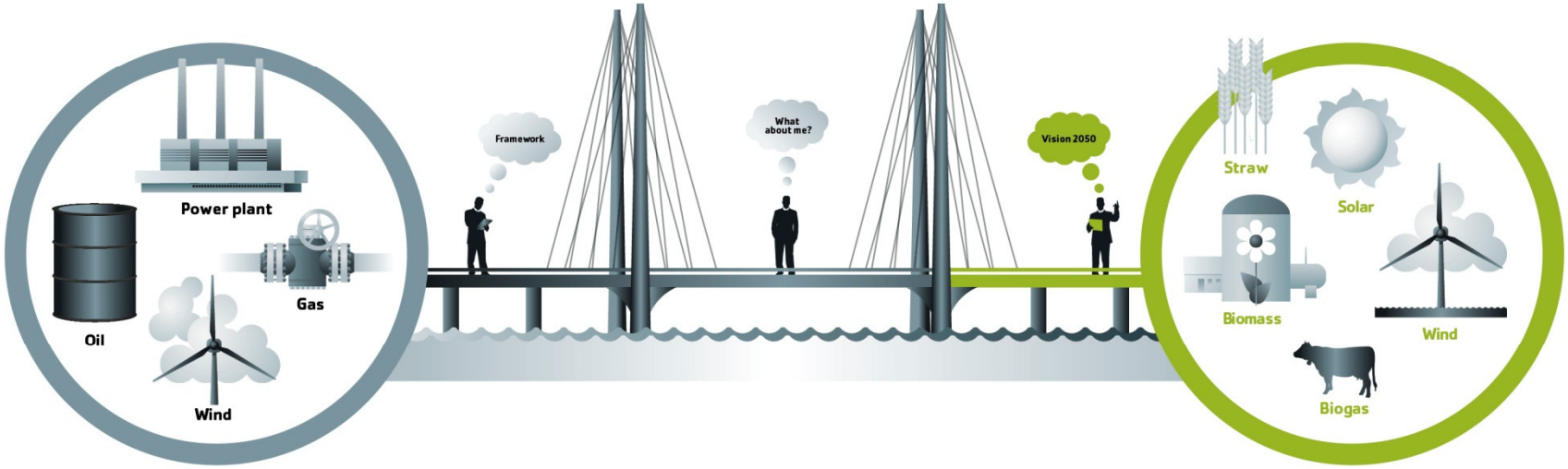
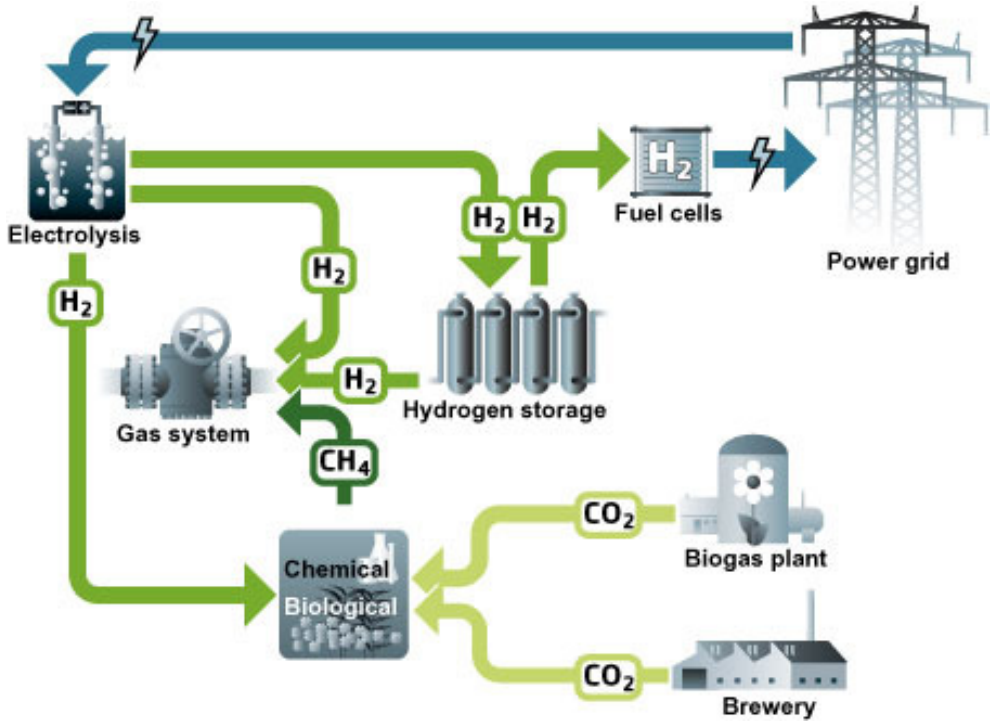
Energy Storage – Hydrogen injected into the Gas Grid via electrolysis field test

North Sea Power to Gas Platform
20th of May 2014
Jesper Bruun

Hydrogen - bridging to a fossil free future



Hydrogen a part of integrating energy systems



- Hydrogen will be used in several different applications
- Important for the infrastructure owners to know the limits
- This knowledge is crucial what either the hydrogen is methanized or not

Scope of the project

- To acquire knowledge of the solutions and costs of upgrading the gas grid to handle hydrogen admixed in the natural gas
- Important to build up competences in the participating companies

- Test period: 2 years
- Up to 15 % hydrogen
- Hydrogen content will be varied during the test

- Total costs around 1 mill. €
- Funded partly by EUDP: Energy Technology Development and Demonstration Programme

Partners in the project

ENERGINET.DK

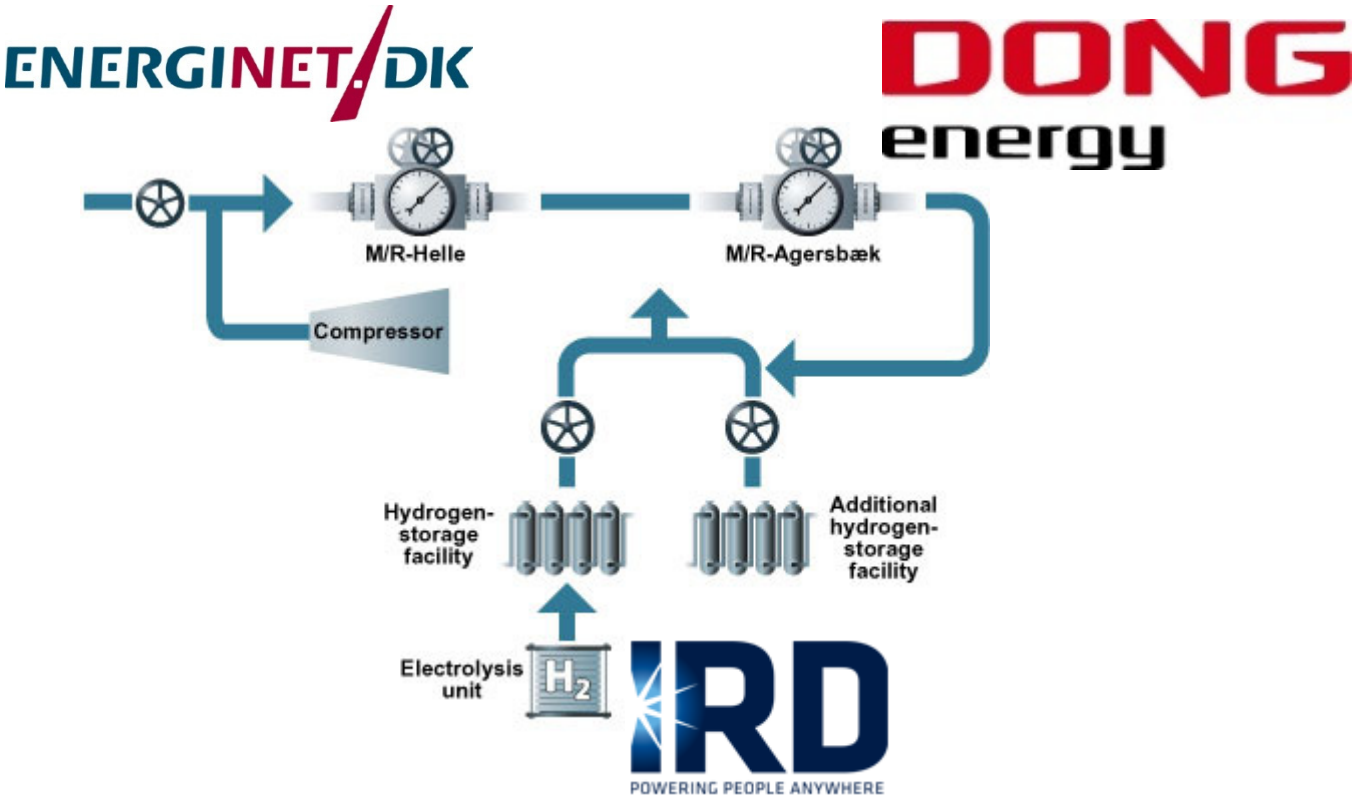
IRD
POWERING PEOPLE ANYWHERE

DGC
Dansk Gasteknisk Center a/s
- rådgivning, udvikling og måling inden for energi og miljø

DONG energy

EUDP
Energiteknologisk udvikling og demonstration

The test loop



Consultant:

DGC

Dansk Gasteknisk Center a/s
- rådgivning, udvikling og måling inden for energi og miljø

Expected challenges

Safety equipment

Seals

Process equipment

Measurement equipment

Focus points of the test

- Hydrogen content up to 15%
- The tightness of seals and equipment
- The materials
- Safe handling of the gas at the stations
- Contact with authorities
- What needs to be changed and how much does it cost?
- Control of the electrolysis plant from Energinet.dk’s control center gas

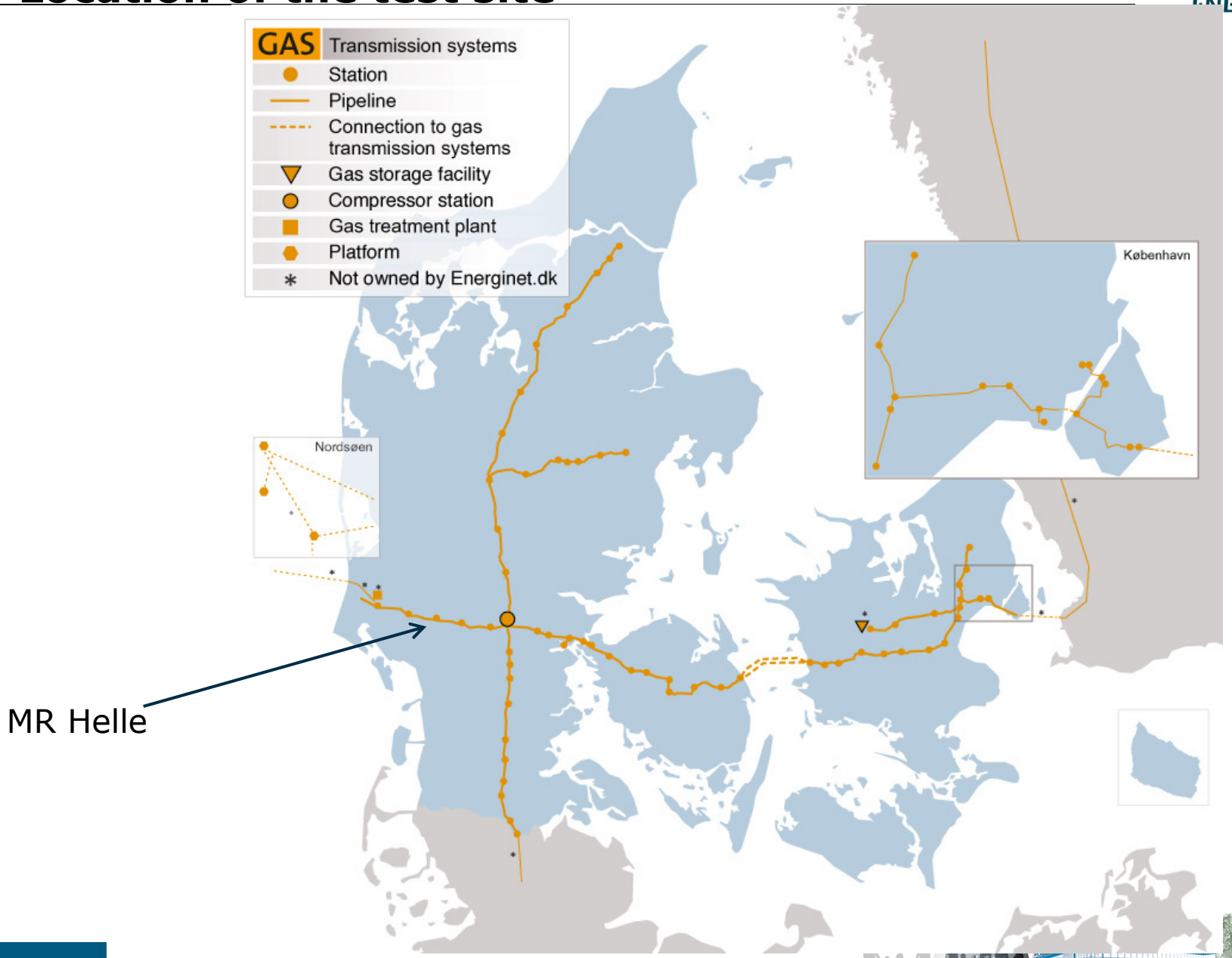
The meter and regulator station

- The MR station has been unused for 2 years
- Not even tight for natural gas after standing still
- First step is a test with nitrogen + hydrogen gas
- Leaks are expected
- The questions are:
  - how many?
  - How much does it cost?

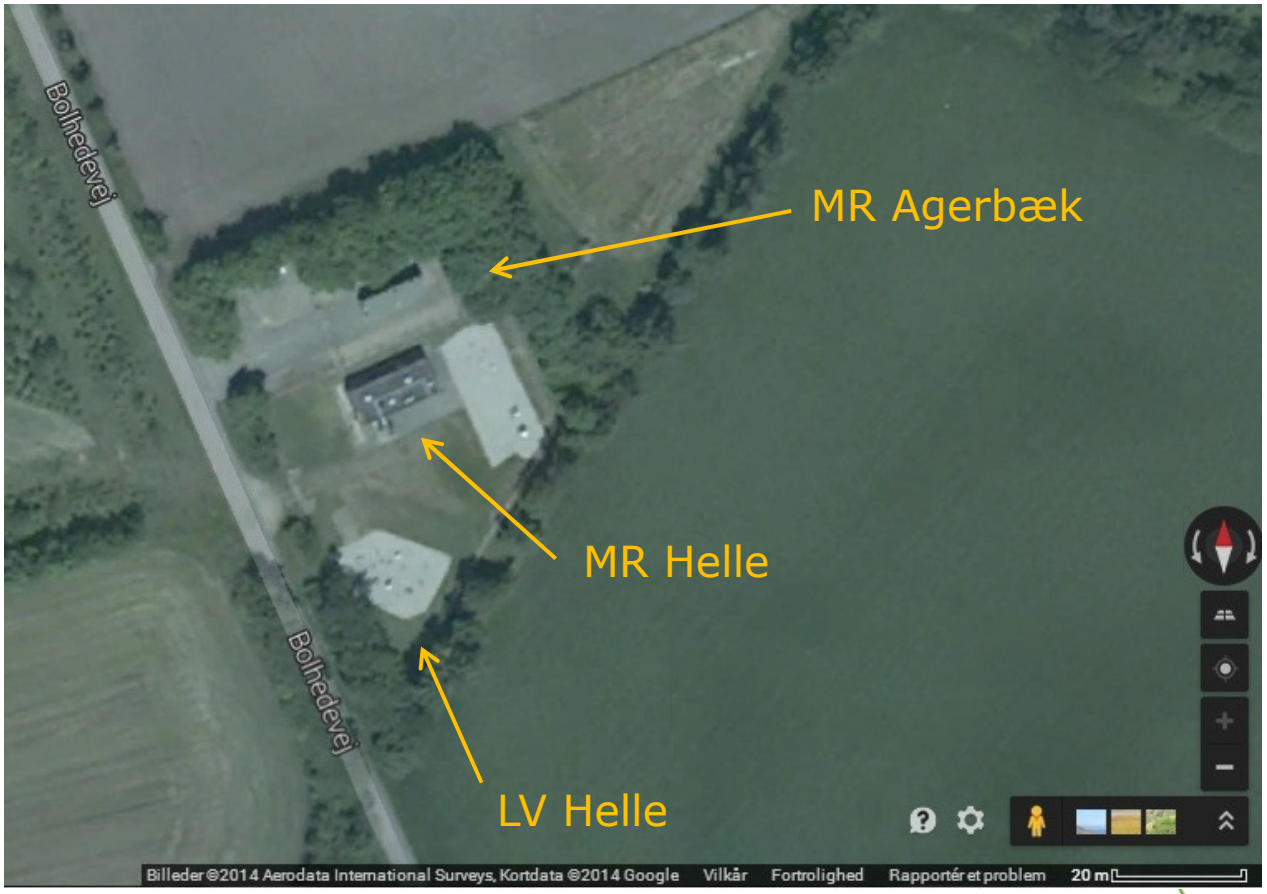
Metering

- The metering will be tested as well
  - Tightness
  - Correct metering
  - A gas chromatograph will monitor the hydrogen content
- Concerns about electrical installations in the MR room.
- All established to natural gas standards not hydrogen
- How much will have to exchanged

Location of the test site



MR Helle and MR Agerbæk

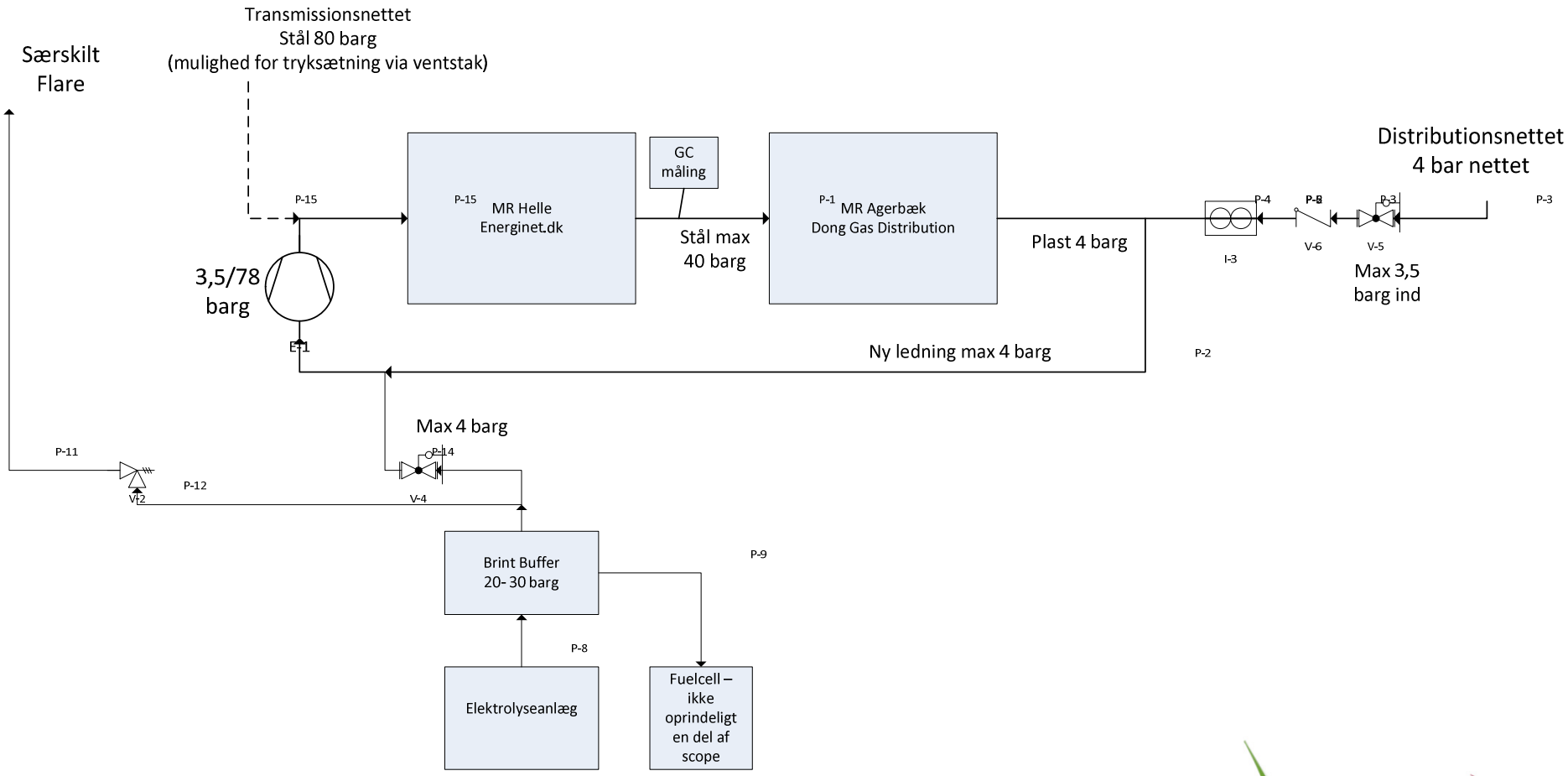


The decoupled MR station

Former connection to the transmission grid

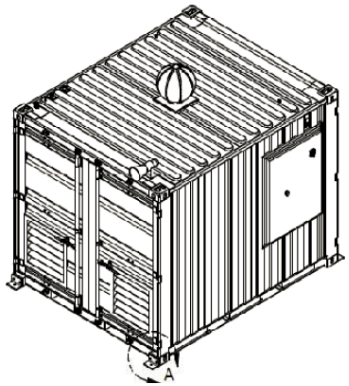
Point of connecting the compressor

Sketched P&I diagram



Compressor for the test

- Membrane compressor from PDC Machines.
- Build for compression of gas with 100 % hydrogen

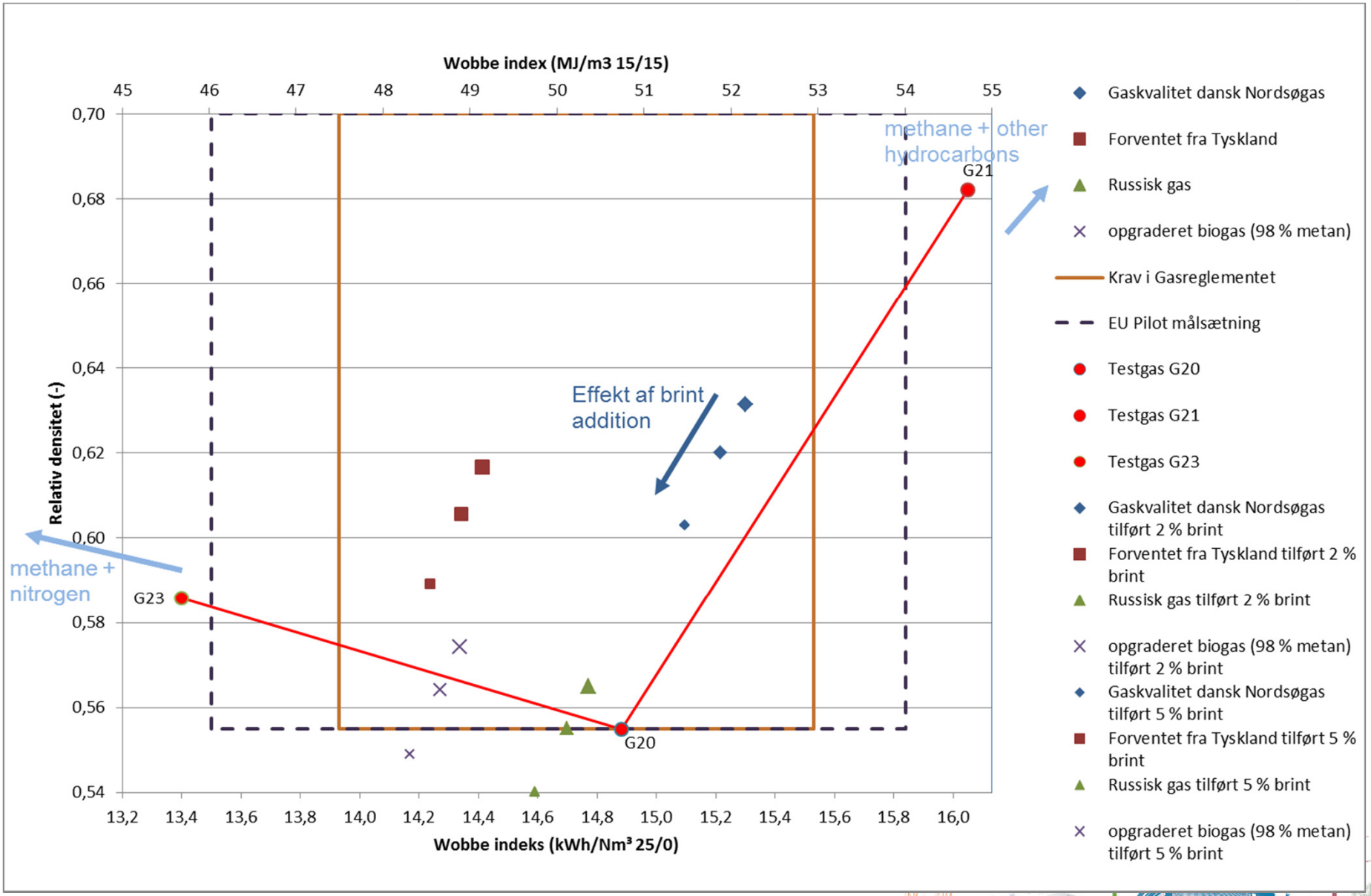


Project plan

År	2014												2015												2016												2017		
Måned	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
WP0 Project management and administration																																							
WP1 Preparation																																							
WP2 Establish the test loop																																							
WP3 Product maturation of electrolysis plant to operate on MRI																																							
WP4 - 24 -month test phase																																							
WP5 - dissemination plan and further work																																							

- Recent activities:
  - Locating potential problems through review of documentation
  - Preparation of process design
  - Specification of compressor

Gas quality – effect of hydrogen admixture



Summary

- Project started January 2014
- The 2 year test phase starts March 2015
- A lot of experience will be gained in the building of the test loop

- The project results will be:
  - A practical, public guideline that describes
  - how the M/R stations and gas grid must be adapted to handle the injection of hydrogen in the natural gas grid
  - including consequences for regulatory approvals and operation & maintenance.

Links

- Links for information about the project:
  - http://www.energinet.dk/EN/GAS/Aktuelle-temaer-ny/Udvikling-af-gasteknologier/Brint-i-gasinfrastrukturen/Sider/Brint-i-gasnettet.aspx
  - http://eudp.omega.oitudv.dk/node/7592 (in Danish)

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