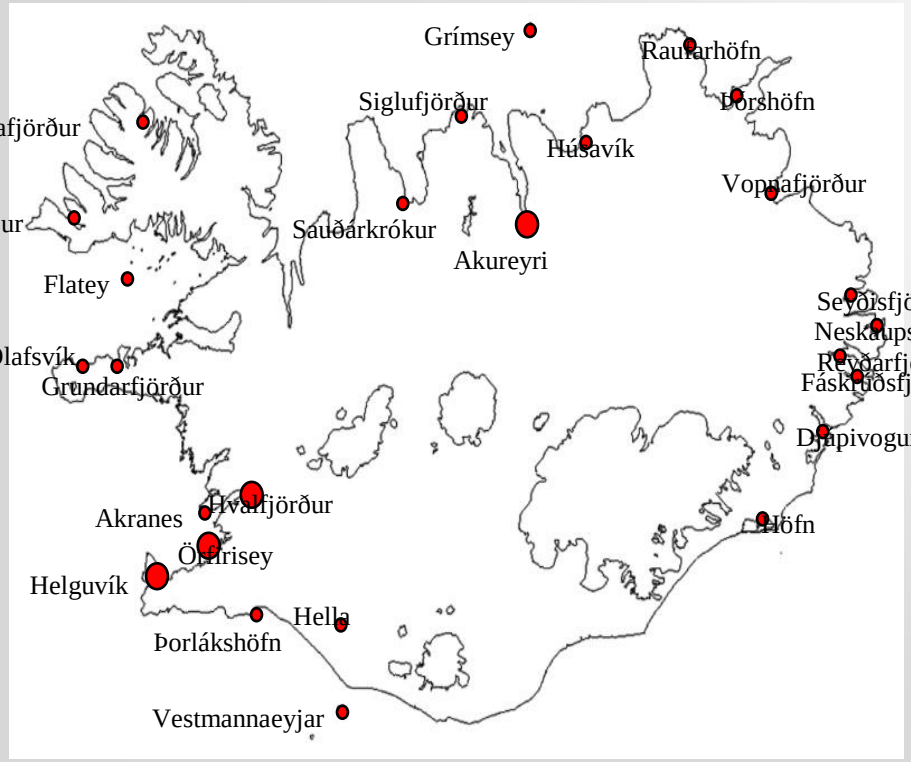
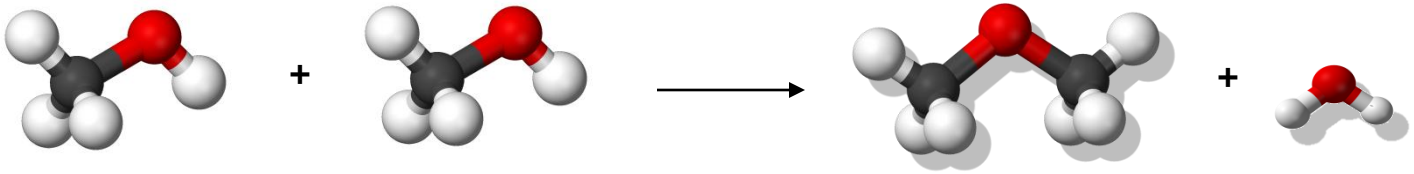
Synthetic fuel infrastructure



Methanol (liquid) + Methanol (liquid) → DME (gas) + H_2O



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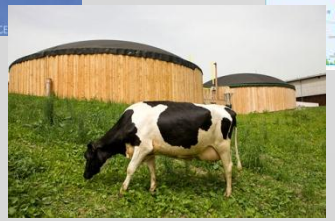
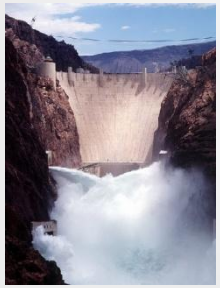
Feedstock analysis

CO_2



Power



CO_2 and Power availability determines CO_2 Electrofuel cost

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Biogas Example

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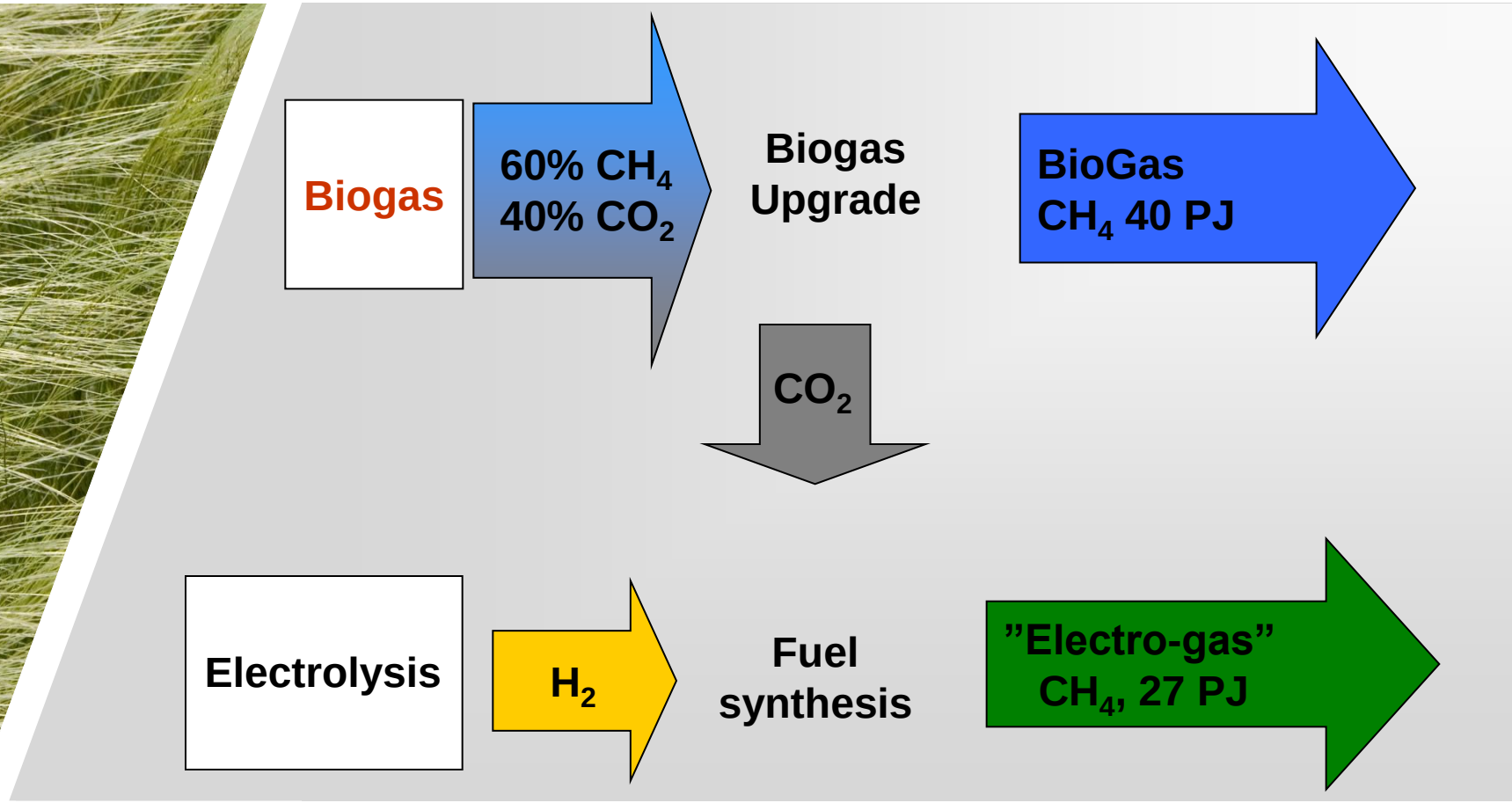

Grid load balancing and 65% more fuel with CO_2 electro-gas.

Summary

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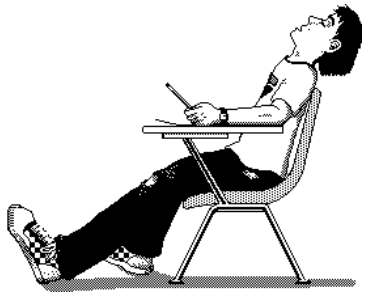
- CO_2 Electrofuels can
  - Potentially double heavy transportation fuels
  - Provide grid load balancing



- New electrolysis technology is developed and feedstock and economics are analysed by 10 Nordic partners

- End goal is to quantify the potential and possible roll-out of CO_2 Electrofuels in the Nordic region and to propose first demonstration sites and assocoated investments

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