Looking at the long-term: Role of gas in a net-zero Europe

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EU energy objectives

Market liberalisation and harmonisation

Decarbonisation

S. of Supply

Energy Union

Clean Energy

Deep decarb.
EU mid-century climate strategy

- UN Paris Agreement (December 2015)

- EU Heads of Government request the European Commission to prepare “within one year a Strategy for long-term EU greenhouse gas emissions reduction in accordance with the Paris Agreement” (March 2018)

- Commission Communication (November 2018)
Mid-century “deep decarbonisation”

- 2050: -95% CO₂
- 2070: -100% CO₂ (net-zero, including some negative emissions)
- 86% greenhouse gases
Which pathway?

<table>
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<tr>
<th>All-electric</th>
<th>“Gaseous fuels”</th>
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<td>But all-electric might not work out simple or cheap ...</td>
<td>What are the possibilities for climate-compatible gas fuels and infrastructure?</td>
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<td>Electricity is becoming green: All-electric looks like a simple answer for the energy transition</td>
<td>Is a multi-vector energy transition too complicated, or is it more affordable?</td>
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Renewable and decarbonised gas

• CO₂-neutral Green Hydrogen from Power-to-Gas (P2G) processes using renewable electricity

• CO₂-neutral Blue Hydrogen produced from natural gas in combination with pre-combustion carbon capture and storage/use (CCS/U)

• Carbon negative Synthetic Methane produced from biogas or P2G in combination with post-combustion CCS

• CO₂-neutral Biogas and Biomethane produced from municipal waste, agricultural residues and sewage
Net-zero feedstocks and energy
**Scenario 1: Conventional Wisdom**
- Economy to pick up, overall lower than previous outlooks.
- Renewable energy, especially wind power, to increase.
- Nuclear power is limited by upcoming closures, but stable in the long-term.
- CCS to be developed at a slower pace than previously expected
- Increasing use of gas for shipping and truck transport.

**Sensitivity 1.1: Electrification**
- Aim: to assess the consequences of an increasing push towards electrification.
- Electrification is maximised in all sectors.

**Scenario 2: Innovative Gas**
- Aim: to assess new technological developments of recent years.
- Same macro-economic outlook as ‘Conventional Wisdom’
- Exploring the potential of power-to-gas, used in full gas system.
- Reflecting current societal concerns: Less new nuclear sites to be available, and less CCS site to be available.

**Sensitivity 2.1: Fuel Switch**
- Aim: to assess the consequences of a fuel switch in the power sector, based on the Innovative with gas scenario, as it is found that this does not occur with current model settings.
Into the future

Equinor/Vattenfall/Gasunie: conversion to run on hydrogen of the three 440 MW Magnum units of Vattenfall Nuon in Eemshaven (MoU 2017).

H21 Leeds Citygate: conversion of existing natural gas demand and distribution to hydrogen in a city of 1½ percent of the UK population (launched 2017, completion 2025).

Causeway: Gas Networks Ireland will inject renewable gas into the Irish gas network for the first time (biomethane from anaerobic digestion of agricultural residues and by-products 2018).

L’Oréal USA/ Big Run Landfill in Ashland, Kentucky: corporate purchase agreement to offset company thermal load carbon footprint from manufacturing and distribution centres with biomethane for injection into the grid.
Thank you for your attention