

# Gas and the Energy System

## - The FutureGas project

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$$f(x+\Delta x) = \sum_{i=0}^{\infty} \frac{(\Delta x)^i}{i!} f^{(i)}(x)$$

The image also features a variety of other mathematical symbols and expressions, including:

- $\int_a^b \epsilon$  (Integral with limits a and b, and Greek letter epsilon)
- $\Theta$  (Greek letter Theta)
- $\sqrt{17}$  (Square root of 17)
- $\Omega$  (Greek letter Omega)
- $\int \delta e^{i\pi} =$  (Integral of delta times e to the power of i pi)
- $\infty$  (Infinity symbol)
- $\chi^2$  (Chi squared)
- $\Sigma$  (Sigma symbol)
- $\gg$  (Greater than greater than symbol)
- $\{2.7182818284$  (A sequence of digits representing the number e)
- $!$  (Exclamation mark)
- $\epsilon$  (Greek letter epsilon)
- $\Delta$  (Delta symbol)
- $\epsilon$  (Greek letter epsilon)
- $\theta$  (Greek letter theta)
- $\delta$  (Greek letter delta)
- $e^{i\pi}$  (Euler's identity)
- $\chi^2$  (Chi squared)
- $\Sigma$  (Sigma symbol)
- $\gg$  (Greater than greater than symbol)
- $\epsilon$  (Greek letter epsilon)



## FutureGas Partners



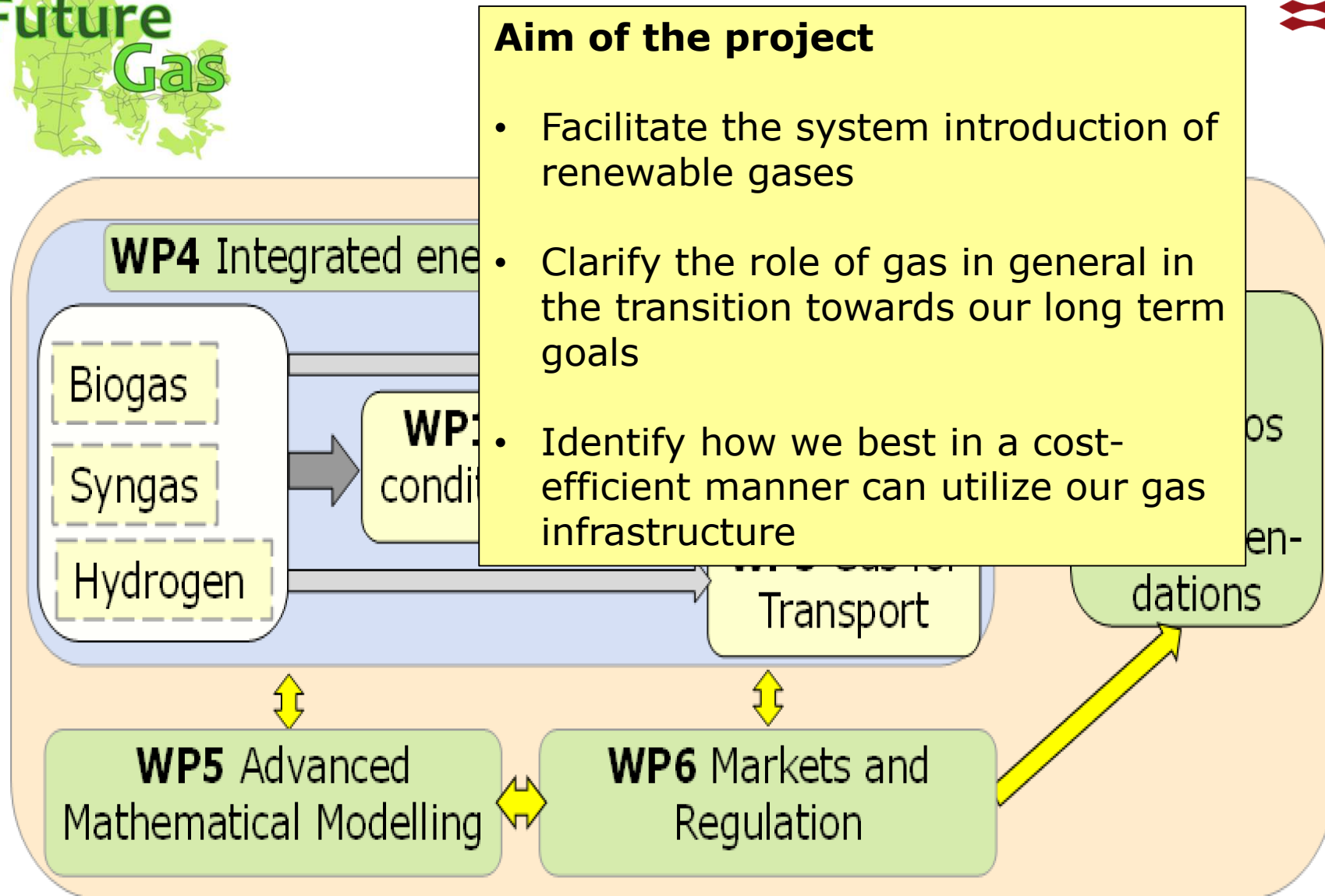


# Kick-off meeting



Technical University of Denmark

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## Integration of gas in the Energy System

- Power, District heating, Transport...

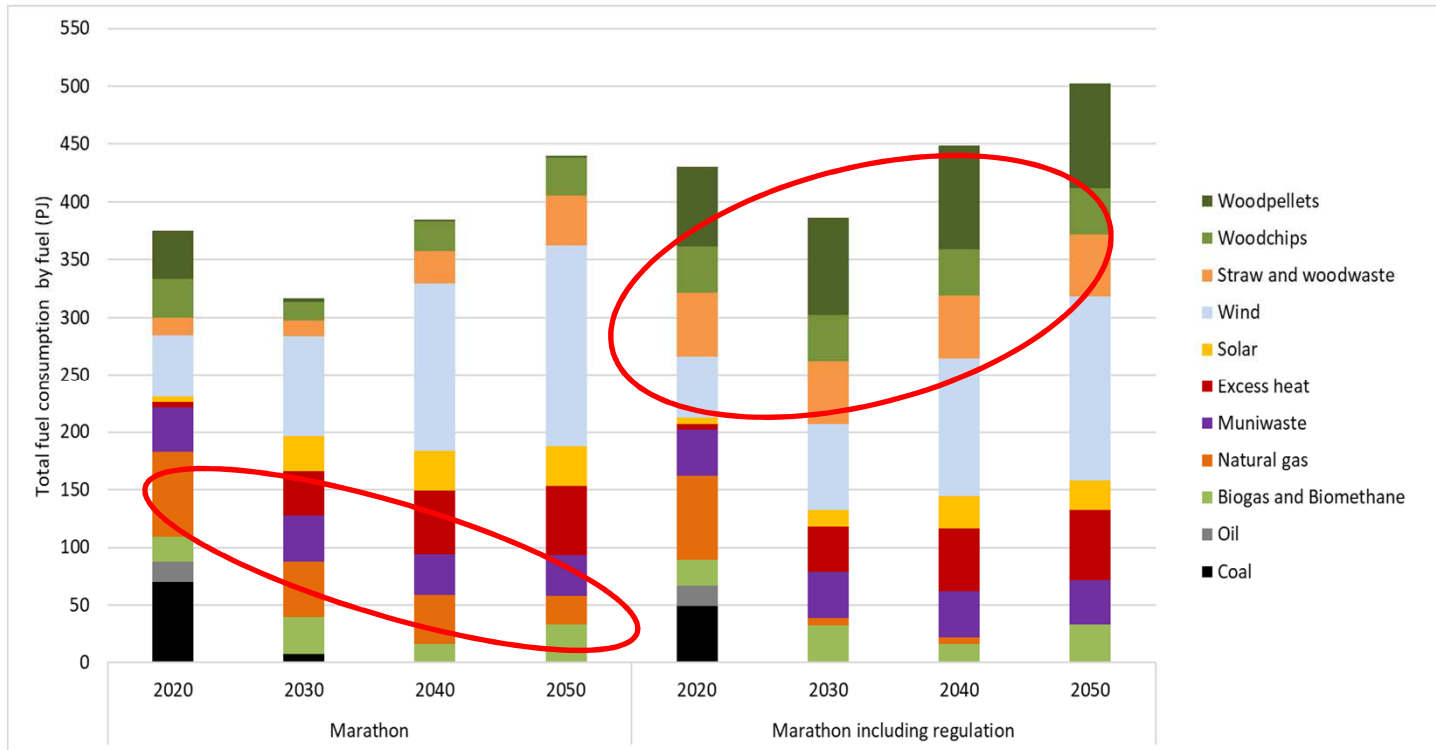
- **Cost-efficient integration of gasses based on renewable energy**
  - Biogas, SNG, hydrogen..
  - How are they best utilised – Upgraded/direct use
- **How do we best utilize the existing gas infrastructure?**
  - Natural gas as a transition fuel
  - Dedicated grids?
- **Gas in transport**
  - Experiences from Sweden
- **Modelling gas**
  - Balmorel, Sifre, advanced tools..
- **Regulation of gas**
  - Tariffs, taxes....

# The use of gas in the transition phase?

- **Gas in Transport**
  - Heavy transport – person transport a
- **Gas for industry**
- **Gas for heating purposes**
- **Need for balancing wind and solar**
  - Power balancing by gas – fast in ramp
  - Interconnectors can do quite a lot
- **In periods with low wind we will need gas**
  - Central and/or decentralised power plants
  - Short periods = Use of Gas turbines
- **Long term storage facility**
  - Short term might not be needed – flexible



# Base case for Regulation: Gross Energy Consumption in Denmark Compared to the Marathon case



## Base case for Regulation: Domestic heating in Denmark – shown on technologies compared with the Marathon case

