Gasunie gaat verder in gastransport

System Level Interaction Gas-Power in Northwest Europe

The Gas Perspective

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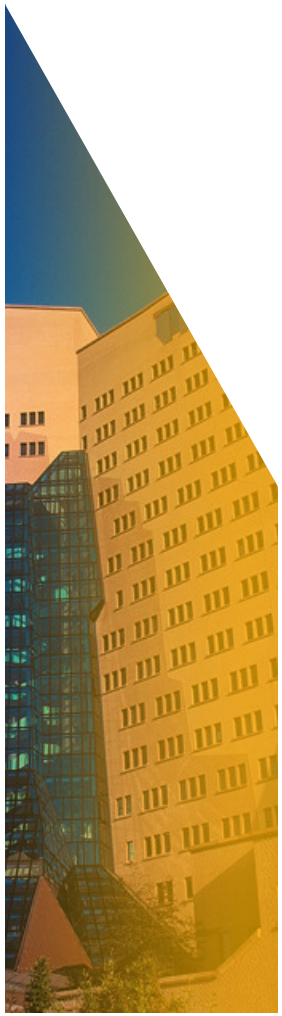
Agenda

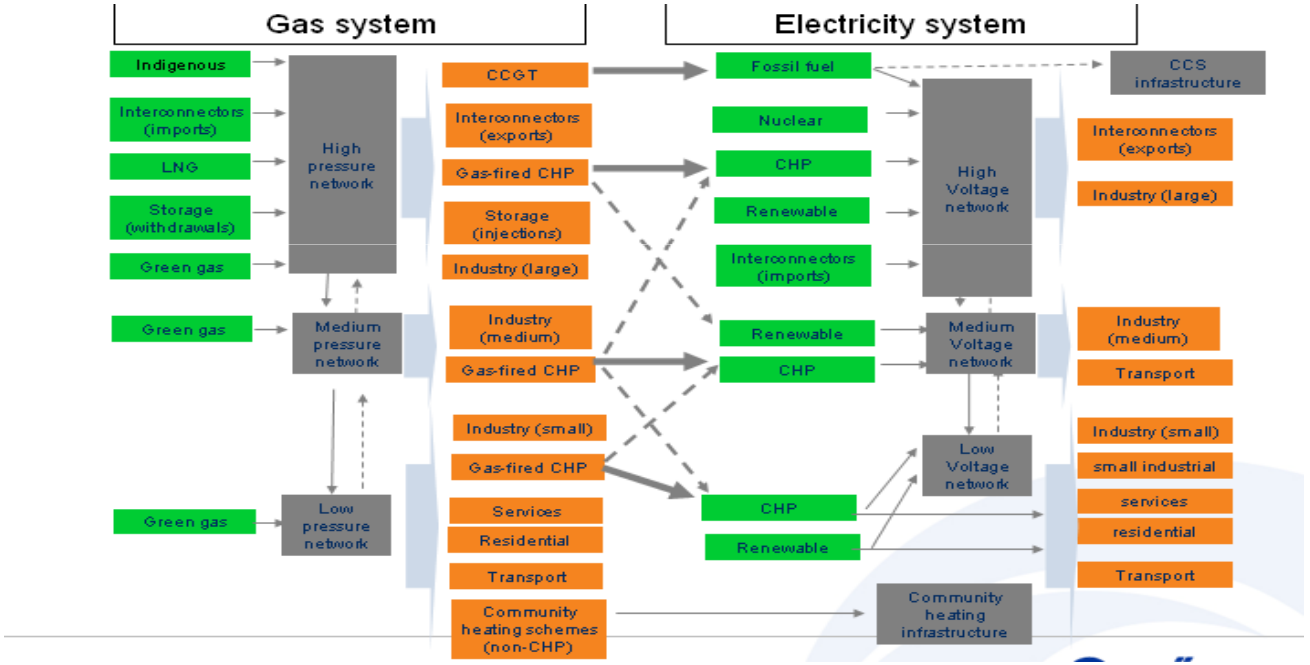


- Basic Understanding
- Vision
- Scenarios
- Drivers
- Risks
- Rewards
- Conclusions

Basic Understanding

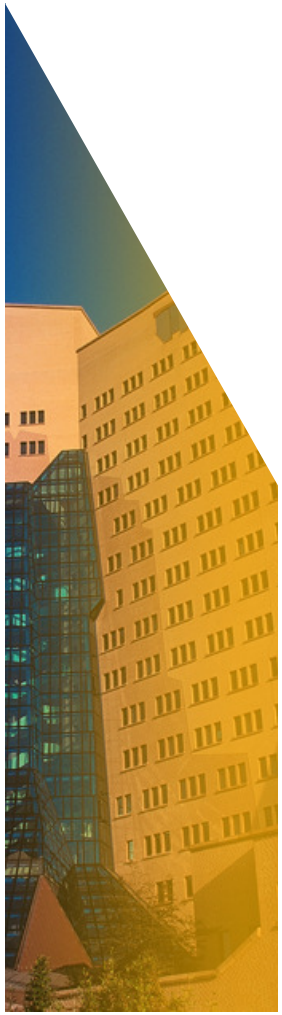
Today we have Large Intertwined energy systems.

Interdependency and Interaction between gas and power will grow the coming decades.



- **Will there be Battles between Power and Gas?**
- **Winner takes all?**
- **One Size Solution fits all in Europe?**

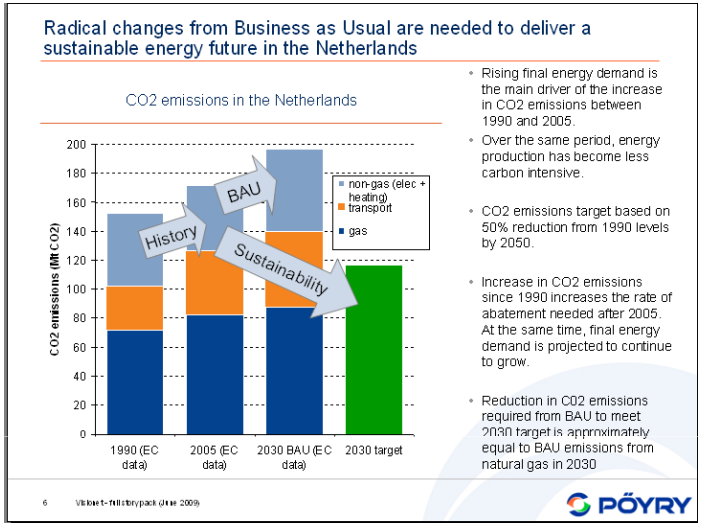
Vision

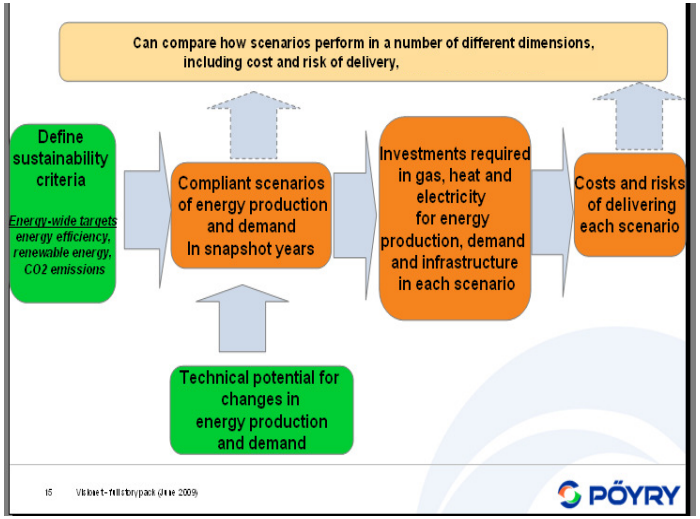


- **Gasunie envisaged a sustainable energy future study for the Netherlands and Germany**
- **In this study futures were assessed from a systems perspective (G&P)**
- **Sustainable and low carbon scenarios were put together, calculated and compared.**

Main Conclusions:

- ***The Efficient and Low Carbon Future: Business as Usual is not an option.***
- ***There are different pathways to a Sustainable Future, but with relative differences.***





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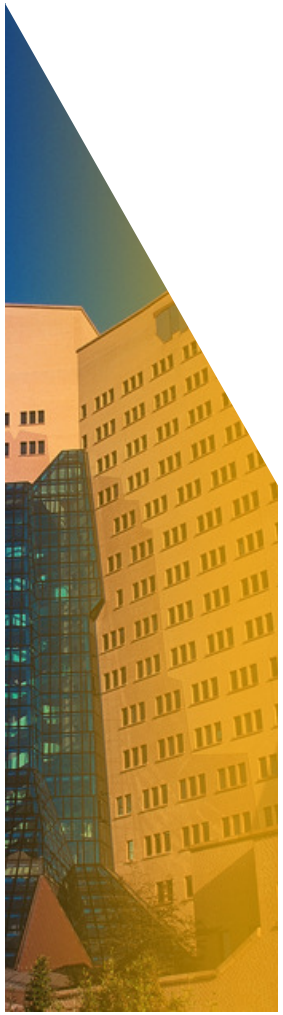
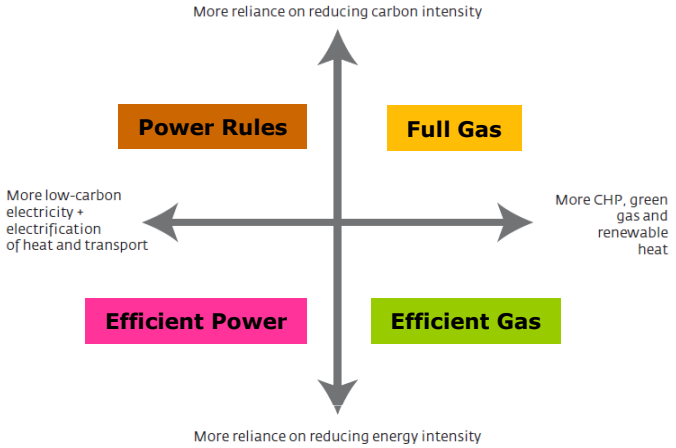
Scenarios



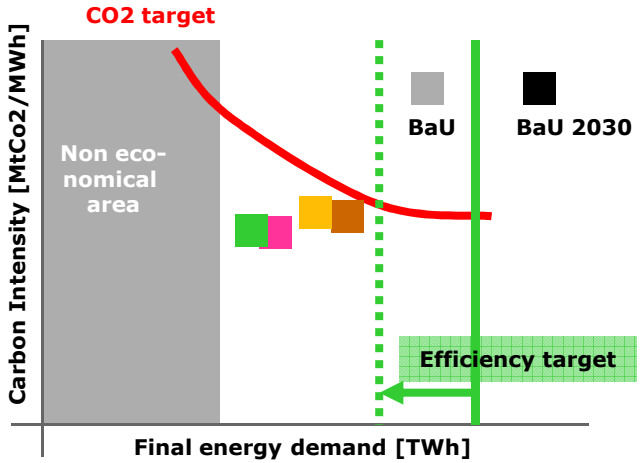
Four scenarios were constructed

- **that comply with European and National sustainability targets**
- **Choices drive energy efficiency, renewables and CO_2 abatement measures.**



Scenario Starting points:

- **The actual energy situation**
- **The actual infrastructure**
- **A feasible development of technology**
- **The curbing of energy demand**
- **The deployment of renewable gas and CCS**



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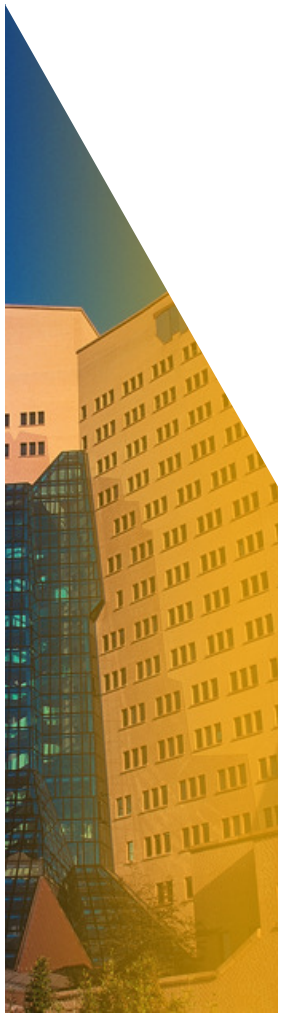
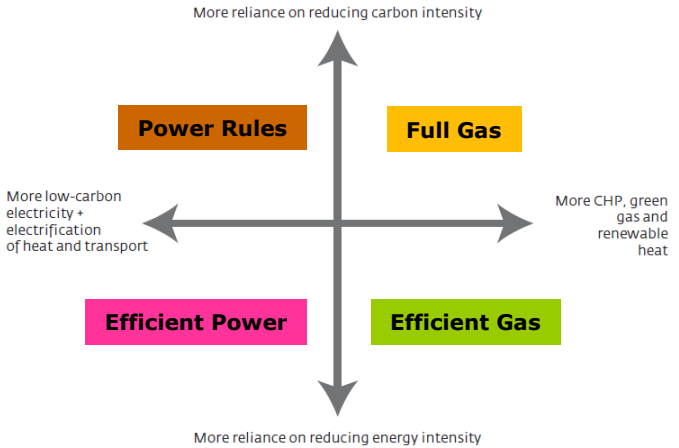
Drivers



Summary Key Drivers and Changes (2030) in each scenario (the Netherlands)



Power Rules

- 10 GW of wind
- 3 GW of CCS coal
- 0.5 mln of electric cars
- Limited emphasis on energy demand management
- Carbon savings primarily delivered by low-carbon electricity

Full Gas

- CHP produces 55% of Dutch electricity
- 4 bcm/yr of green gas
- 0.7 mln CNG vehicles
- Limited emphasis on energy demand management
- Significant carbon savings by CHP and green gas (gasification of transport)

Efficient Power

- Final energy demand 30% lower than BAU
- 10 GW of wind
- 0.5 mln electric cars
- Emphasis on energy demand management
- Deployment of renewable electricity

Efficient Gas

- Final energy demand 30% lower than BAU
- CHP produces 45% of Dutch electricity
- 2 bcm/yr of green gas
- Emphasis on energy demand management
- Deployment of renewable heat, including green gas

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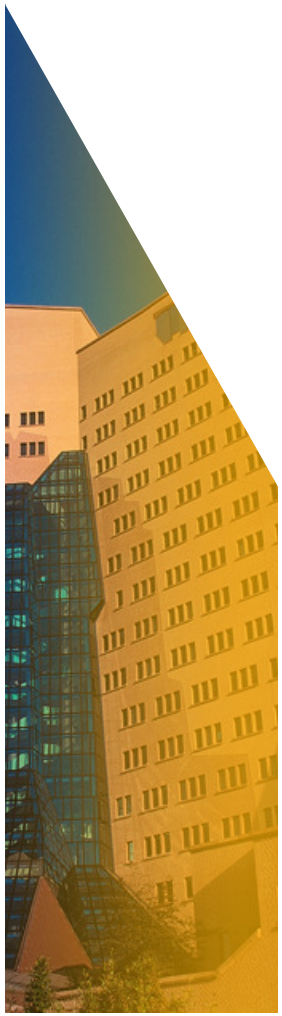
Risks

Change involves Risks.
Risks need mitigation for the goals to be achieved.
Different scenarios have different Risks and Feasibilities.



	Efficient Gas	Efficient Power	Full Gas	Power Rules
Physical investments	x Limited compared to other scenarios	x x Offshore grid requirements by 2020	x x Deployment of heat networks	x x x Highest offshore grid requirements by 2020
Technology roll-out	x x Renewable heat	x Limited compared to other scenarios	x x x Renewable gas and renewable heat	x x x CCS
Behavioural change by 2030	x x x Energy demand 20-30% below BAU	x x x Energy demand 20-30% below BAU	x x Energy efficiency improvements lower but still stretching	x x Energy efficiency improvements lower but still stretching

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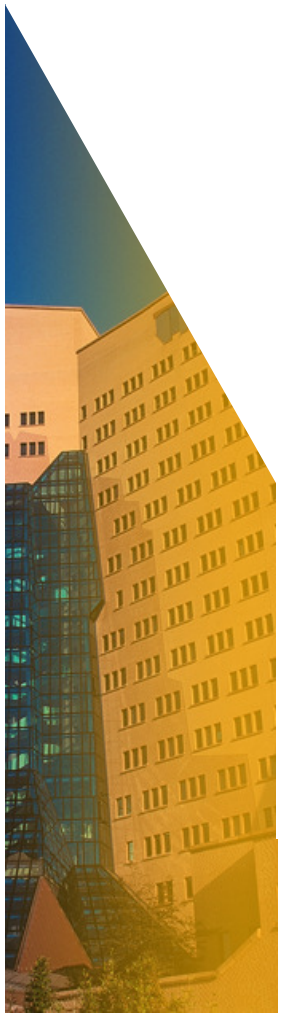
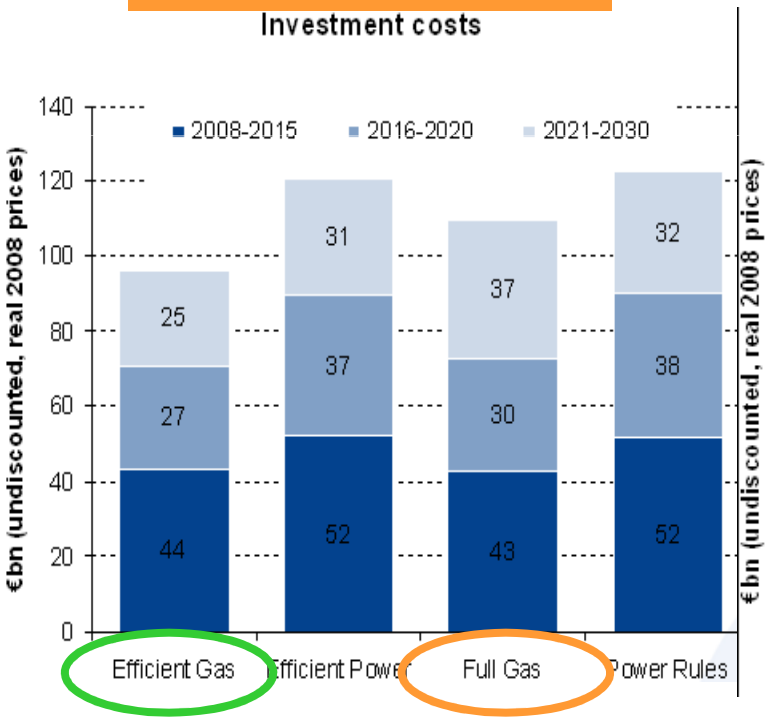
Rewards

In the Netherlands gas scenarios show favourable investment transition costs.

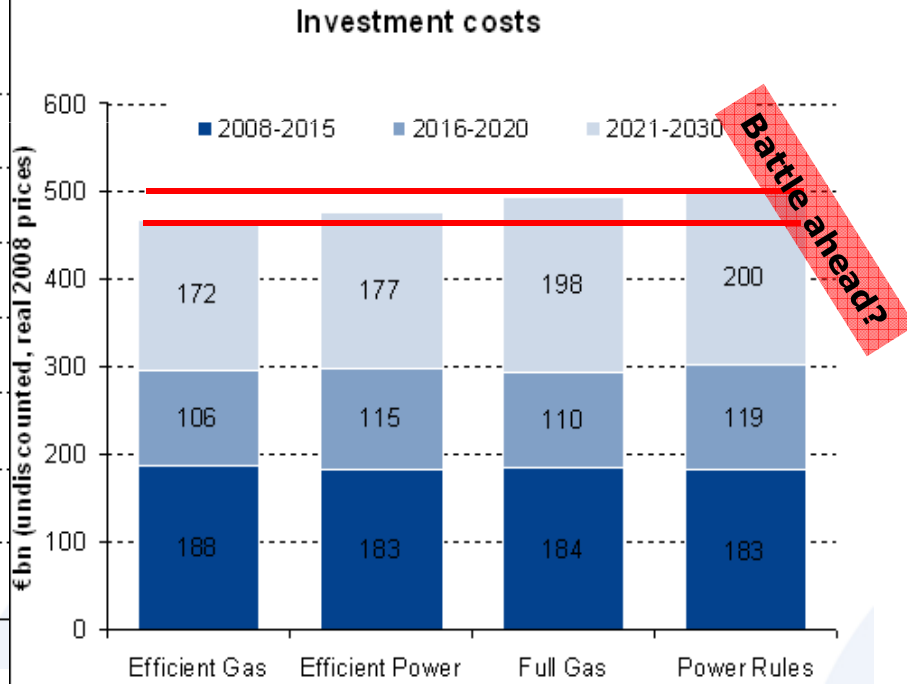
For Germany differences between scenarios are close to call.



The Netherlands



Germany



Total System Investment costs (€bn, real 2008 money, undiscounted)

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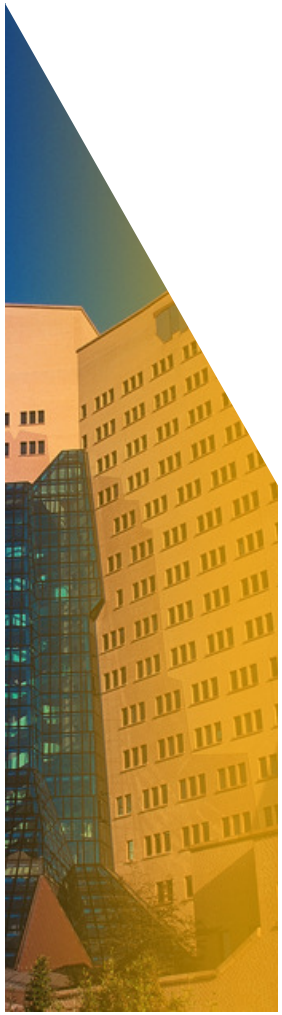
Conclusions



- The Efficient and Low Carbon Future is achievable with gas.
- We can and should build on Today's business.
- "The Solution" to the problem is a mix of measures that depend on the starting position of a Region.
- Based on transparent economics, tailored customer needs and common sense the position of both gas and power can be strengthened for Tomorrow's business.
- The transition pathway with gas in the Netherlands is feasible and most likely cost effective.

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