



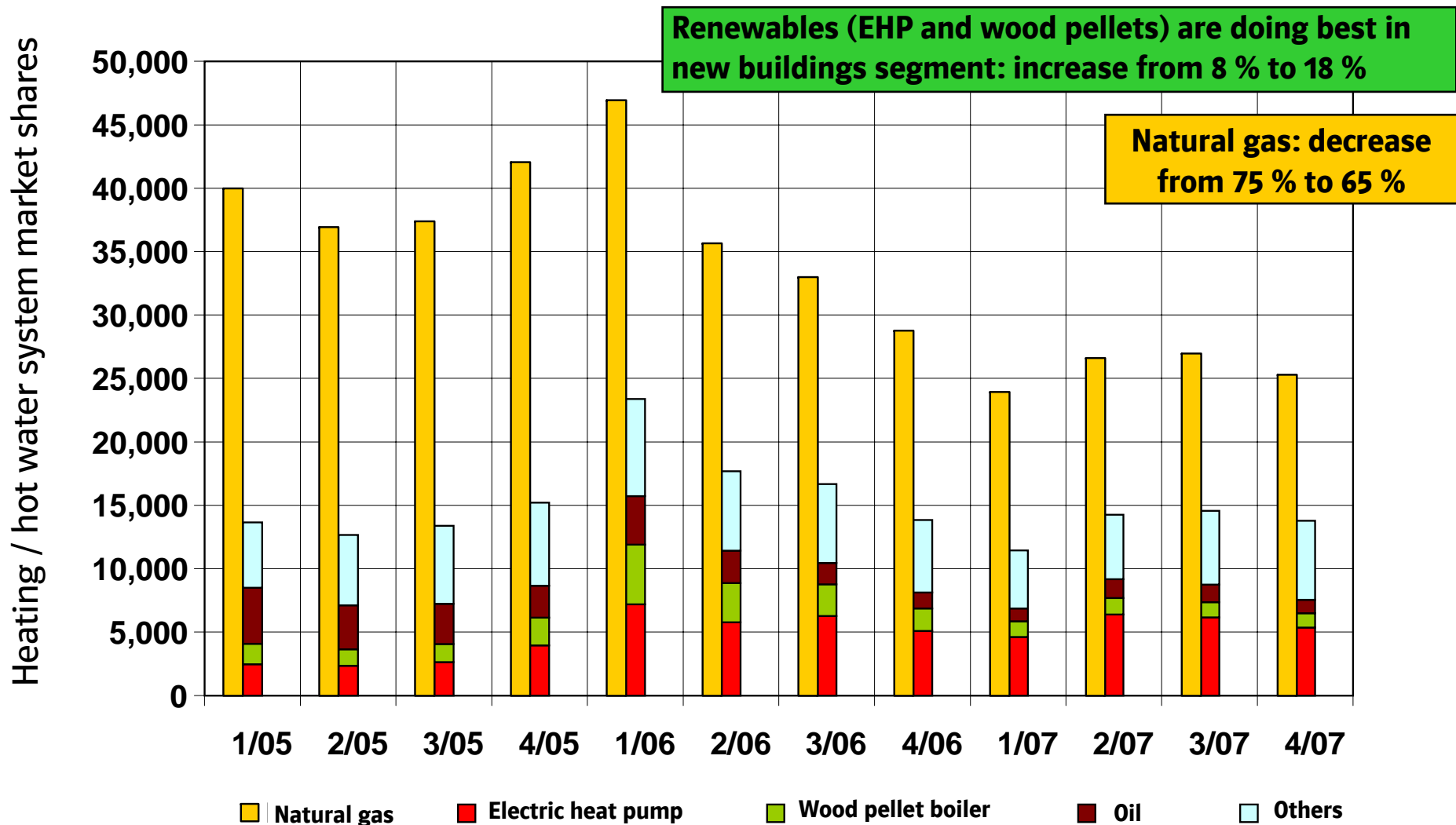
State of the Art of
Gas Driven Heat Pumps –
A Report from the
'Gas Heat Pump Initiative' in Germany

Dr. Rolf Albus, Gas Utilisation
Zurich, 20th May 2008

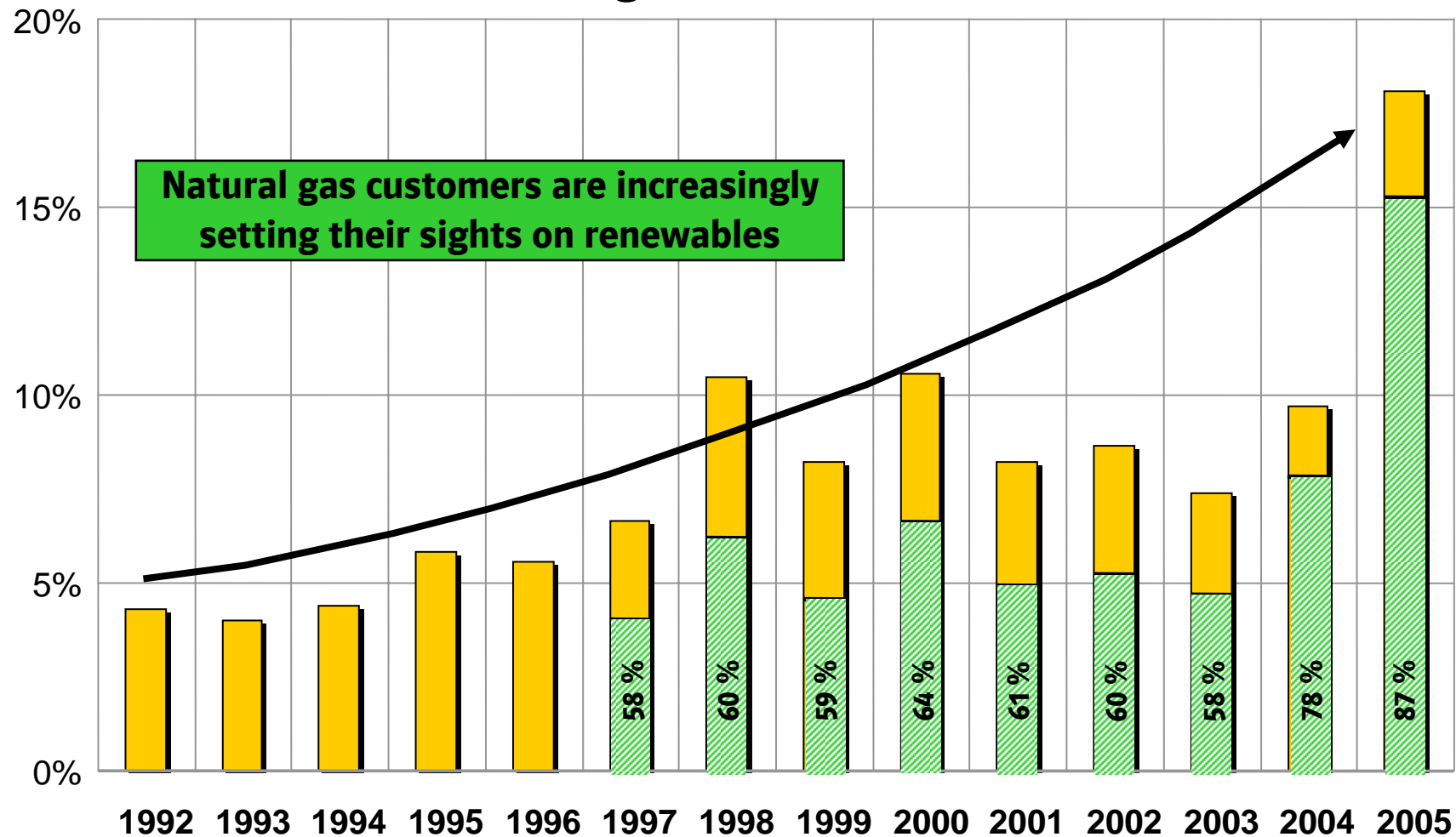
Overview

- **Market situation for natural gas**
- Political framework
- Gas heat pumps
- Technologies compared
- Gas Heat Pump Initiative
- Summary

Market shares of different energies in the new build sector



Existing buildings: Natural gas customers wishing to switch ■
 Share of customers wishing to use renewables ▨



Background

- On the heating market, natural gas technologies find themselves competing increasingly with systems that allow the use of renewable energy sources.
- There is particular need for new natural gas technologies in the new build sector.
- CO₂ assessment of fuels: gas has advantages over oil; disadvantages compared with wood pellets for example.
- Gas offers clear advantages in terms of emissions (CO, NO_x, particulate matter).

**Even so, more and more customers are now deciding
against natural gas solutions**

Reason enough for the German gas industry to set up the
'Gas Heat Pump Initiative'

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Political requirements - Renewable Energies Heat Act



Local state level (BW)

- New buildings (1 April 2008) Target: 20 % renewables
- Existing buildings (1 Jan. 2010) Target: 10 % renewables

Technical options (selection):

1. Gas boiler with solar panels	**		
2. Gas heat pump	Annual coefficient of performance		1.3
3. Electric heat pump	Annual coefficient of performance		3.5*

* cannot be achieved when using air as heat source, results of field tests by E.ON Energie 2002/2003

** 0.04 m² panel surface/m² of floor area; Panel surfaces certified acc. to European "Solar keymark" approval mark"



Federal level (currently in progress)

Further improvements to gas-fired condensing appliances in response to more stringent political requirements

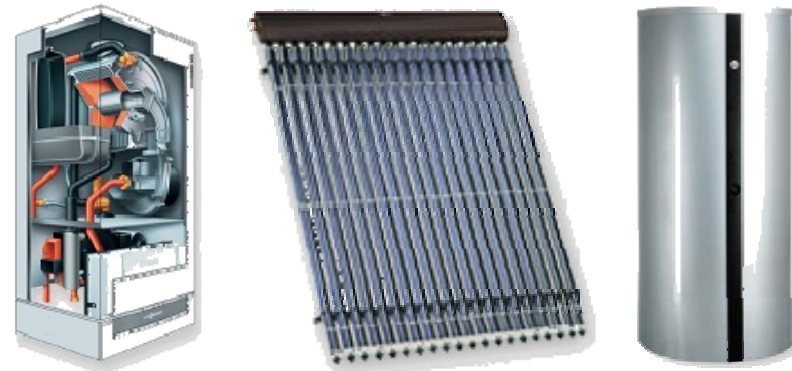
Condensing appliance

- Competitively priced unit
- Simplified gas installation
- Adjustment to output requirements
- Reduced auxiliary energy requirements
- Reduced maintenance costs

Challenge for appliance manufacturers and gas suppliers

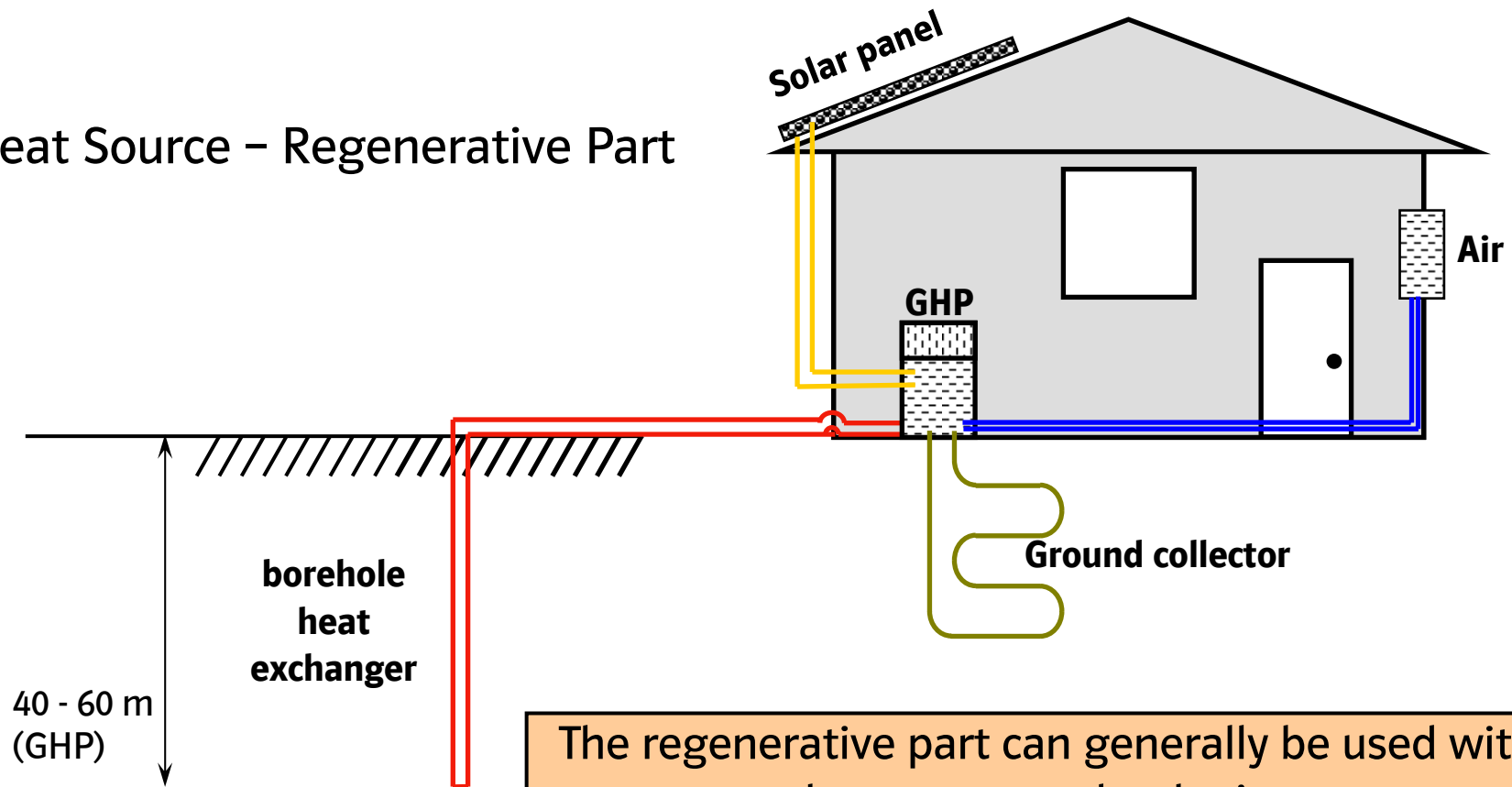
Condensing appliance + solar energy

- Integrated condensing appliance/solar solution
- Units for natural gas



Technology: GHP for Single-Family Homes

Heat Source – Regenerative Part







The regenerative part can generally be used with heat pump technologies

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Gas Heat Pumps in Germany

Gas heat pump manufacturers / product development			
Manufacturer	Process	Development status	Use in
	Diffusion / Absorption	Prototype / null-series	10 kW (new buildings)
	Adsorption	Prototype / null-series	
 climate of innovation	Adsorption	Prototype	
 konsequent umweltbewusst	Absorption	Market / prototype	15 - 40 kW (existing buildings)

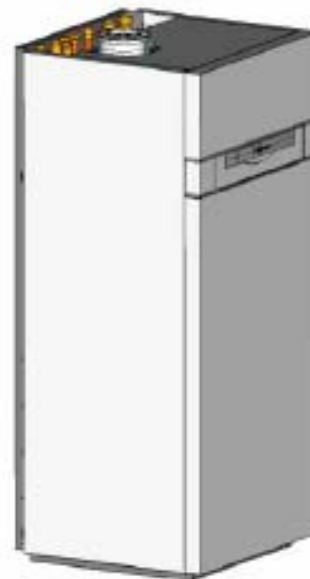
Gas Heat Pumps in Germany



Quelle: BBT 9.2007



Quelle: Vaillant 9.2007



Quelle: Viessmann 9.2007



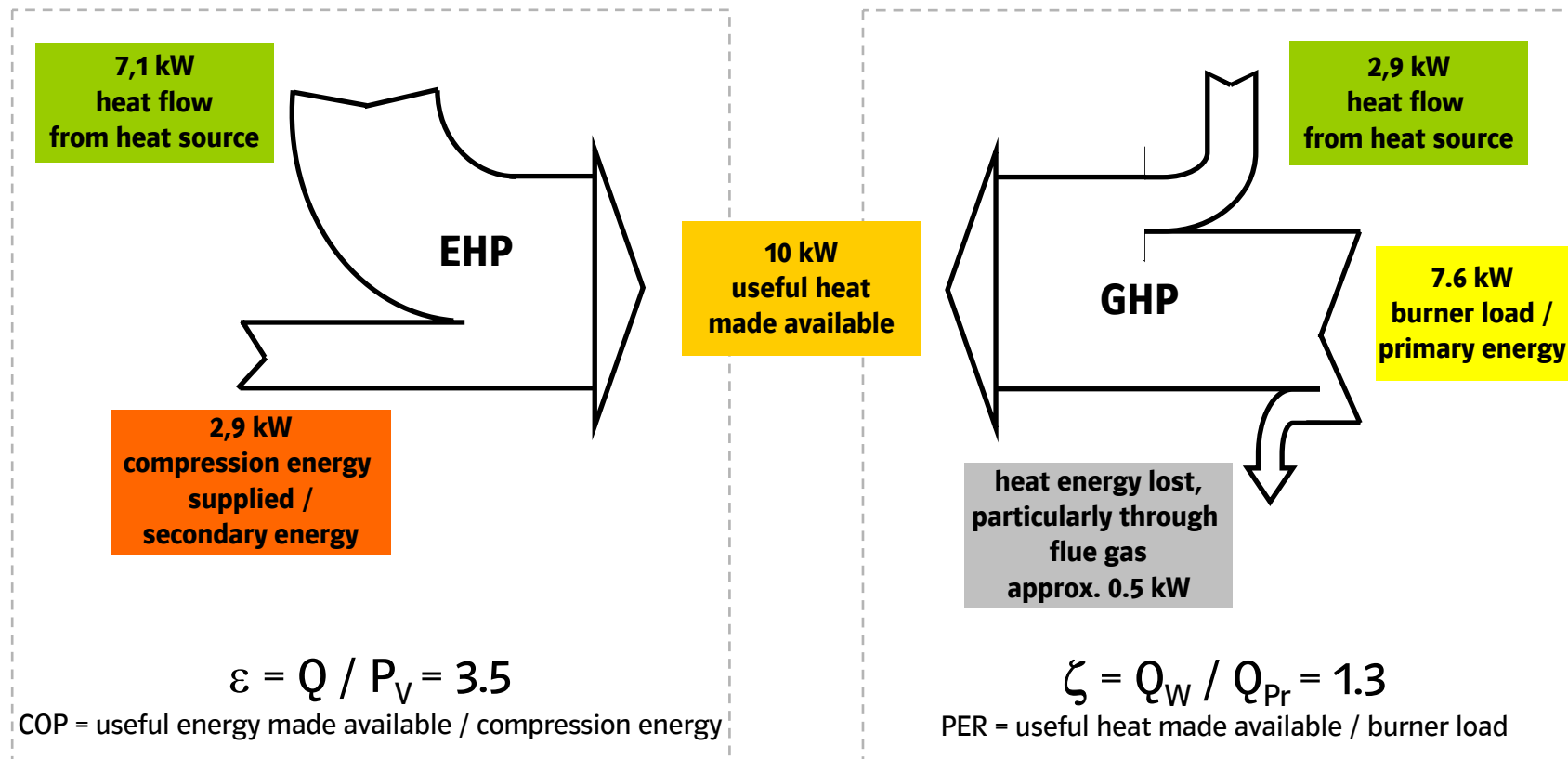
Robur GmbH

Overview

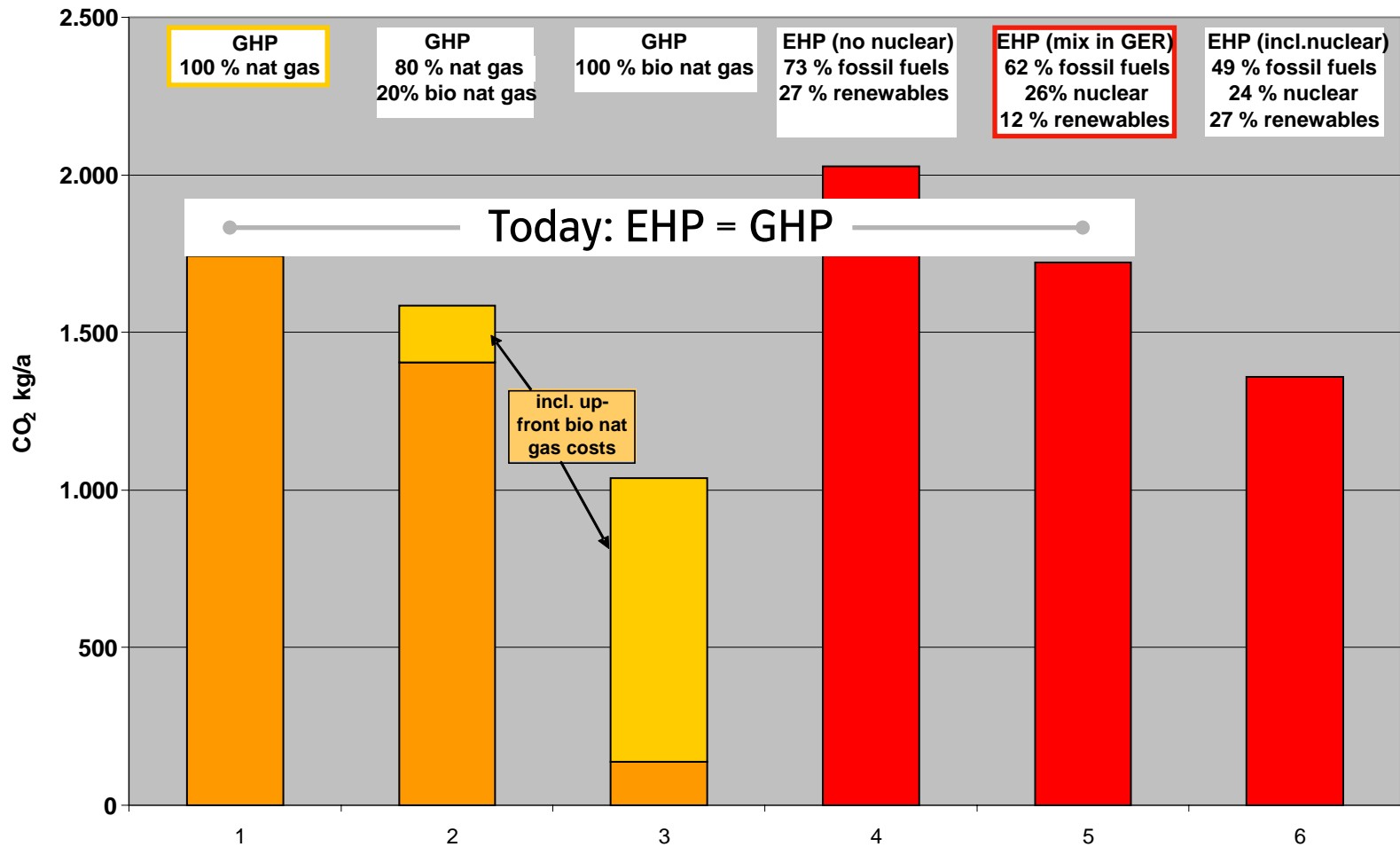
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Energy flow diagram for heat pumps

Simplified energy flow diagram



Annual CO₂ emissions from new buildings (GHP vs. EHP)

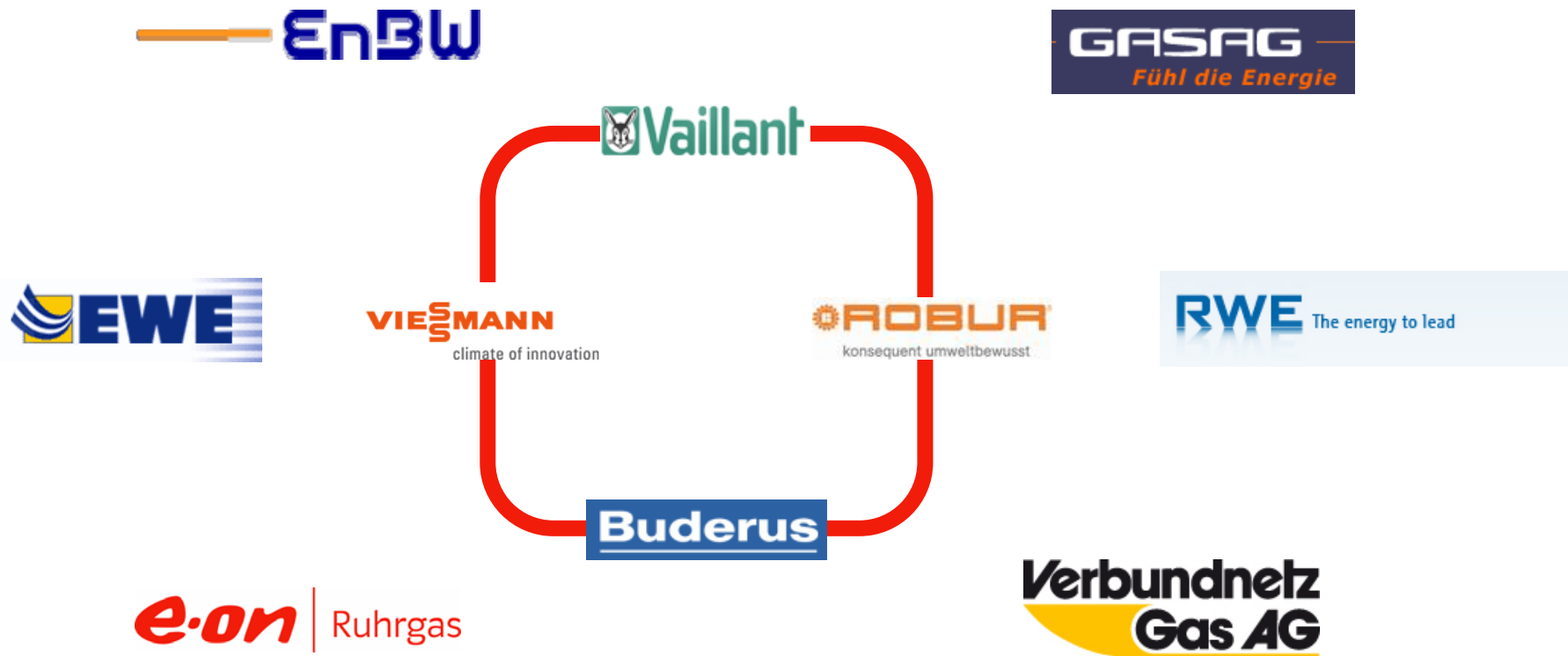


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"Gas Heat Pump Initiative"

A concerted campaign by the gas industry



> established in February 2008 <

Key aspects of the Gas Heat Pump Initiative

Objective:

To develop gas heat pump technology to market maturity by pooling the expertise of **appliance manufacturers** and **gas utilities**.

Approach:

1. Supporting laboratory tests at the gas utilities
2. Field tests / trials at selected customers
3. Market launch with product-specific marketing support

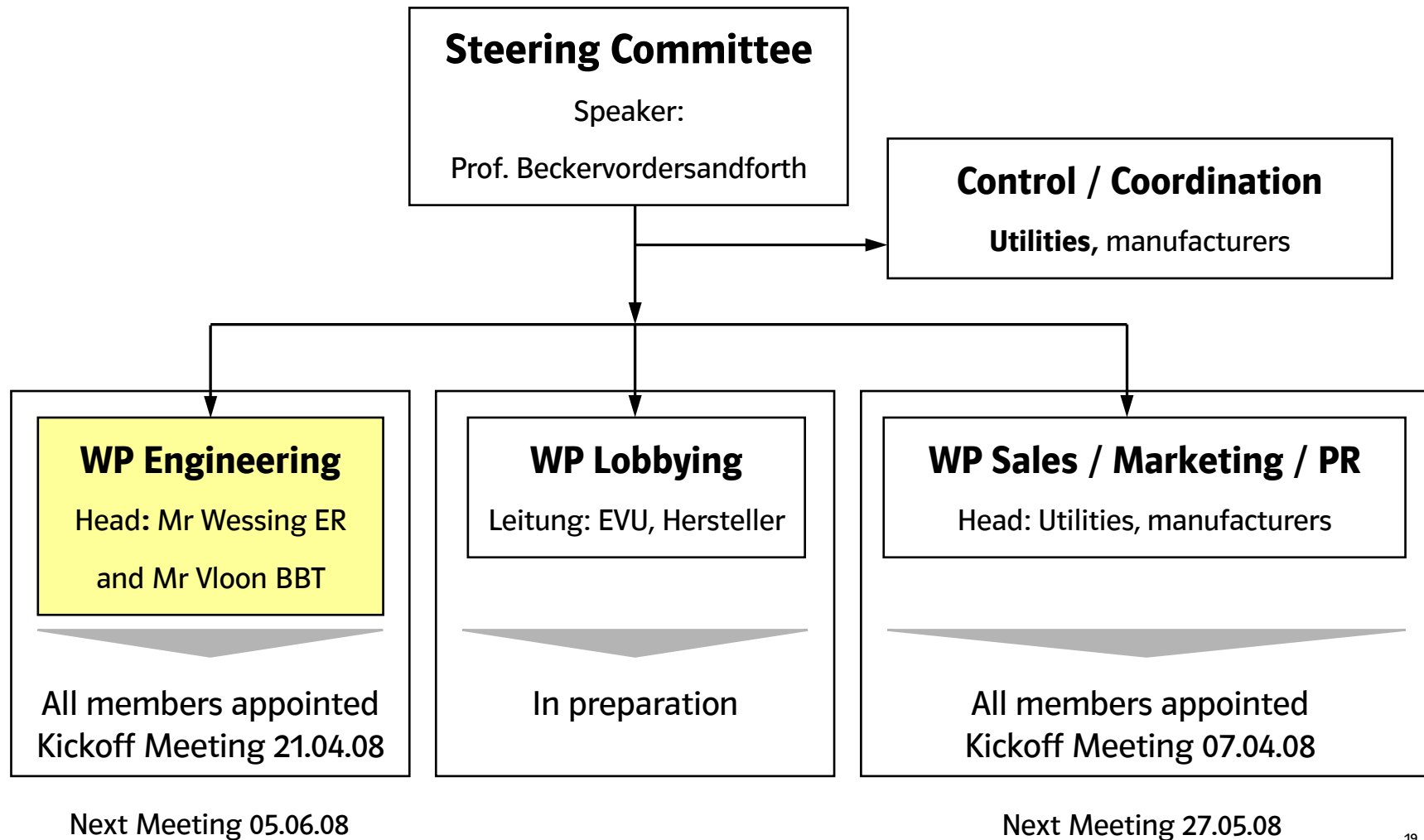
Budget:

EUR 15 million (EUR 7.5 million provided by gas industry)

Project term:

3 years

Organisation of the Gas Heat Pump Initiative



Gas Heat Pump Initiative Task Description

Steering Committee

Heads the GHPI, strategic orientation, approves programme of work, PR budget, new working parties, special projects
Meets twice annually

Control/Coordination

Prepares and follows up meetings of the steering committee and working parties (WP), budget administration, places orders, audits and settles accounts

WP Engineering

Control and documentation of field test results, approval and licensing issues, integration issues etc.,
Project-related budgets
Meets several times a year depending on product status and field test results

WP Lobbying

Political lobbying,
Project-related budgets e.g. if studies are commissioned in 2008
Meets as required

WP Sales / Marketing / PR

Market rollout concept, logo development, corporate design, press relations, Info brochures, MP events, fairs and exhibitions etc.
Budget 2008, DVGW and ZVSHK involvement according to project status, ASUE (guest status)
Meetings to be decided according to project progress

Gas Heat Pump Initiative Membership

- The Gas Heat Pump Initiative is essentially open to further membership (from Germany in the first instance) subject to the consent of all existing GHPI members.
- Energy suppliers undertake to provide a minimum of 10 field test plants.
- Appliance manufacturers must be gas heat pump producers.

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Summary

1. There are calls at political level for the gas industry to provide highly efficient, CO₂-reducing heating systems. These calls will get louder.
2. Activities by gas supply companies have already led to more development work by appliance manufacturers.
3. More far-reaching GHP production developments are necessary.
4. GHP has drawn level with EHP in terms of CO₂ output and full costs; GHP still has further potential.
5. Overall system optimisation (gas connection, installation, appliance, flue gas piping) will further reduce costs.
6. Joint laboratory and field test projects will allow earlier market launch.

Overall conclusion

- Because of changing legislation and increasing customer requests, gas appliances designed for use in combination with renewable energies are an absolute must for the gas industry.
- Newly developed products will have to be tested for their technical usability.
- Concerted action by gas appliance manufacturers and the gas industry is required when introducing new products to the market.