



# GAS FOR CLIMATE

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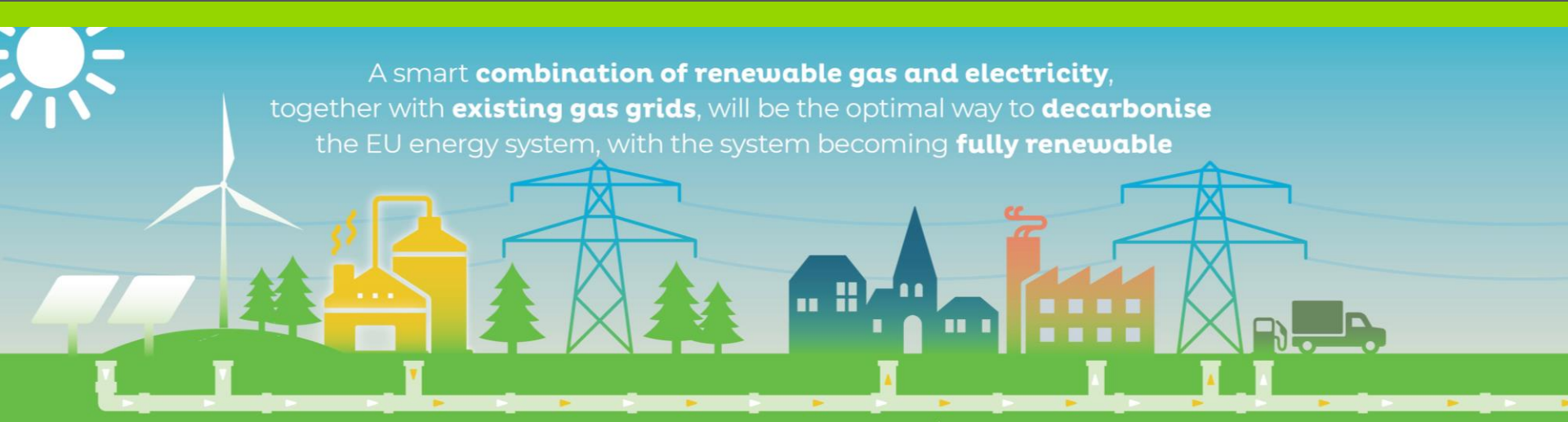
THE OPTIMAL ROLE FOR GAS  
IN A NET ZERO EMISSIONS  
EU ENERGY SYSTEM

MADRID FORUM  
5 JUNE 2019



**GAS FOR CLIMATE**  
A path to 2050

# GAS FOR CLIMATE - VISION AND SCOPE



A smart **combination of renewable gas and electricity**, together with **existing gas grids**, will be the optimal way to **decarbonise** the EU energy system, with the system becoming **fully renewable**

- **Gas for Climate**: a consortium of seven European gas transport companies and two renewable gas industry associations.
- Navigant's 2019 Gas for Climate study analyses the entire energy system:
  - **Supply**: biomethane, power-to-methane, **green hydrogen (from additional wind and solar)**, **blue hydrogen (from natural gas with CCS)** and renewable electricity
  - **Demand**: buildings, industry, transport, power; range of decarbonisation options
  - Gas and electricity **infrastructure**
- In our analysis, we aim for **lowest overall societal cost**

# NEW GAS FOR CLIMATE STUDY ANALYSES ALMOST THE FULL ENERGY SYSTEM

Vision

**Achieving a net zero emissions EU energy system by 2050 based predominantly on renewables**

Scenarios

**Minimal gas scenario**

**Optimised gas scenario**

Future energy categories

Variable renewable electricity

Hydropower

Variable renewable electricity

Hydropower

Biomethane

Biomass power

Green hydrogen

Power to methane

Green hydrogen

Blue Hydrogen

Infrastructure



Demand sectors

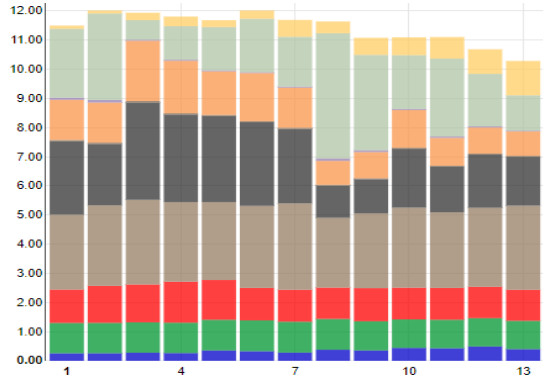
BUILDINGS
 TRANSPORT
 INDUSTRY
 POWER

# RENEWABLE GAS CAN SIGNIFICANTLY REDUCE SYSTEM COSTS, WITH FOUR SWEET SPOTS



POWER

## DISPATCHABLE POWER

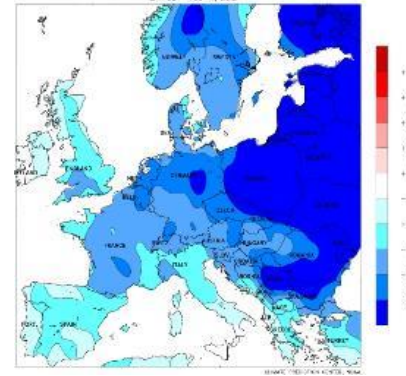


Source: Energy-Charts.de



BUILDINGS

## HEATING SUPPORT IN COLD SPELLS

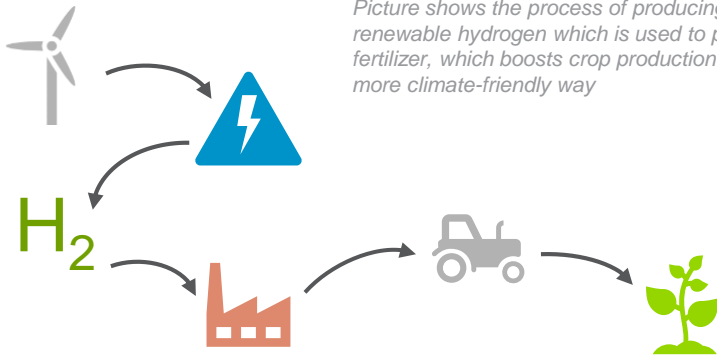


Source: US National Weather Service



INDUSTRY

## HIGH TEMP HEAT & FEEDSTOCKS



Picture shows the process of producing renewable hydrogen which is used to produce fertilizer, which boosts crop production in a more climate-friendly way



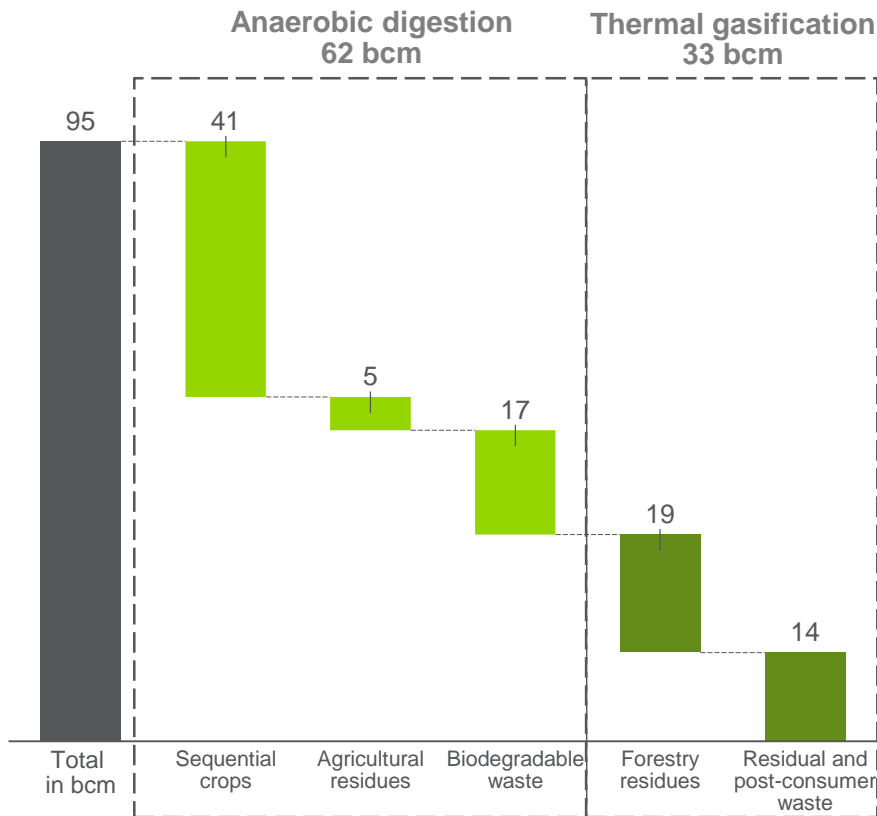
TRANSPORT

## HEAVY ROAD TRANSPORT & LONG DISTANCE SHIPPING



# THE SUPPLY SIDE: BIOMETHANE AND HYDROGEN POTENTIAL

**BIOMETHANE** can supply up to 1,010 TWh (95 bcm) at strongly reduced costs of €47–57/MWh



Source: Navigant analysis

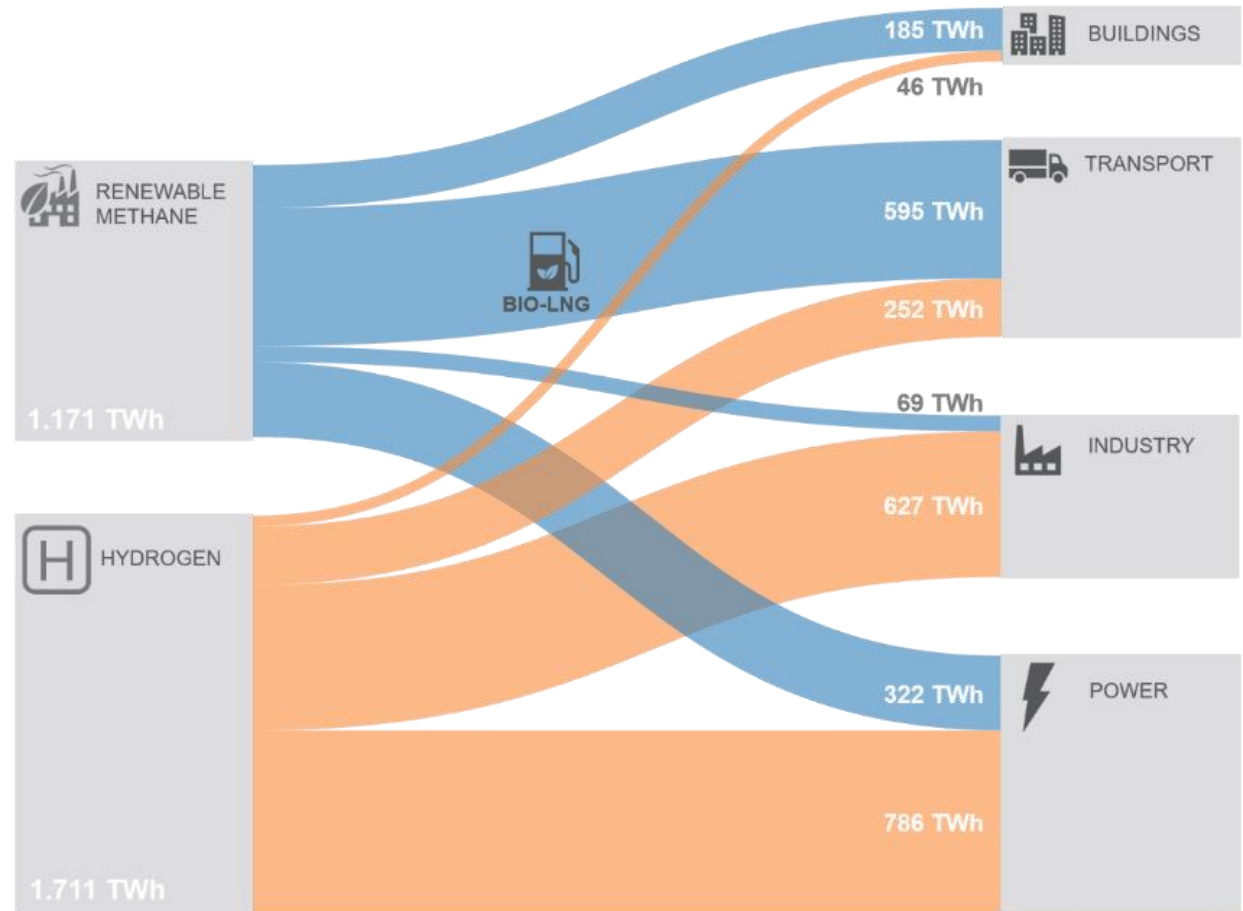
**HYDROGEN** can supply up to 1,710 TWh to the buildings, industry, transport and power sectors. Costs can come down to €52/MWh (based on dedicated renewable electricity)

- **Green hydrogen** has a large technical potential, linked to the potential of offshore wind and solar PV
- **Blue hydrogen** produced from natural gas combined with CCS can be a scalable and cost-effective option to **accelerate decarbonisation** in coming years.
- Navigant envisions that on the longer term the future energy system will be **fully renewable**, with blue hydrogen being replaced by renewable green hydrogen.

# RENEWABLE AND LOW CARBON GAS SUPPLY AND DEMAND IN THE OPTIMISED GAS SCENARIO

Renewable methane is used primarily in the buildings and power sectors and in the transport sector (as bio-LNG)

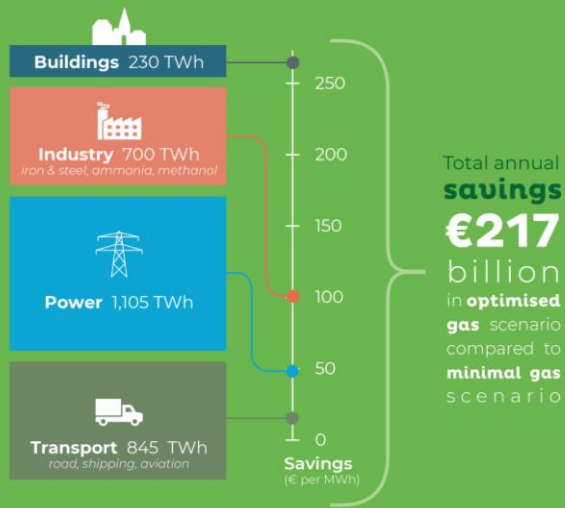
Hydrogen is used primarily in the transport, industry, and power sectors



Source: Navigant analysis

# FUTURE GAS IN EXISTING INFRASTRUCTURE CREATES VALUE

*Renewable methane and hydrogen used optimally in the energy system can save society €217 billion annually compared to an energy system with a minimal amount of gas*

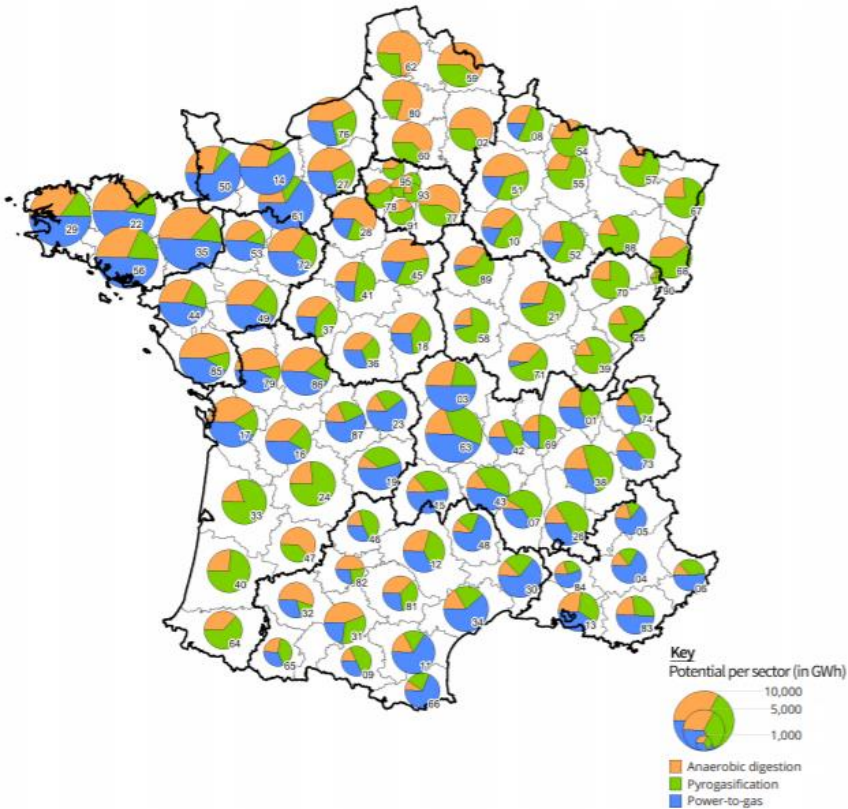


- Gas used in existing gas infrastructure is indispensable to achieve cost-effective full decarbonisation. Not scaling up renewable and low carbon gas and decommissioning gas infrastructure will lead to unnecessary costs.
- Large cost reductions in green and blue hydrogen, biomethane and power to methane are possible, requiring dedicated efforts by companies and governments
- Using existing gas infrastructure is vital to maximise public acceptance to the energy transition by avoiding unnecessary new overhead powerlines

*Gas infrastructure can continue to ensure the reliability and flexibility of the energy system, even when quantities of gas decrease. Current gas grids would almost completely continue to be used, to transport and distribute renewable methane and hydrogen.*

# GAS INFRASTRUCTURE NEEDED TO SCALE UP RENEWABLE GAS TO 272 BCM BY 2050

Medium and low pressure gas networks can serve to collect biomethane where it's produced and distribute it to buildings and other sectors



Source: ADEME

High pressure pipelines can serve to transport hydrogen, carrying offshore wind energy from the North, and solar energy from the South

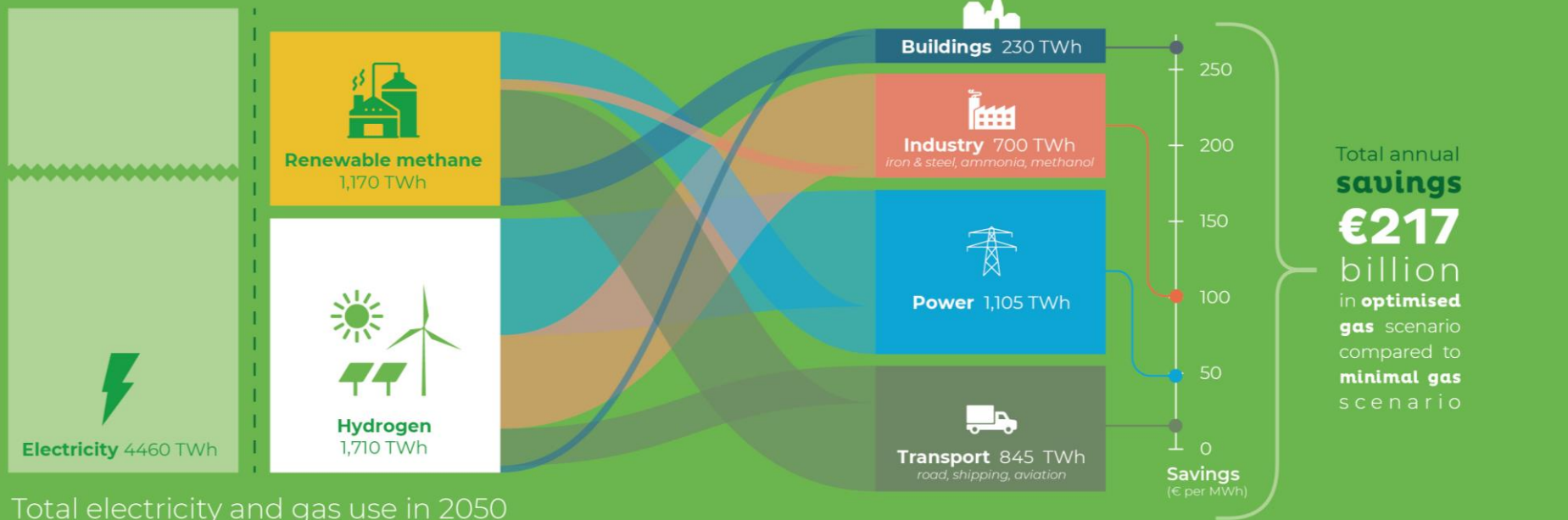


Source: Navigant, on map by ENTSOG





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Total electricity and gas use in 2050 in optimised gas scenario

*This quantity of renewable and low carbon gas equals 272 bcm of natural gas equivalent (energy density).*

# FOR MORE INFORMATION, CONTACT:

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