



Glansager Biogas and PtX

Visited October 21st 2025



Shell Low Carbon Solutions

Biogas



Date, 202x

Story, heritage and future

Who we are



Our heritage

From municipal owned DSO to
World leading biogas producer
in 10 years

- 13 plants in DK
- 1 in France, 1 in Netherlands
- +200 mio. m³ Biomethane
pr year
- More than 700 farmers as
suppliers
- + 5 mio. tons of biowaste
handled pr year
- ~500 employees

Our present

Acquired by Shell in Feb 2023
Since mid 2025 renamed to
Shell Biogas



Our future

Part of **Shell Low Carbon Solutions** together with:

- CCS/CCU
- H₂, e-fuels
- Marine, aviation

Important part of the Shell-
strategy for helping their
customers to decarbonize –
molecule by molecule



Long story short

During the 1970s Denmark was hit by two international oil crises. This was one of the reasons why the Danish Parliament adopted an act that would introduce natural gas in 1979. In the wake of that decision, we emerged through a collaboration between municipalities in Funen County, and in 1981 we began to build the gas grid in Funen.

In 2015 we established our first biogas plant, and while we no longer operate the gas grid, we are among the world's largest producers of biomethane with 13 plants in Denmark and one in France.

We have gone from being 30 colleagues working with biogas to our current figure of over 500, all of whom are dedicated to the work of turning waste into value.

The Funen municipalities decided to sell Nature Energy to a group of private investors at the end of 2017. And in 2023 Nature Energy was acquired by Shell.



← Add from 80's saying:
"Natural gas, burning so clean that you can have a wine cellar next to it"



And the global potential is great



Evolution of biogas

Biogas 1.0



- Small farm-based
- No upgrading, not on grid
- Use for power and heat at the farm
- Large share of energy crops
- Moderate CO₂e abatement

1970's

Biogas 2.0



- Industrial scale
- Upgraded and injected to gas grid
- Waste and residues from farming, food industry and households
- Very high CO₂e abatement
- +20 million m³ a year

2015: Our first plant on grid

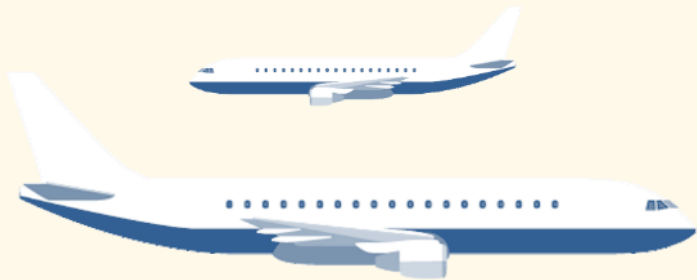
Biogas 3.0



Shell
Low Carbon Solutions
Biogas

- Integrated, sustainable hubs which produce biomethane and monetize CO₂, biofiber, fertilizer and other streams
- Even better CO₂e abatement vs 2.0

Where we are going



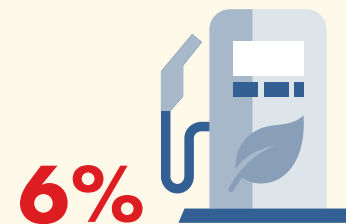
Shell fuels a plane every **~20s**



experience
in carbon markets



A leading supplier of
SAF to major airlines in
40 locations globally



of global biofuels
demand is met
by Shell



World's
largest global LNG
bunkering network
~26 locations
12 countries



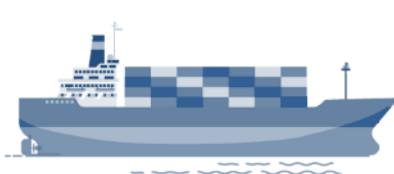
raízen

**Leading producer
of 2nd-Gen**

sugarcane ethanol
globally

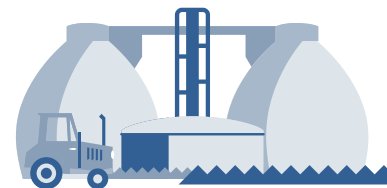
~10,000

vessels use
Shell Marine lubricants

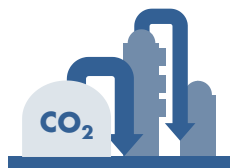


We are
**Shell Low Carbon
Solutions**

17 Biogas plants
across Europe & US



17.3M
carbon credits retired
by Shell in 2024



6 CCS Projects

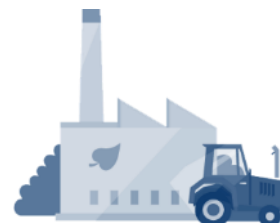
3 operational &
3 under construction



>8bln
litres of ethanol
a year in Brazil



Quest has captured
and safely stored
9+mt of CO₂
underground



First CO₂ delivery
to Northern Lights
in 2025



**3 Renewable
Hydrogen Projects**

1 operational &
2 under construction



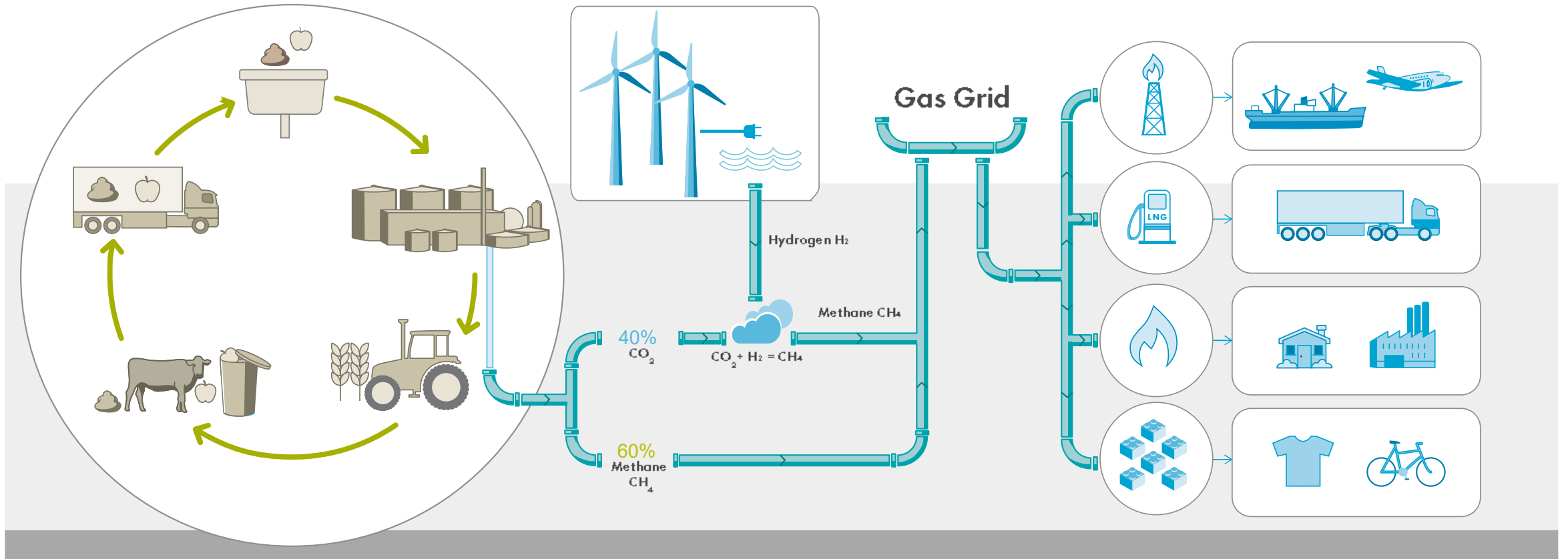
NBS projects in
>10
countries

Internal use only

What do we do and the Danish model



Circular economy



The biogas plant is a nutrient factory to farmers



Our biogas plants is an effective system for recycling of nutrients



A typical Shell Biogas plant in DK produces 0.5 mil. tons of nutrient rich green fertilizer



Saving costs on fertilizers and improving the environmental footprint of the farms



Value to cover crops/intermediate crop



The sun, the wind, and the organic waste

Organic waste and residue can, just like the sun and the wind, be made into a sustainable source of energy. The use of biomethane can reduce CO₂ emission when replacing its fossil equivalent.

As long as there are humans on Earth we will be cooking – and that inevitably leads to organic waste and residue from households, industry and agriculture.

Take a look at the green bag under the sink in your kitchen.

Imagine the organic waste and residue from baking just one piece of bread. And multiply it with all the households.

Extracting energy from organic waste and residue and recircling all the nutrients for tomorrow's food production provides a stable and secure production of renewable energy and fertilizer.

The chemical name for biomethane is CH₄ – completely equal to natural gas from the underground - but made from organic waste and residues. Sometimes it is named Renewable Natural Gas (RNG)



The Danish model

The Danish government aims for 100% biomethane in the grid by 2032.

In 2021 the percentage of biomethane in the grid was around 20%.

In 2024 it was close to 40%

The Danish model for reaching 100% biogas in the grid is characterized by:

- **Large-scale** facilities producing more than 20 million m³ pure methane a year.
- **Co-digestion**; using household waste, manure, and organic waste and residues from industry.
- **Upgrading** the biogas by separating CO₂ from CH₄ and injecting the biomethane into the grid.



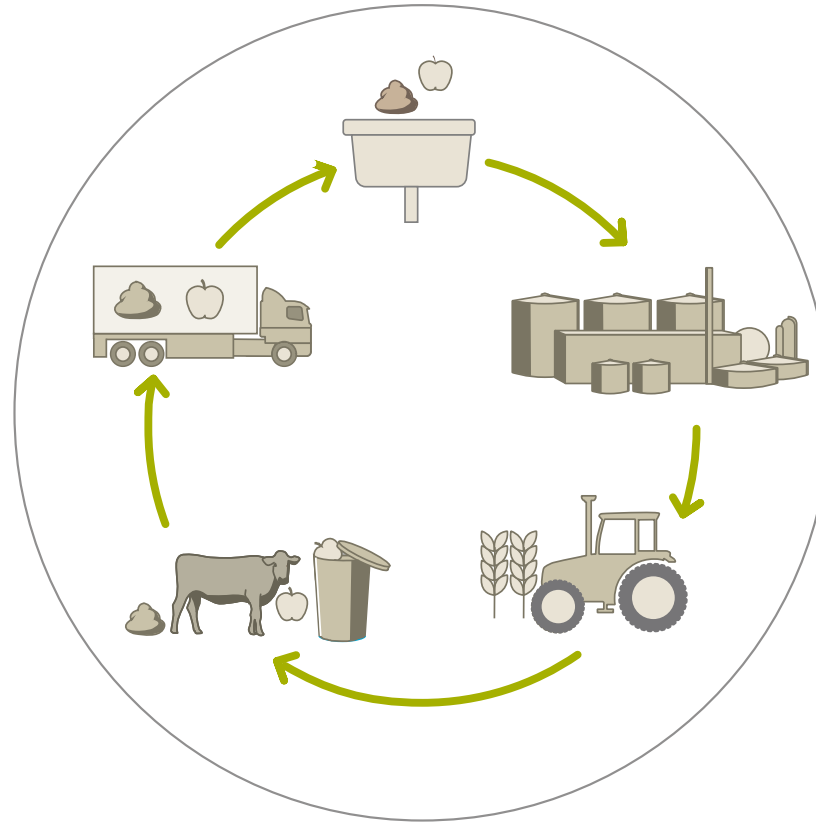
Turning waste to value – benefits with large scale biogas

The farmer

- Better fertilizer that can be spread more easily
- Farmer as energy-supplier
- Possibility to be a co-investor
- Economic savings as the biogas plant handles fertilizer accounting and transport of degassed biomass to the fields

The society

- Biological waste and residues are turned into value
- Local energy production
- Reduced emissions of greenhouse gases
- With a portfolio of biogas plants, we can:
 - optimize transport
 - buy large amounts of biomasses when the price is good
 - optimize the biomass mix
 - Have experts for specific knowledge



The Municipality

- The municipality takes the final decision on establishment
- Handling of green waste/household waste
- Green fuel for local transport
- Option to carry out continuous control through the given approvals

The Community

- Jobs at the biogas plant
- Jobs in local area
- Reduces smell when spreading the manure
- Other supports to the local community

PtX



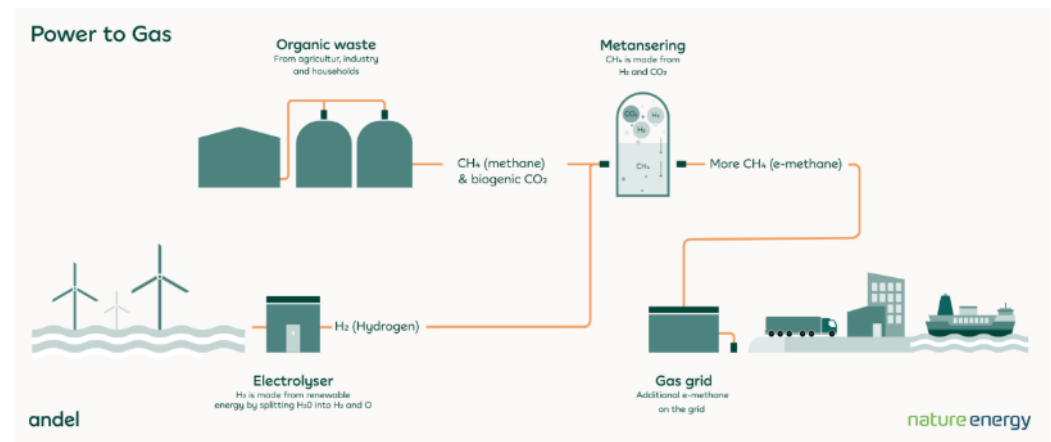
Power-to-Gas

The rise of renewable energy from solar and wind gives us a surplus of energy when the production exceeds the current offtake.

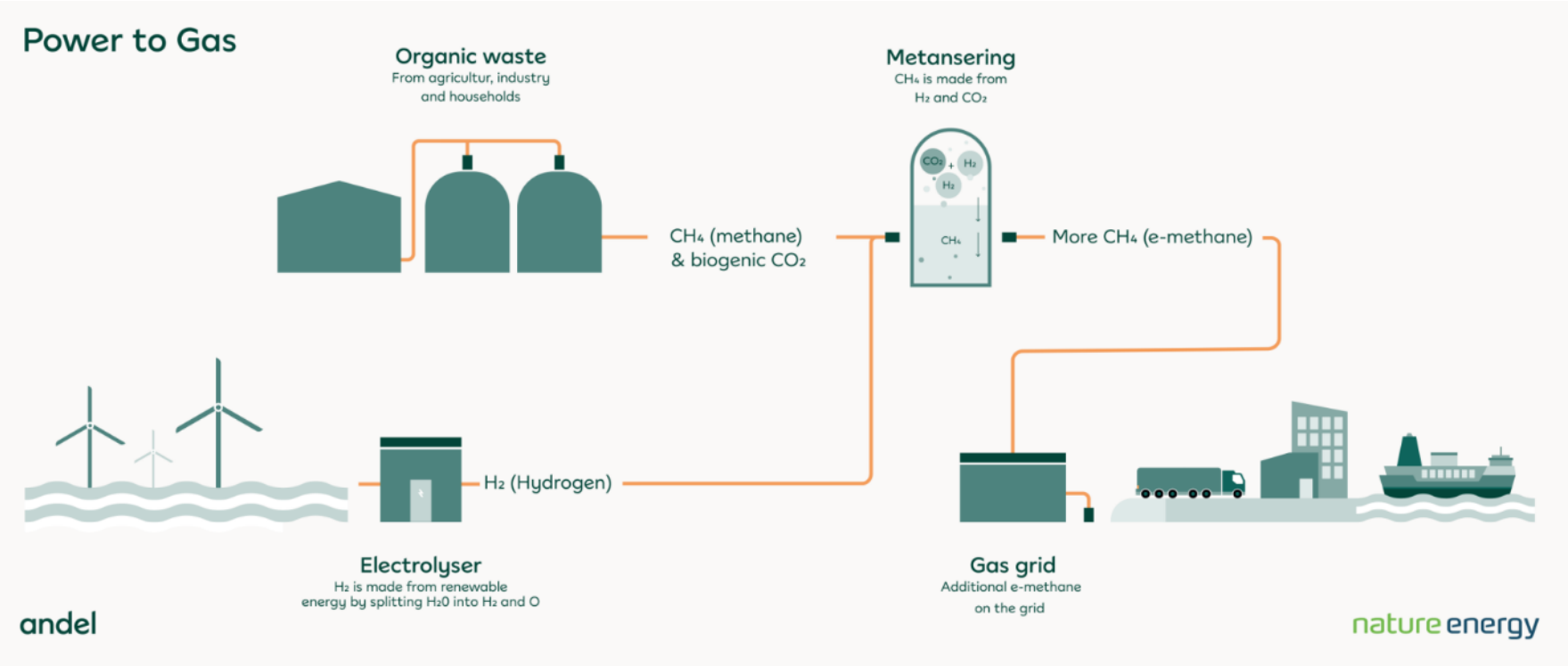
We use the surplus of electricity to create Hydrogen (H_2) and mix it with the raw biogas. H_2 and CO_2 will turn into CH_4 , that can be labeled RFNBO with a very high value of the certificate.

That way, we get better use of the waste and residues we already have picked up, and at the same time, we get a better balance between the production and the offtake of electricity.

Andel owns and operates the electrolyzers while we own and operate the methanization facility. The project is developed along with the University of Southern Denmark and X-Automation and supported by the European Regional Development Fund.



Power-to-Gas



Our mindset



Our mindset

Be circular.

Biomethane is the epitome of a circular economy.

By turning waste into value, we offer a stable production of renewable energy and at the same time we ensure that all nutrients are recircled and used as fertilizers in tomorrow's food production.

Like bees pollinate crops, biomethane is the indispensable cornerstone linking the organic waste from our daily lives to a sustainable energy production that also generates fertilizers for ongoing food production.

In this circle, biodiversity plays a decisive role.

Be the future. Be circular.

The power of a Butterfly's wing

A flap of a Butterfly's wing in Denmark can set off a huge change in the European energy-system.



Our mindset

Eye of the beholder

To embrace the full potential, you have to comprehend that there is more than meets the eye.

Meet the methanogens

When you place a small drop of organic waste and residue under a microscope, you can get a glimpse of some of our little helpers in the green transition. The methanogens.

Just how much help they can offer depends on understanding how they behave and react, and their preferences.

This knowledge tells us how to create the best environment in the digester tank to get the most value from the waste. There are so many molecules just waiting to be captured. We are still just scraping the surface of designer manure and how to take care of limited resources like phosphorus.

It is not manure – it's biochemistry at its finest.

That's why biogas is so much more than just CH₄.



Eye of the beholder

To embrace the full potential, you have to comprehend that there is more than meets the eye.

Meet the methanogens

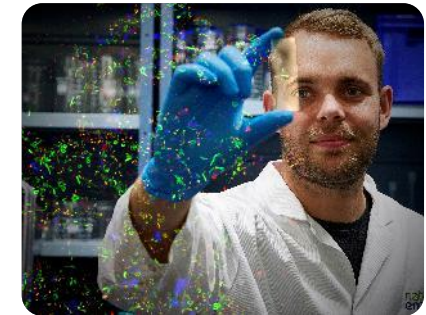
When you place a small drop of organic waste and residue under a microscope, you can get a glimpse of some of our little helpers in the green transition. The methanogens.

Just how much help they can offer depends on understanding how they behave and react, and their preferences.

This knowledge tells us how to create the best environment in the digester tank to get the most value from the waste. There are so many molecules just waiting to be captured. We are still just scraping the surface of designer manure and how to take care of limited resources like phosphorus.

It is not manure – it's biochemistry at its finest.

That's why biogas is so much more than just CH₄.



Test your knowledge





Test your memory!

Match the numbers

(answers on next page – don't cheat!)

6 million

100.000

5 million

200 million

86

15

9 billion
trillion



Answers for the test



6 million kilometres
a year – around
150 times around
the planet.

86 trucks in total. 42
of our own +
external



100.000 cows
provides us with 2.3
million tons of
feedstock.

1 in 6 cows in
Denmark could
have a Pecten on it.

All in all, we take in
5 million tons of
organic waste –
and return 5 million
tons of fertilizer to
the farmers.



15 is the number of
biogas facilities we
operate. 13 in
Denmark, one in the
Netherlands and the
JV I France

9 billion trillion is the
number of bacteria in
the reactor



200 million m3 of
CH₄ is injected to
the gas grid a year
from our facilities



Thank You

Come back any time you want – in the meantime, let's stay connected.

You find us at

www.linkedin.com/company/biogas-shell-low-carbon-solutions



Shell Low Carbon Solutions

Biogas