

# 26<sup>th</sup> World Gas Conference

1 – 5 June 2015, Paris, France



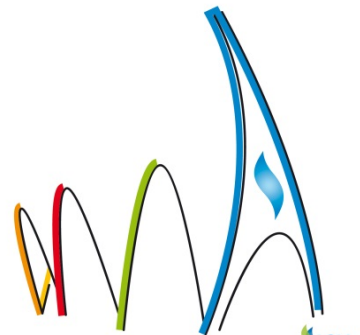
## CONVERTING THE GAS SYSTEM FROM FOSSIL TO GREEN ENERGY CARRIER

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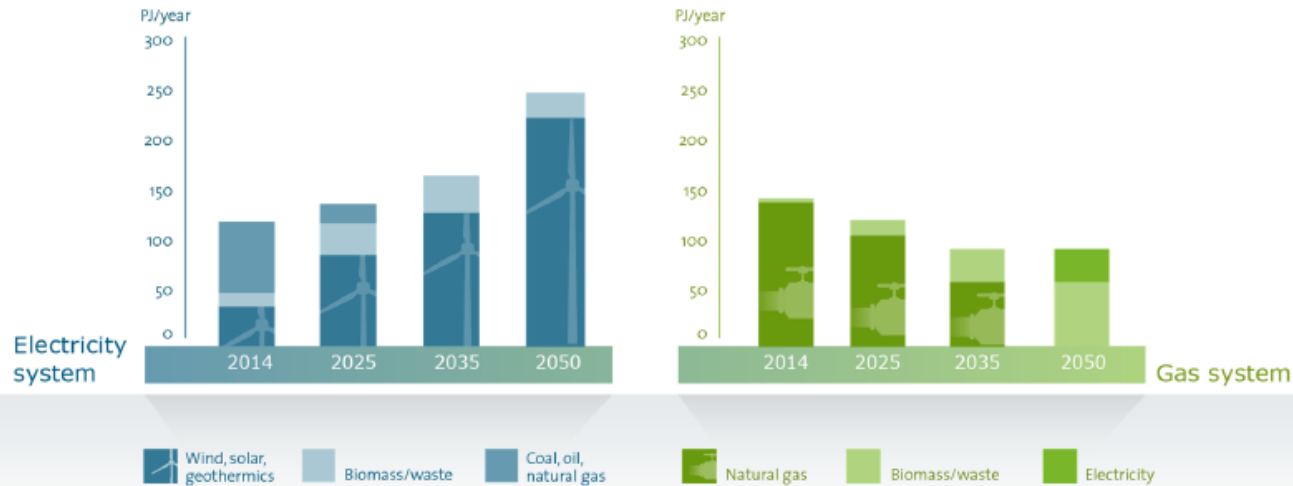
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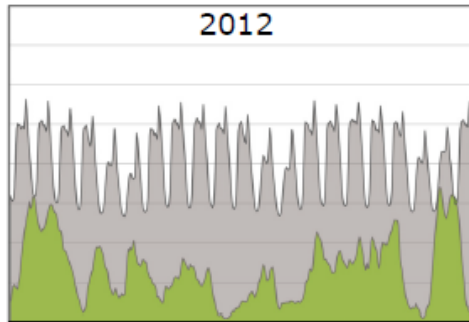
## Energinet.dk's role in the green transition

We integrate more wind, sun and biogas while maintaining the security of supply

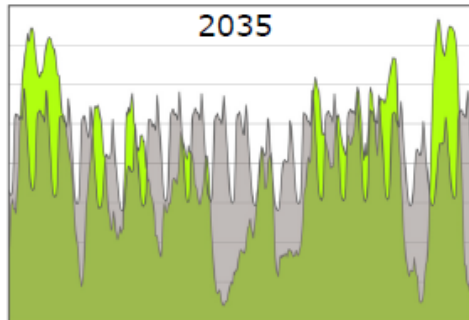


# Wind electricity production and current consumption

Prognosis for 3 weeks in November in Denmark

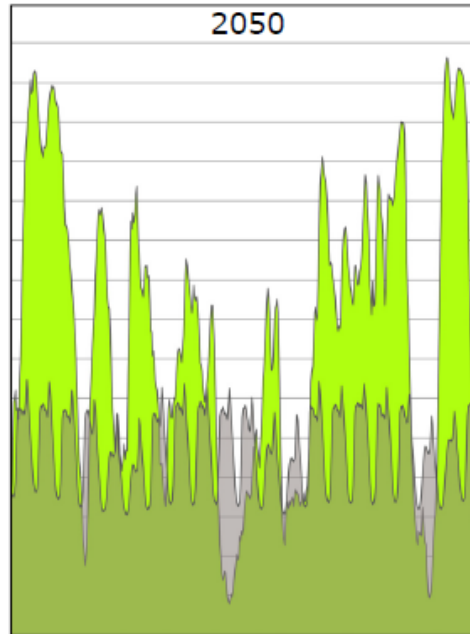


30 % of classic consumption



App. 75 % of classic consumption

## Prognosis based on the 2050 vision

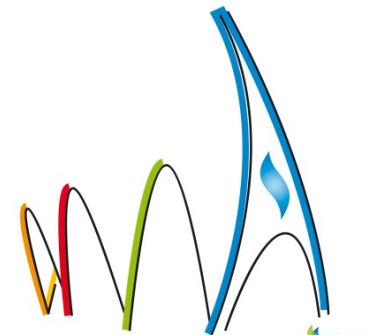


App. 140 % of classic consumption

Part of former DK government energy policy:



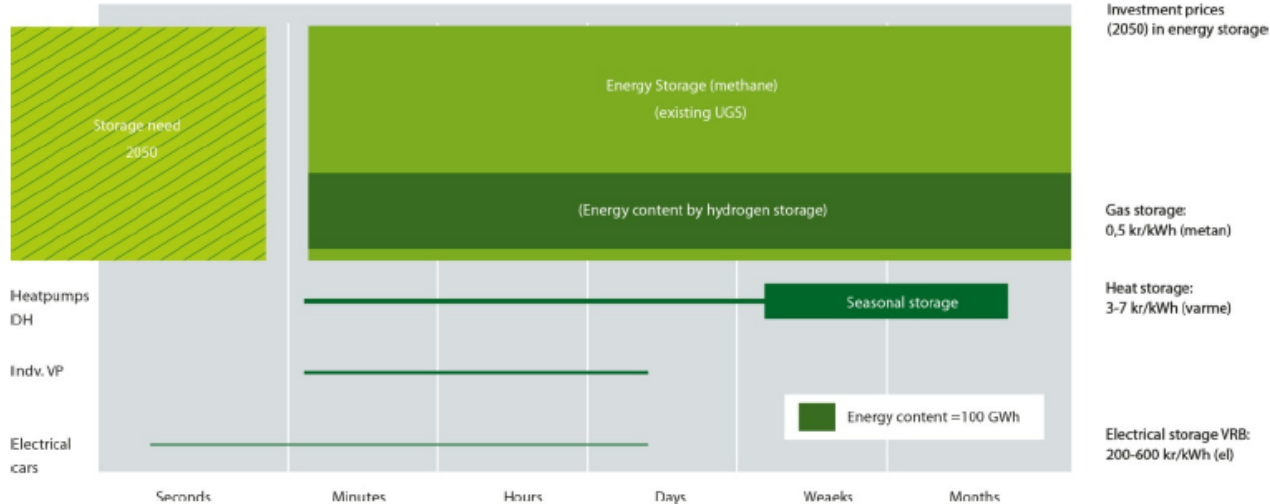
Part of current DK government policy:



IGU  
WGCPARIS2015  
WORLD GAS CONFERENCE

# Balancing tools for the power system - the Danish case

Storage capacity (electrical input)



Investment prices  
(2050) in energy storage

Gas storage:  
0,5 kr/kWh (metan)

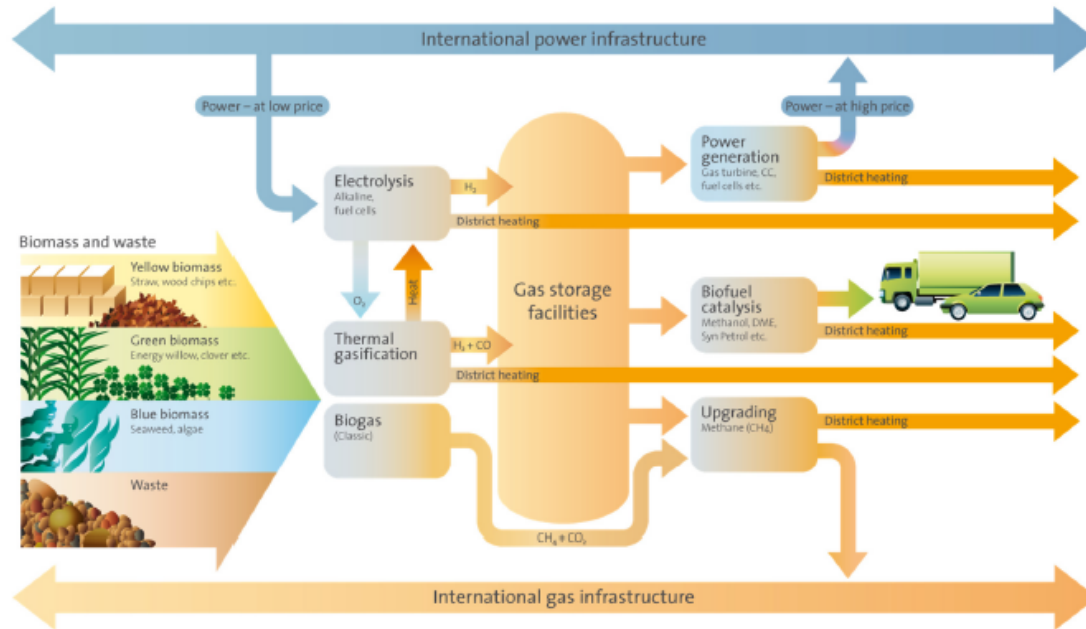
Heat storage:  
3-7 kr/kWh (varme)

Electrical storage VRB:  
200-600 kr/kWh (el)



# Imagine a future renewables - power - heat - gas integrated energy system ...

... with gas storage at the centre



# How to make gas green

We have a CH<sub>4</sub>+ gas system ...  
... not just a natural gas system





# How to make gas green

## We have a CH<sub>4</sub>+ gas system ...

... not just a natural gas system

## Biogas is now mature technology ...

... and is subsidised and injected into many gas systems

## Gasification of e.g. wood is on the way back ...

... and based on more and more sophisticated technologies

(Examples are AU-VUT (Güssing+Oberwart), F-GAYA, D-ZSW and Blue Tower, NL-ECN (Milena+Olga), US-Great Point Energy, SF-Carbona, S-Chalmers, GOBIGAS, CORTUS-WoodRoll and E.ON-Bio2G, US-GreatPoint Energy, DK-Pyroneer and Haldor Topsoe)

## Next is power2gas from renewable electricity (H<sub>2</sub>) and the CO<sub>2</sub> we remove from biogas or from CCS ...

... demonstration is ongoing

(D-RH2-WKA, Audi, E.ON, Power2Gas Werlte, Power2Gas Morbach, juwi, Solarfuel, Fraunhofer IWES, ZSW, EWE, Enertrag Hybridkraftwerk, Total, Vattenfall, Deutsche Bahn, H-tec, DVGW, IOLITEC, Outotec, Engler-Bunte-Institut, EnBW Energie, US-Electrochaea, DK-Electrochaea.DK, Haldor Topsoe, HIRC, DTU, GreenHydorgen)

## Adding pure Hydrogen (H<sub>2</sub>) is also possible...

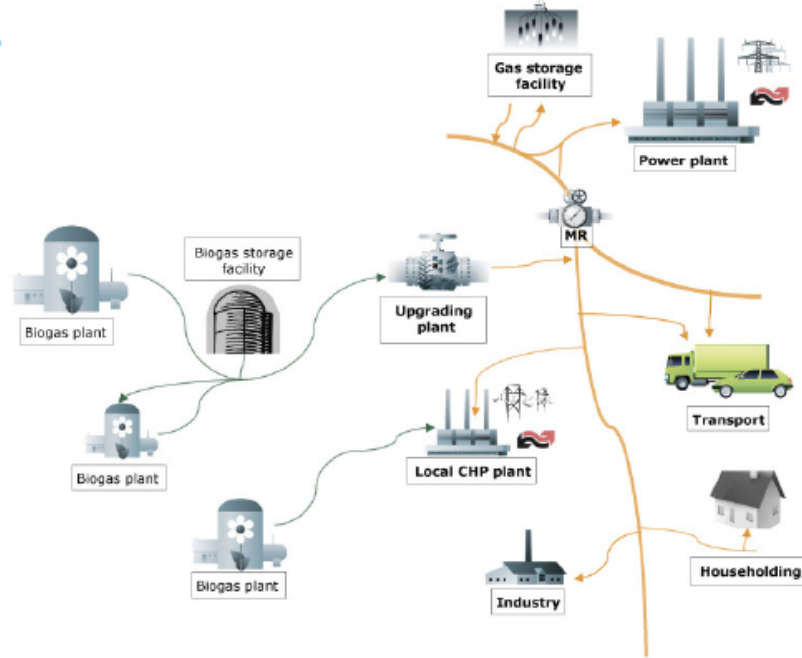
... demonstration is ongoing and it can make gas more low-carbon  
(NI-Greenpeace-Gasunie, F-GRTGaz, DK-Energinet.dk ...)



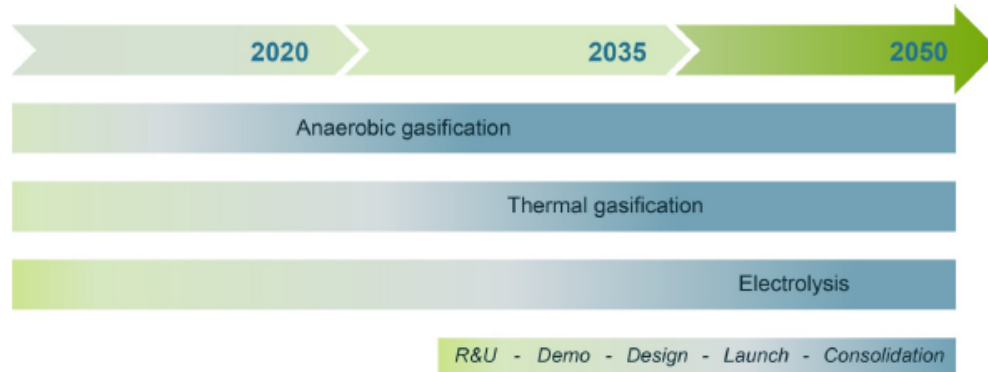


# The grid and the biomass is there ...

...



## Development perspectives



# Green Gas Value Maximisation is all about

**Access to EU  
Gas Market  
Prices**

Grid access

**Certificate  
Green Value  
Maximisation**



# KEY MESSAGES

**Making Gas Part of the Energy Future**

=

**Converting Gas from Fossil to Green**

**Converting Gas from Fossil to Green in a Market Based Way**

=

**Making a Green Gas Market**

**Making a Green Gas Market**

=

**Recognising the Green Value + Making it Tradable**