



## Perspectives for Gas Utilization under New German Climate Legislation

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### DVGW in Survey

- Technical association of Gas and Water
- Non profit organisation
- founded in 1859
- 12.000 members
- R&D facilities Gas
  - in Freiberg, Leipzig, Karlsruhe
- R&D facilities Water
  - in Karlsruhe, Hamburg, Dresden
- 11 regional and 64 district units
- Subsidiary companies for consulting, certification and publishing



DVGW sites ○

## DVGW - Member Structure 2008

Gas- and Water  
Supply Companies : 1.725

Authorities, Institutions,  
Organisations (AIO): 223

Manufacturers:  
1.362

Individual, personal members :  
9.108

**Members total: 12.500**

## Activities

Codes and standards

Knowledge  
Transfer



Research and  
Development



Safety



Environment

Hygiene



Communication



Testing and  
Certification

Professional Training

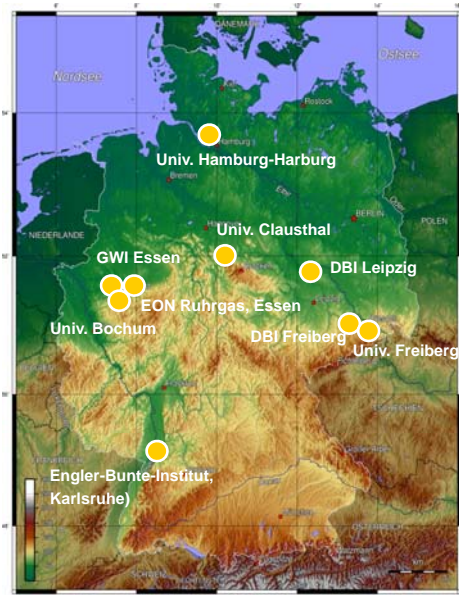
## Main Gas Research Sites in Germany

R&D is performed  
In DVGW own or asso-  
ciated institutes.

EON Ruhrgas operates  
a R&D center in Essen.

Other main gas companies  
as RWE oder VNG perform  
R&D at different sites.

There are some additional  
Research Institutes  
(Universities)



[www.dvgw.de](http://www.dvgw.de)



## Deutschland baut auf erneuerbare Energien.

Setzen Sie auf Wärme mit Zukunft.



## The Situation of Gas in the Domestic Market

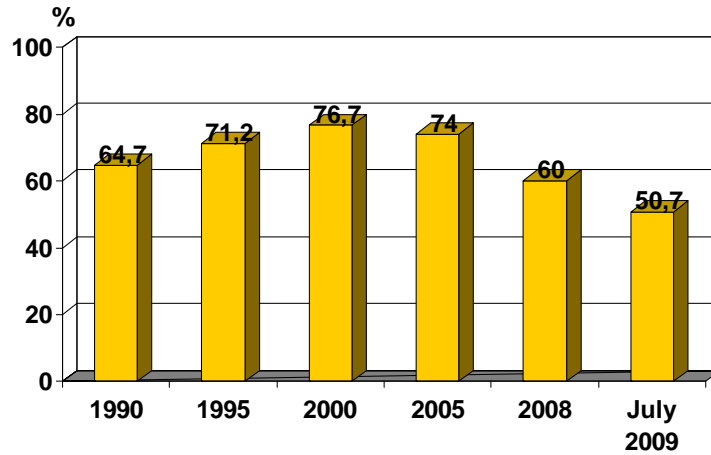
Actual advertising campaign  
of the german government.

„Solarenergy, biomass  
and geothermal energy  
are the heatsources  
of the future...“

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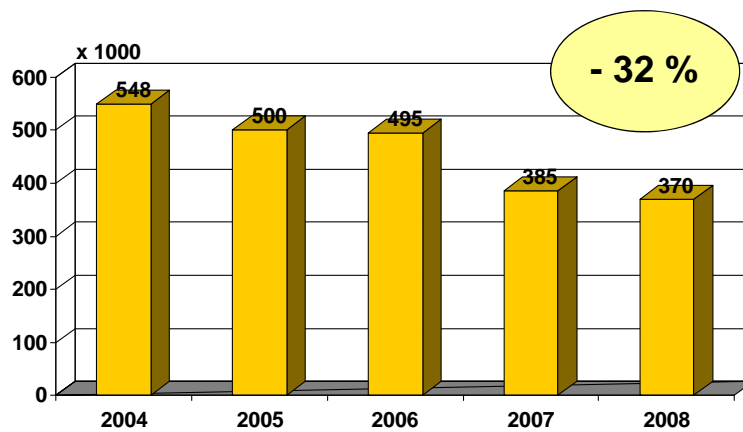


## The Market Share of Gas in new built Houses over the years



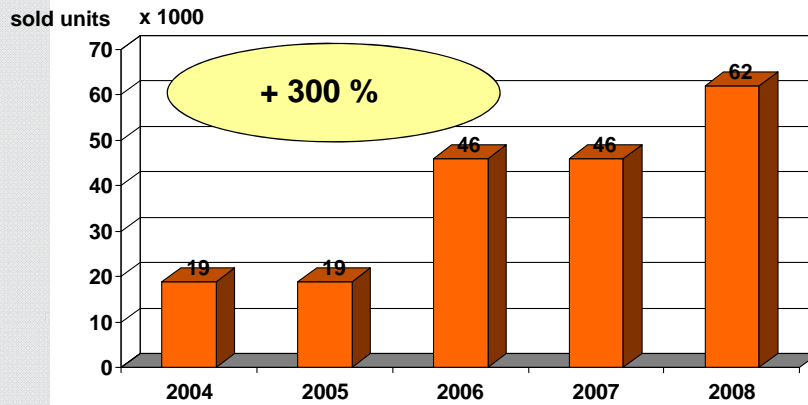
➔ To develop a strategic chance for gas in the domestic market

## The Sales of Gas Appliances in Germany



Source: German Association of Heat Appliance Manufacturers

## ... and the Sales of Electrical Heat Pumps



Source: German Association of Heat Appliance Manufacturers

## The „Integrated Energy- und Climate Program“ (IEKP) is the New Climate Legislation since 07/2008

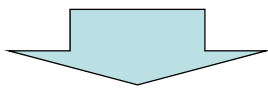
→ 29 laws and acts



	2020	today
CO <sub>2</sub> -Reduction (referring to 1990)	- 40 %	- 23 %
Share Renewables on the overall energy market	18 %	6 %
Renewables in the domestic heat market	14 %	6 %
Reduction of the overall Energy consumption (ref. 2005) in the domestic heat market	- 20 %	
Share CHP in electricity production	25 %	12 %

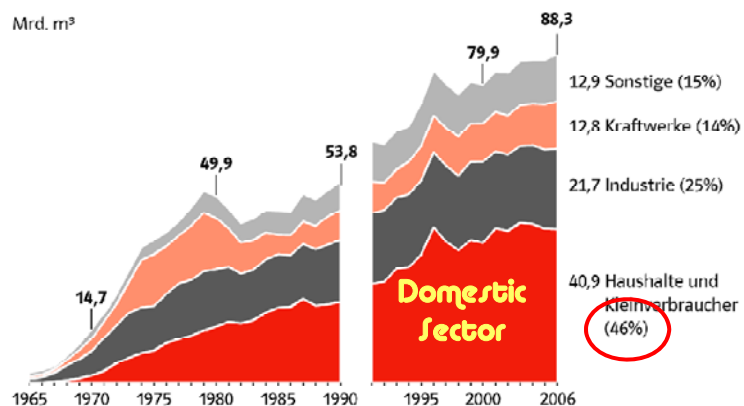
## The Basic Elements of the „Integrated Energie and Climate Programme“ (IEKP) are:

- The legislation forces (and excludes) specific technologies. It is **basically not open for all technologies**.
- **Competition of energy sources** comes to **competition of technologies (and systems)**.
- The change of energy supply towards more **decentralized structures** is politically intended.

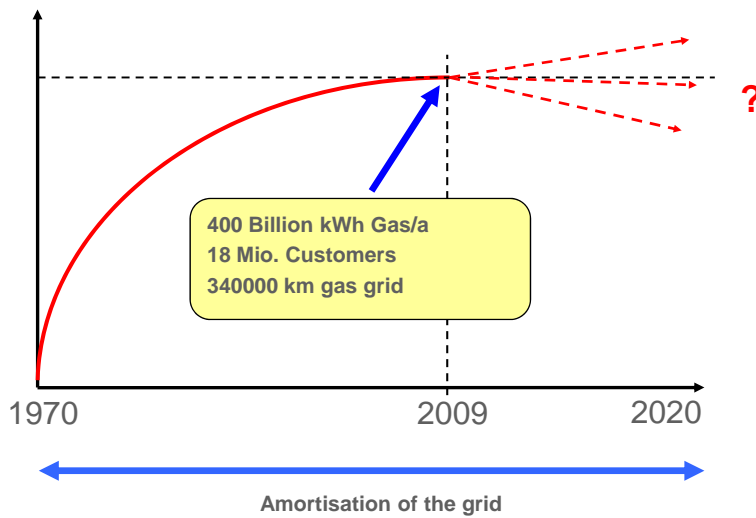


- The „natural“ advantages of gas will not be sufficient in future
- IEKP will lead to massive changes in market and distribution.

## The Domestic Gas Market in Germany - how it developed

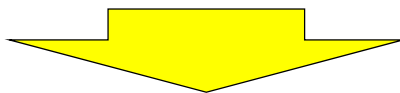


## ... and where to ?



## A first short Summary:

- General means to save energy (insulation, ...) are enlarged
- Renewable Energies („Bio-Energy“) and new technologies (heat pumps) are being installed more and more
- The heat demand of buildings will decrease – also in existing buildings
- The requirements on energy efficiency for technologies and appliances will increase



**Future Role of Gas ?**

## A Study together with Swiss Consultant PROGNOSE was carried out ...

- To show and evaluate the future framework of the domestic energy market
- To analyse existing and future gas technologies for the domestic sector in the new boundaries
- But also: To analyse existing and future competitive technologies
- To validate the gas technologies on typical applications (which technology for which application)
- To identify research & development needs and further supporting actions

## The main Guidelines of the Project were:

1. Development towards an innovative and high efficient utilization of gas
2. „Greening of the Gas“ – Biogas, Renewables
3. Systemic view: „From gas appliances to energy systems“



## Technologies

### Gas:

- Condensing boiler (stand alone, and with integration of solar heat)
- Heat pumps (different technologies)
- Co-Generation (Otto-Engine, Stirling-Engine)
- Fuel Cells (diff. Technologies)
- (Micro-gasturbine)

### Competitive Technologies:

- Oil condensing boiler (stand alone, and with integration of solar heat)
- Electrical heat pump (diff. Technologies)
- Biomass (Pellets, wood chips)

Table KF-1: Assessment and Suitability of the Heating Systems by Application Case (with respective exemplary characteristics)

		Single-family house, newly erected	Single-family house, (partially) refurbished	Single-family house, unrefurbished	Multi-family house, partially refurbished	Housing est. local heating, existing buildings	Hotel incl. restaurant, partially refurbished	Nursing home and care facility, part. refurbished	Administration building, partially refurbished
Gas CB	Gas condensing boiler (CB)	●	●	●	●	●	●	●	●
	Gas CB + solar DWH	●	●	●	●	●	●	●	●
	Gas CB + solar DWH & heating support	●	●	●	●	●	●	●	●
CHP	Otto motor	●	●	●	●	●	●	●	●
	Micro gas turbine	●	●	●	●	●	●	●	●
	Stirling motor	●	●	●	●	●	●	●	●
	Fuel cell: PEMFC	●	●	●	●	●	●	●	●
Gas HP	Fuel cell: SOFC	●	●	●	●	●	●	●	●
	Gas absorption HP	●	●	●	●	●	●	●	●
	Gas compression HP	●	●	●	●	●	●	●	●
	Gas diffusion-absorp. HP	●	●	●	●	●	●	●	●
	Gas zeolite HP	●	●	●	●	●	●	●	●
Electr. HP	Electr. ground source HP	●	●	●	●	●	●	●	●
	Electr. water HP	●	●	●	●	●	●	●	●
	Electr. air HP	●	●	●	●	●	●	●	●
	Electr. exhaust air HP *	●	●	●	●	●	●	●	●
Oil CB	Oil condensing boiler (CB)	●	●	●	●	●	●	●	●
	Oil CB + solar DWH	●	●	●	●	●	●	●	●
	Oil CB + solar DWH & heating support	●	●	●	●	●	●	●	●
Wood	Wood heating: pellets	●	●	●	●	●	●	●	●
	Wood heating: split logs	●	●	●	●	●	●	●	●
	Wood heating: wood chips	●	●	●	●	●	●	●	●
Heat distribution	Local heating network	●	●	●	●	●	●	●	●
	District heating network	●	●	●	●	●	●	●	●

CB: condensing boiler DWH: drinking water heating HP: heat pump SOFC: solid oxide fuel cell PEMFC: polymer electrolyte membrans fuel cell  
Prognos 2009

\* Insufficient for full coverage due to dimensions of heat source; is used as heating support. Full coverage potentials exist in so-called 'passive houses'.

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Gas CB	Gas condensing boiler (CB)	●	●	●	●	●	●	●	●
	Gas CB + solar DWH	●	●	●	●	●	●	●	●
	Gas CB + solar DWH & heating support	●	●	●	●	●	●	●	●
CHP	Oil motor	●	●	●	●	●	●	●	●
	Micro gas turbine	●	●	●	●	●	●	●	●
	Stirling motor	●	●	●	●	●	●	●	●
	Fuel cell: PEMFC	●	●	●	●	●	●	●	●
	Fuel cell: SOFC	●	●	●	●	●	●	●	●
Gas HP	Gas absorption HP	●	●	●	●	●	●	●	●
	Gas compression HP	●	●	●	●	●	●	●	●
	Gas diffusion-absorp. HP	●	●	●	●	●	●	●	●
	Gas zeolite HP	●	●	●	●	●	●	●	●
Electr.	Electr. powered device HP	●	●	●	●	●	●	●	●
	Electr. water HP	●	●	●	●	●	●	●	●
HP	Electr. air HP	●	●	●	●	●	●	●	●
	Electr. exhaust air HP	●	●	●	●	●	●	●	●
Oil CB	Oil condensing boiler (CB)	●	●	●	●	●	●	●	●
	Oil CB + solar DWH	●	●	●	●	●	●	●	●
	Oil CB + solar DWH & heating support	●	●	●	●	●	●	●	●
Wood	Wood heating pellets	●	●	●	●	●	●	●	●
	Wood heating split logs	●	●	●	●	●	●	●	●
	Wood heating wood chips	●	●	●	●	●	●	●	●
Heat distri.	Local heating network	●	●	●	●	●	●	●	●
	District heating network	●	●	●	●	●	●	●	●

CB: condensing boiler Prognos 2009 HP: heat pump SOFC: solid oxide fuel cell PEMFC: polymer electrolyte membrane fuel cell  
 \* Insufficient for full coverage due to dimensions of heat source; is used as heating support. Full coverage potentials exist in so-called "passive houses".

### The Project showed, that ....

- Gas has **potential** in the „new“ energy world of the German Integrated Energy and Climate Package, i.e. together with biogas.
- There will be **not „one“ gas technology** for all applications. The market will be **wider**.
- Gas condensing technology**, together with solar energy, meets all legal and economical requirement for a wide spectrum of applications – even today.
- New **gas heat pumps** are under field trial and will be ready soon. Gas heat pumps will come with easy technologies to catch ambient heat - compared with electrical heat pumps.
- Co-Generation with gas** meets all future requirements due to a combined heat and power production (CHP).
- Fuel Cells** have a particular potential for future high insulated buildings due to high electrical efficiencies.

## The Strategic Option is:

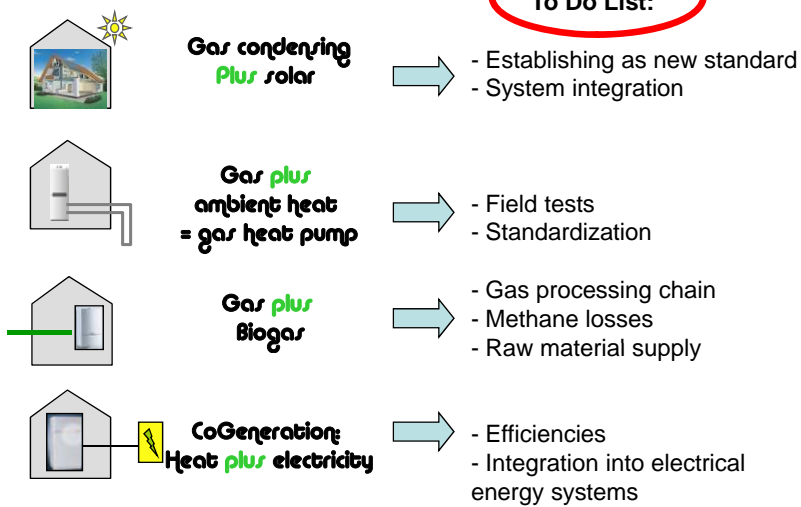
Gas-Technology

Gas-Plus-Technology

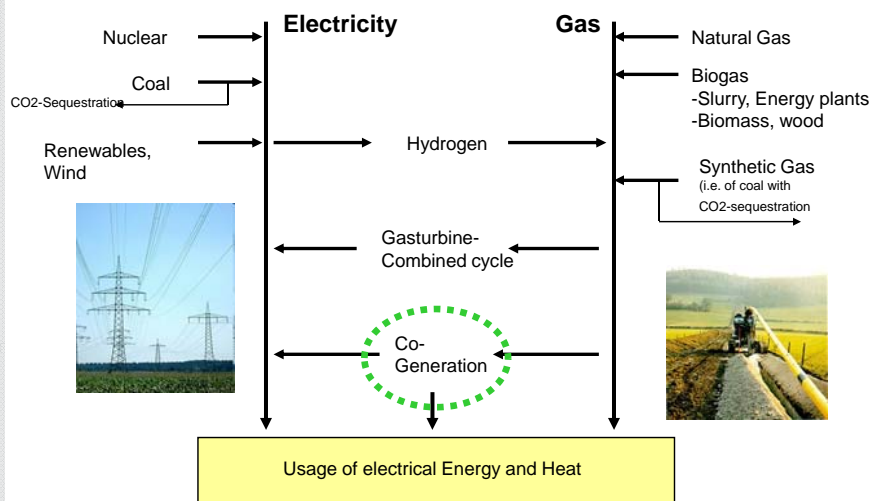
- Gas plus Biogas
- Gas-Condensing plus Integration of Solar Energy
- Co-Generation: Gas to produce Heat plus Electricity
- Gas heat pumps use Gas plus Ambient Heat
- Additional solutions to come (AirCo): Heat plus Cold

## Gas-Plus-Technology: Things to do

### To Do List:



## An Outlook: The Role of Gas in a Future Energy System – Convergence and interaction



## Summary

- The new energy and climate legislation („Integrated Energy and Climate Programme“) leads to new requirements for the gas industry
- Gas ist „part of the game“
- Biogas is a strategic option (digester, thermal gasification)
- Gas-Plus-Technologies are necessary for domestic market and the gas distribution system
- Co-generation (CHP) - electricity plus heat - meets in particular the requirements of the future