

Main Drivers for Today's Gas R&D are:

1. Regulation of the gas business and the consequences:
 - Cost **effective and safe** operation of the gas networks
 - Sustainable framework for the gas distribution business
2. Climate (and Resource) Protection:
 - Reduction of CO₂-emissions
 - Efficient use of energy
 - Integration of **renewable energy in the systems**
3. Market requirements:
 - Security of supply, availability of energy
 - Low Price (but: price = value?)

There are three main drivers for today's gas R&D in Germany.

First of all is regulation of gas business and its consequences.

The gas networks have to be operated effectively but also safe

Therefore we need a sustainable framework for the gas distribution business. We will need suitable performance indicators.

In Germany in the past the technical rules have been goal orientated, but in the future they have to be much more detailed. At this point we agree with the national regulation authority.

Second driver is the climate discussion. Sometimes it seems, that resource protection has been forgotten. Most of R&D is done now with reduction of CO₂-Emission, but also efficient use of energy.

Integration of renewable energy in gas technology is a solution which meets the request of legal framework.

Finally security of gas supply, especially in shortage situations is an issue at least since the end of the last year. The question is, if the common market price for energy meets the real value for the supply in the special situation.

Driver 1: Regulation of the gas business and the consequences

Procedures & Processes


- Enhanced methods of asset management: development of maintenance strategies for gas distribution grids
- Aim: life time extension of the assets
- „Real“ Performance of the existing PE-pipework


Materials & Components

- New Materials (Polyethylene, Polyamide, easy-to-go-fittings)
- BUT: Cost reduction effects only by larger lot sizes

Measurement & Billing

- Reconstruction of transient gas quality: measuring vs. modeling



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As a consequence of regulation and the resulting cost pressure enhanced methods of asset management and maintenance strategies for gas distribution grids are in development.

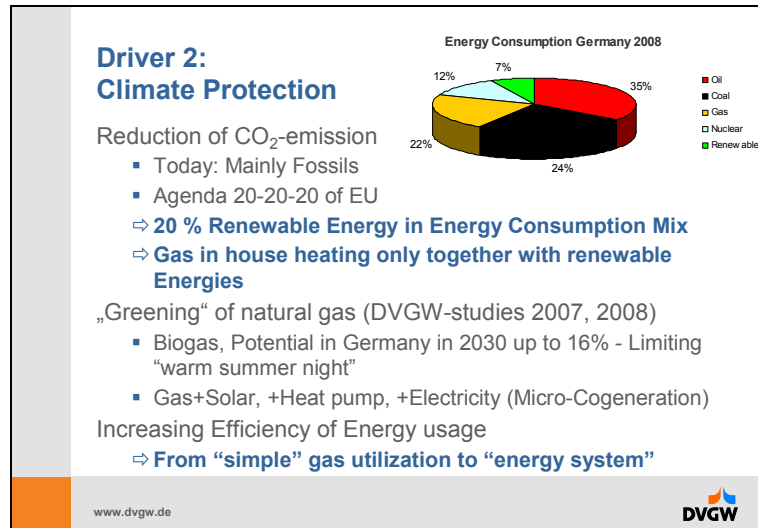
The aim is life time extension of the assets, but also cost reduction by condition orientated maintenance of the net.

Investigation of „Real“ Performance of the existing polyethylene pipework is an example.

We find, that the condition of the polyethylene-net is better than originally expected.

New Materials like Polyamide or easy-to-go-fittings are further examples, But cost reduction will take effect only in case of larger lot sizes, which are not expected in the next future.

Finally measurement & billing equipment and tools are needed. The question here is reconstruction of transient gas quality: measuring or modeling.



Climate protection has been enforced by the legal frame very strongly. In Germany mainly fossil fuels are used. So CO₂-reduction is possible only by saving energy by more efficiency and by switching to renewable energies.

With the Agenda 20-20-20 of EU the goal is for the year 2020:

20 % renewables in energy consumption mix by overall saving of 20%.

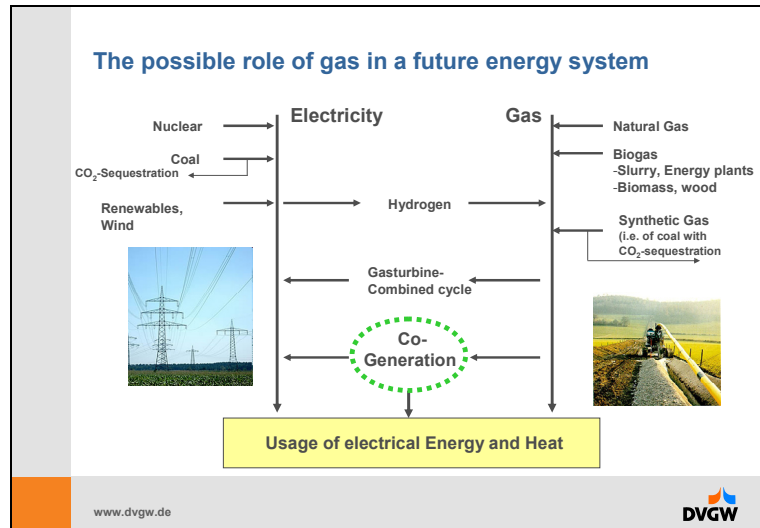
As a result gas in house heating in future seems to be only possible together with renewable energies. So we observe, that in the last years the percentage of new gas house connections has dropped down to about 50%

DVGW investigated the potential of different gas utilization processes under the future legal and economical conditions in Germany.

Gas together with renewables like solar or geothermal energy and especially in combination with high efficient decentralized electricity production may be very attractive and has a big potential especially in the German market.

So we are moving from “simple” gas utilization to “energy systems”

Biogas has additionally a high potential in Germany up to 16% in 2030. By that the limit will be fixed by the “warm summer night”



So gas can have a strong position in future energy systems.

Interaction between gas and electricity will become more important.

The gas grid together with its big advantage of energy storage can fit excellently in a two way system of gas and electricity.

Usage of heat and electricity in decentralized systems can be very attractive in such a system.

Driver 3: Customer and market requirement

Security/availability of supply – Precautions for crises

- **Physical** means: Deviation of large gas flows (Ukraine crisis in winter 2008/09), Storage.
- Development of **Management tools for customer needs**
 - ⇒ **Tradable „premium“ supply rights** which individually back up base supply in case of shortages. (cost-based pricing of supply security)

Increase marketable capacity of grids and storages

- Develop advanced **commercial capacity products** like „early or last minute booking“, „interruptible vs. firm booking“, „reverse flow capacity“ etc.
 - ⇒ commercial capacity > physical capacity

Finally we have to find solutions to manage Security of supply especially in case of shortage by internal or external crisis.

Physical means are deviation of large gas flows (like Ukraine crisis in winter 2008/09) or storage.

Another means which is in principle already included in the legal framework is the development of Management tools for customer needs.

Tradable „premium“ supply rights, which individually back up base supply in case of shortages, could be such a tool.

That means in fact cost-based pricing of supply security.

Measures to increase marketable capacity of grids and storages could be advanced commercial capacity products like „early or last minute booking“, „interruptible vs. firm booking“, „reverse flow capacity“ etc. Such models are under development.

As a result the commercial capacity is bigger than physical capacity and the overall load of the grid can be optimized.

What will be new?

Interaction between gas and electricity more important

- Gas grid: energy storage
- Vice versa, two way system

New power plant structures need new concepts

- Co-Generation with gas meets all new climate requirements
- Volatile energies (wind, solar) need conventional backing – chance for gas

Security of energy supply will have a new value



Task: Flexibility – Availability – Efficiency
optimized load management



Solution: Smart Grids?

So, what is new?

Interaction between gas and electricity will become more important

New power plant structures need new concepts.

Co-Generation with gas meets all new climate requirements and

Volatile energies (wind, solar) need conventional backing – this is a chance for gas

Security of energy supply will have a new value

The task is, to bring Flexibility – Availability – Efficiency together which needs optimized load management.

A solution could be Smart Grids?