

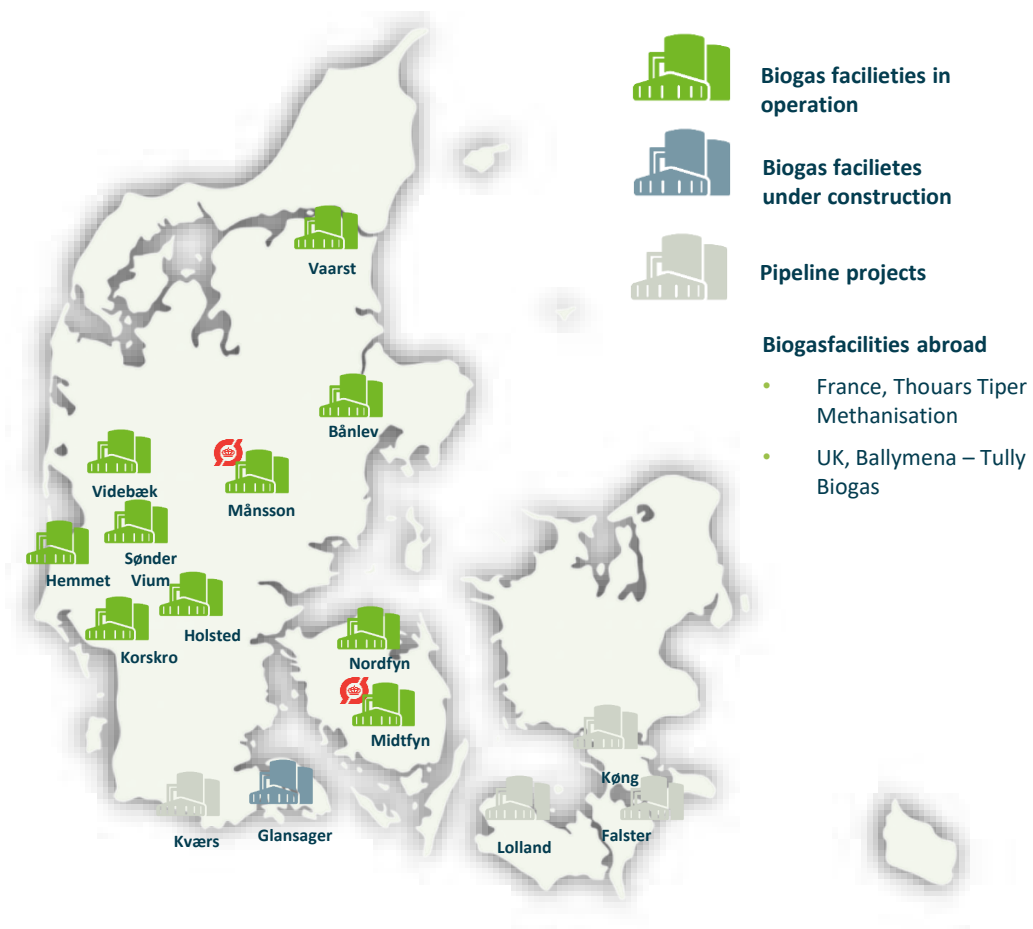


nature  
energy

# THE 'NOT SO' STRAIGHT AND NARROW PATH FOR BIOMETHANE

4.9.2020

# Today we operate 12 facilities



Nature Energy produces biomethane. The biomethane is produced from livestock manure, household waste and other wastestreams created by society.

The first biomethane facility was established in Holsted in 2015, and today Nature Energy is among the largest producer of biogas with 10 facilities on the island of Funen and in Jutland.

In 2021 Nature Energy converts almost 5 mio. tons of biomass into 170 m<sup>3</sup> of biogas



## Plant commissioning date

October 2018

## Biomass digestion

700.000 tonnes annually. 75 % manure and 25 % industrial waste / Maize  
<5% maize.

## Biogas production capacity

240 GWh/a of upgraded biomethane.

## Certification and guarantee of origin



## Upgrading plant

Amine scrubber - puregas

## Other Facts

Partially owned by livestock manure suppliers

Biomasses are stored in closed containers at all times

CO<sub>2</sub> is captured and used for various purposes (Breweries etc.)





## Global demand for biomethane will increase significantly, especially in Asia

Average growth in global demand is expected to be 20% per year.

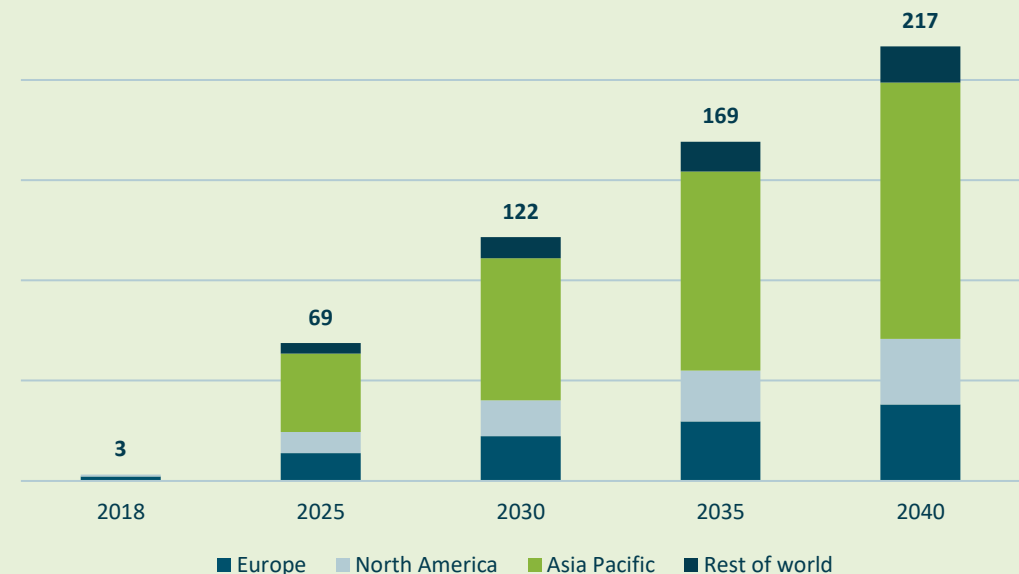
From 2025 60% of the global demand will come from Asia, while 30% will come from Europe and North America



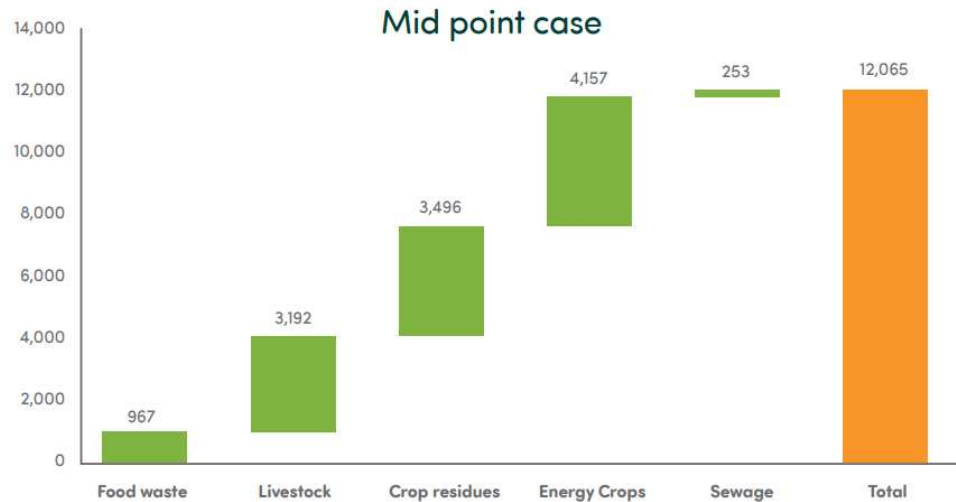
## Biomethane is competitive

According to IEA most of the potential for biomethane is competitive against other abatement alternatives, particularly when including reduced methane emissions (< 200 €/ton CO<sub>2</sub>)

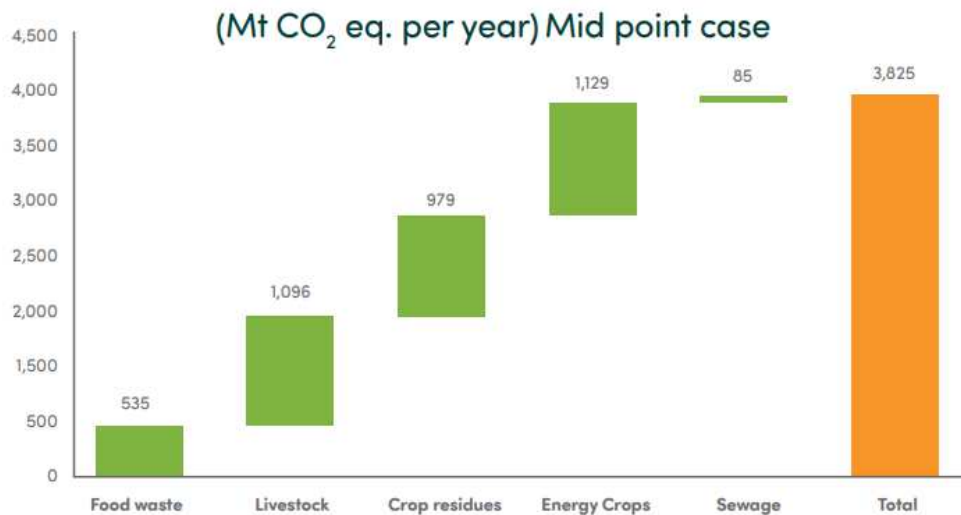
Projections for biomethane demand across regions, BCM CH<sub>4</sub>



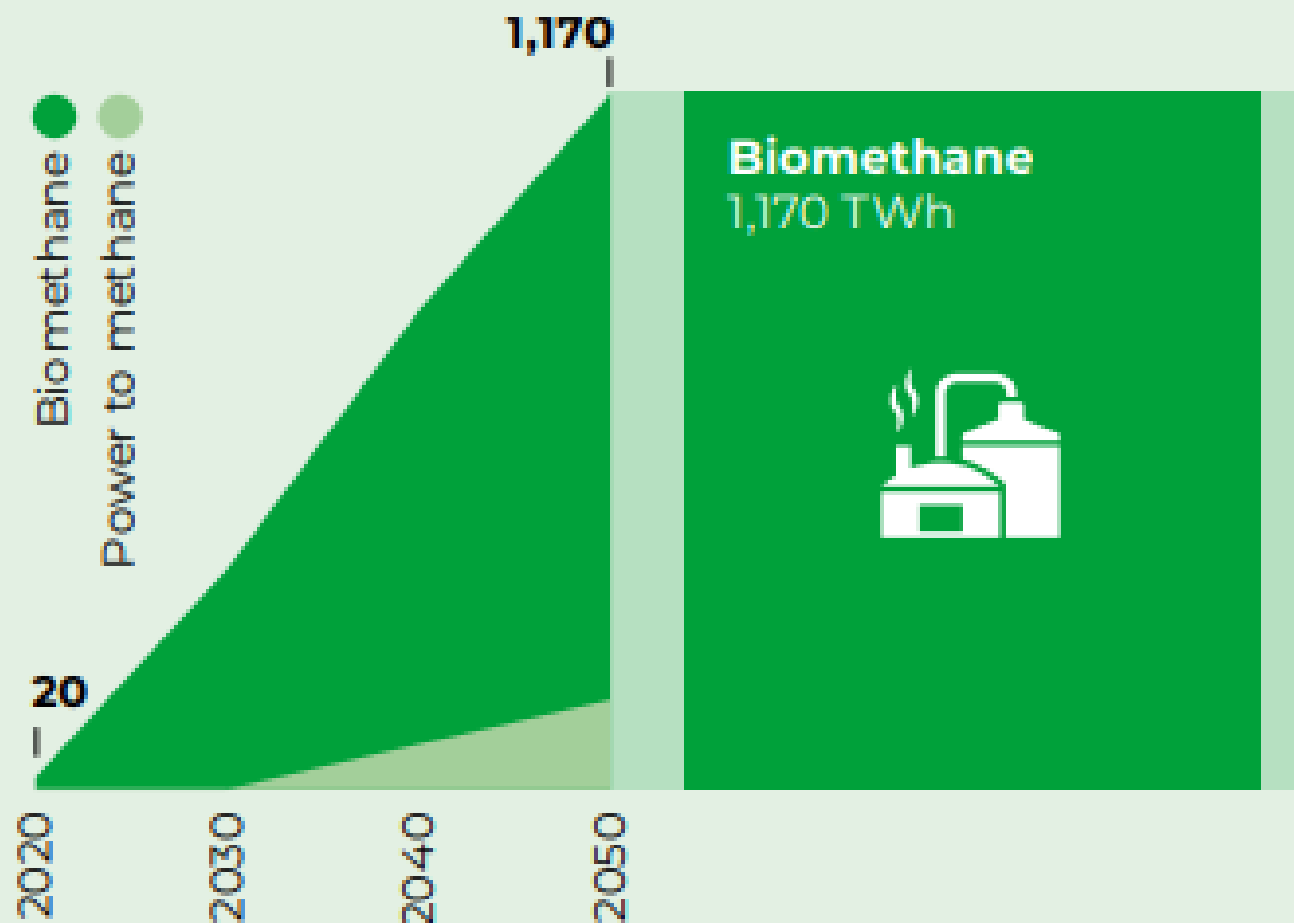
### Potential energy generation from various feedstocks (TWh)



### Potential GHG abatement from various feedstocks



- World Biogas association has modelled the potential for producing biomethane
- Estimating a potential for 12,065 TWh in 2050
- With reductions of 3,825 Mt CO<sub>2</sub> pr year
- With production costs of 60€/MWh this is below the expected 2030 carbon price of 200€/ton CO<sub>2</sub>



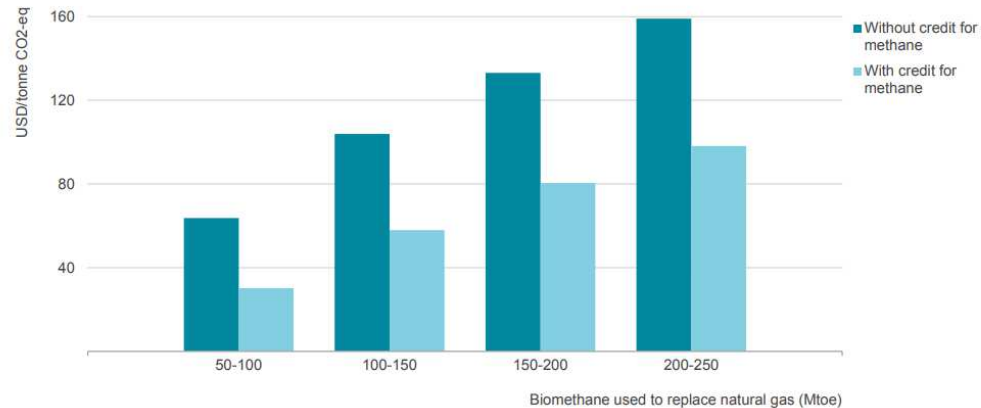
- Gas for Climate: potential for 1,170 TWh renewable methane in 2050. Recommends biomethane above green hydrogen as low cost option
- 370 TWh in 2030
- Societal value of having sustainable gasses in the energy mix compared to a minimum of gas is 217 billion pr. year

Sector	Cost savings (billion € per year)
Buildings	61
Industry	70
Transport	14
Power	54
Infrastructure	19
<b>Total</b>	<b>217</b>

Implications

## Putting a value on avoided methane can dramatically tilt the cost equation in favour of biomethane ...

Global marginal abatement costs for biomethane to replace natural gas, with and without credit for avoided methane emissions, 2018



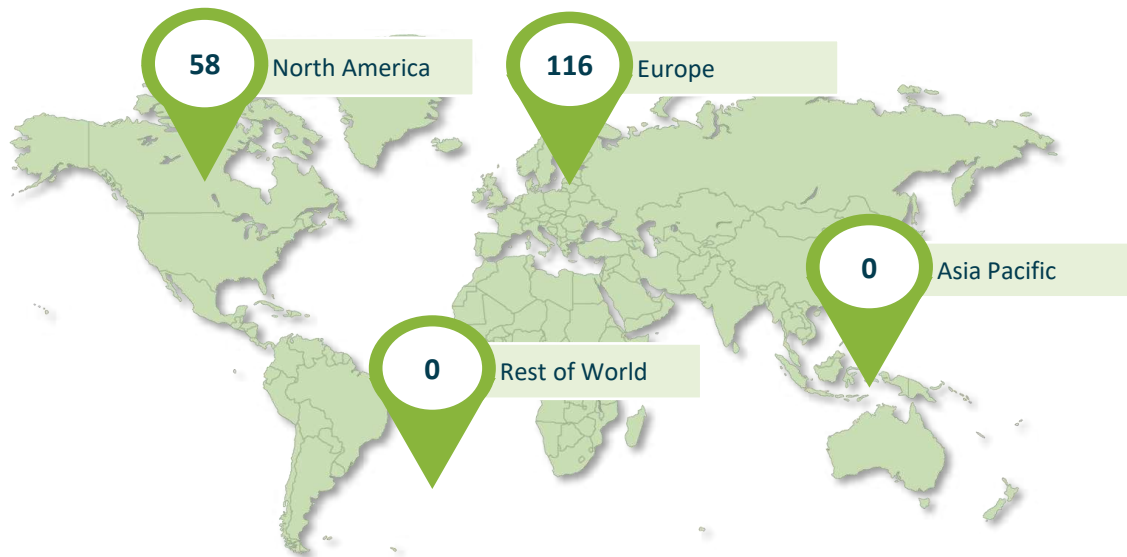
Note: Chart shows the biomethane potential starting from the cheapest production options that would require a GHG price; the first 30 Mtoe of the global biomethane potential costs less than regional natural gas prices (and so should not require a GHG price to be cheaper than natural gas).

- Biomethane is competitive against other low carbon options
- 200-250 Mtoe can be produced globally below a 160 USD/tonne CO<sub>2</sub> when not adjusting for avoided methane
- When adjusting for avoided methane the cost reduces to 100 USD/tonne CO<sub>2</sub>
- Compare this to expected Marginal Abatement costs of 200 €/tonne CO<sub>2</sub> in Denmark and Europe in 2030

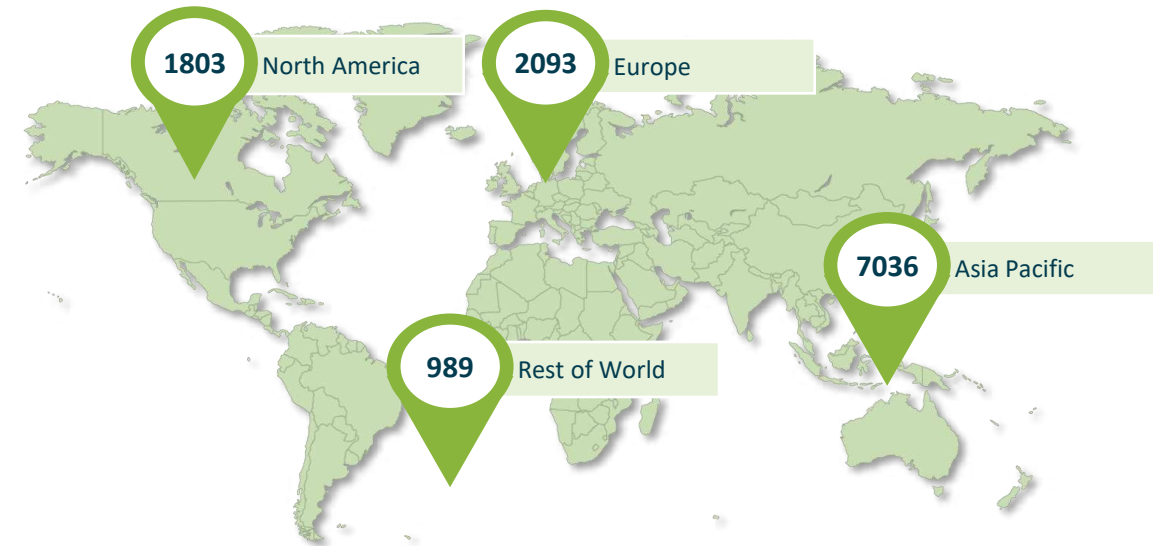


# Demand converted into average sized Nature Energy facilities

The figures below show the global demand for biomethane converted into averaged sized Nature Energy facilities. It is assumed that 1 BCM CH<sub>4</sub> corresponds 55 average sized Nature Energy facilities.

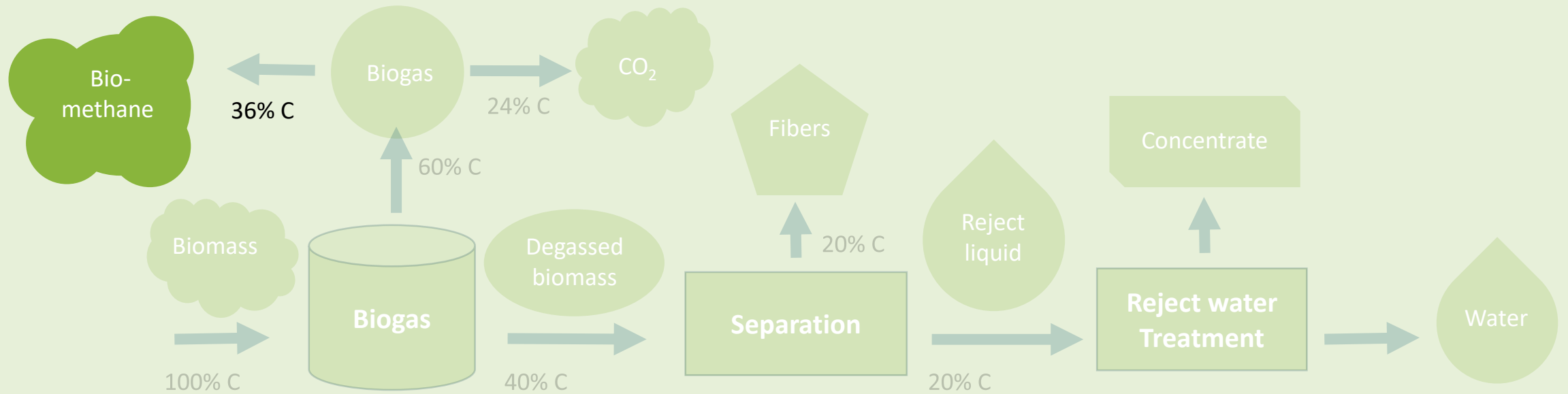


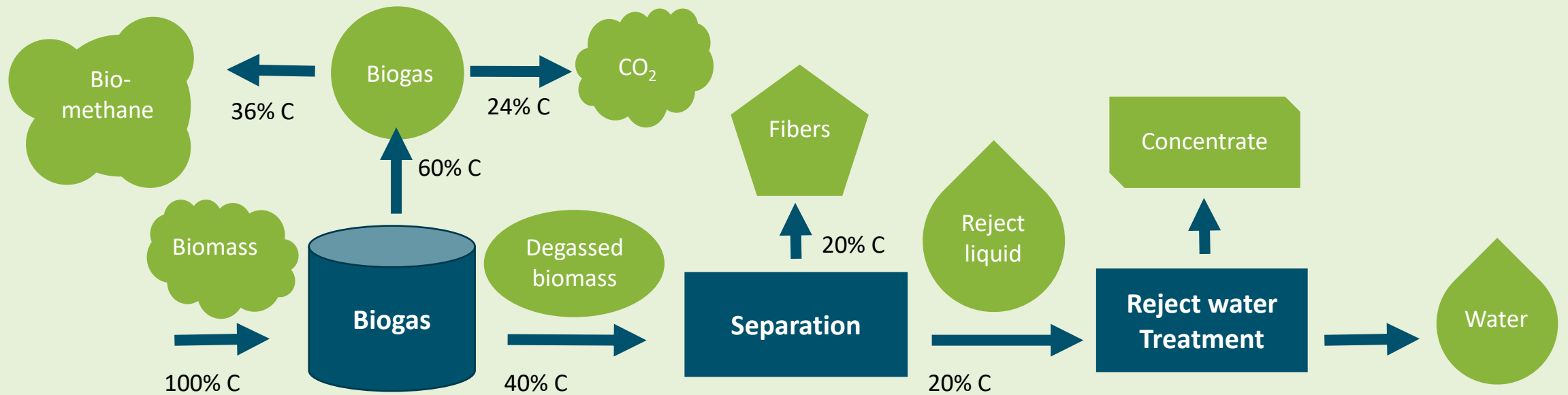
2018



2040

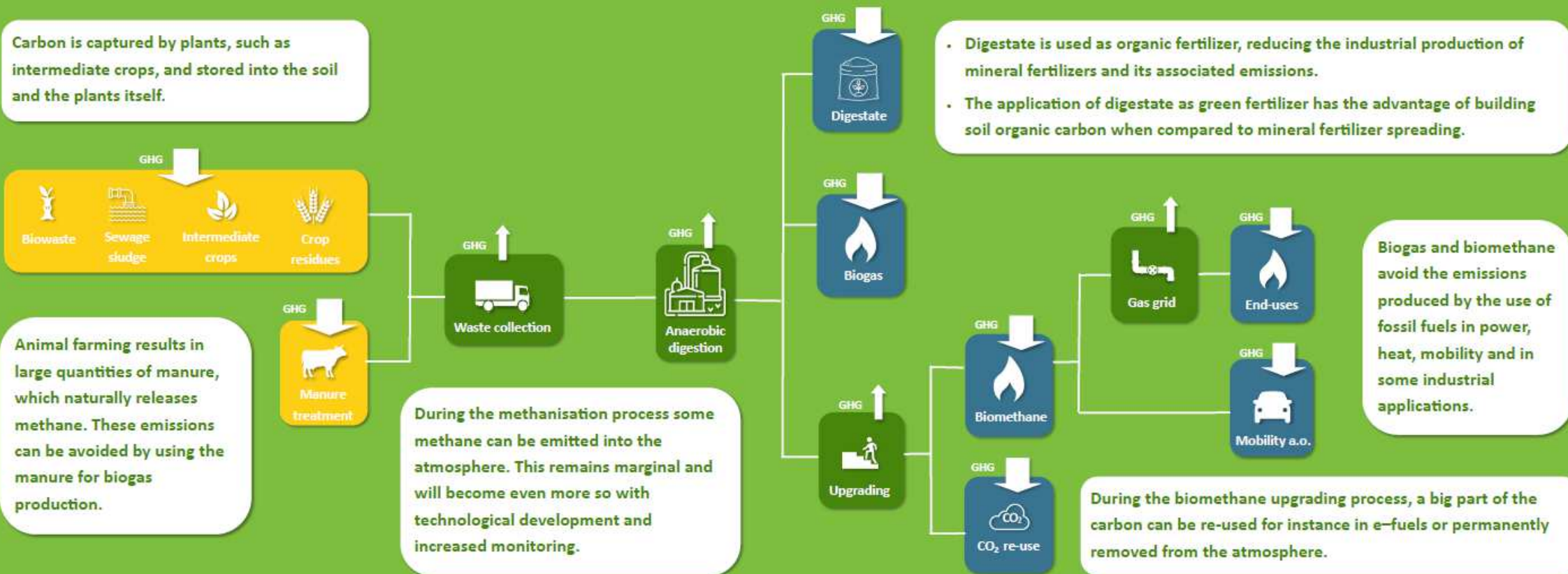






## GHG reduction potentials of biogas and biomethane industries

This infographic explains the different pathways in which biogas and biomethane industries are contributing to achieve climate-neutrality by 2050. The sector has the potential to reduce global greenhouse gas (GHG) emissions by 10-13%. Total emission savings through the use of biogas and biomethane can reach up to **-240% compared to fossil fuels**.

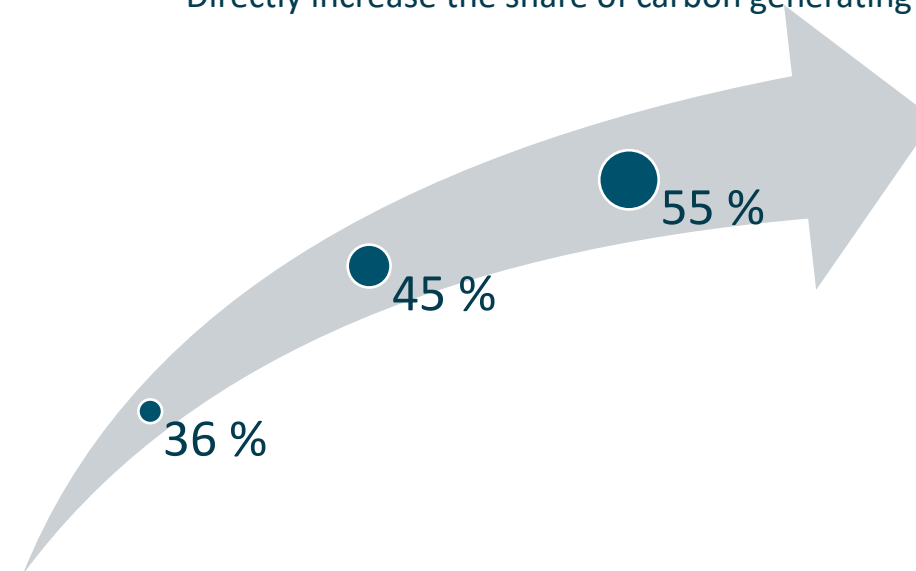


- The fit of biomethane and biogas for decarbonisation is very dependent on all the other parts of the national regulations

- Regulation on Waste
- Regulation on Agriculture
- Regulation on Waste and Agriculture
- Regulation on Energy (and the intersections with waste and agriculture)
- Carbon taxes on local emitters
- Carbon border taxes
- Local Biomass regulations
- Global Biomass availability

- Nature Energy’s approach

- Directly increase the share of carbon generating revenue



- Indirectly increase the regulations particularly on non energy sectors to contribute to GHG emission reductions
  - Agriculture
  - Waste Management
  - Industry

**Thank you for your  
attention**