

# World Gas Conference 2006

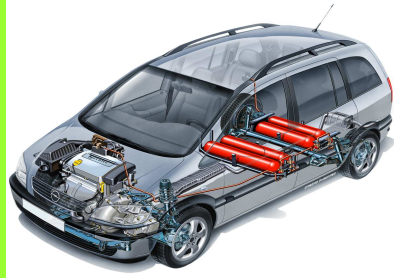
Strategic Panel

Natural Gas Vehicles: The Road Ahead ?

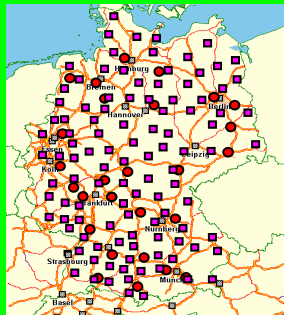
CNG-Distribution in Germany

Dr. Bernhard Jeken, erdgas mobil Verw.-GmbH

# Success Factors for Natural Gas as an Automotive Fuel

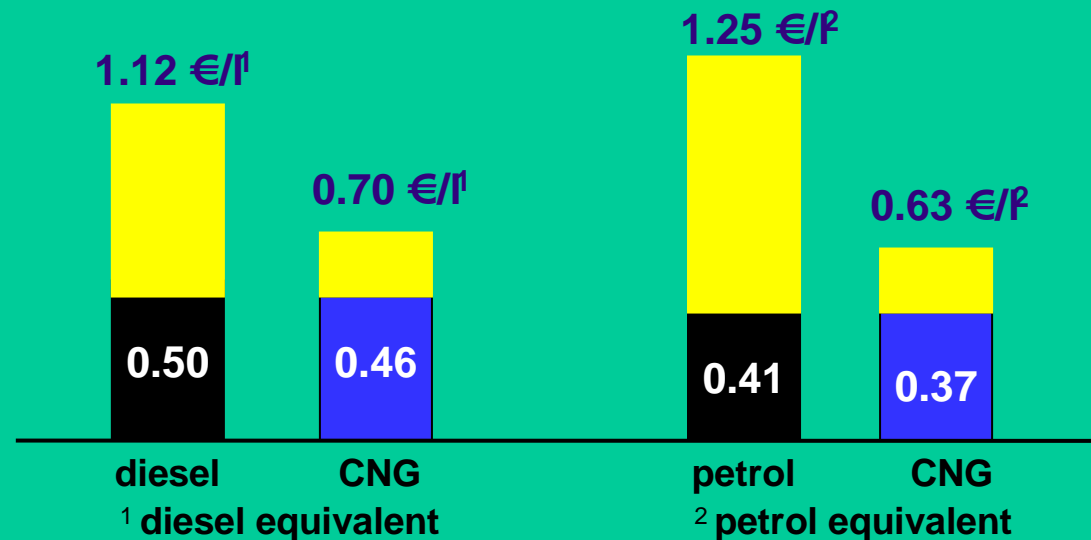


Range of vehicles offered by automotive industry  
Cars and commercial vehicles



Establishment of a Germany-wide infrastructure  
Strategic gas industry investment

Fiscal incentives for use of natural gas as a vehicle fuel



- Fuel economy is key element
- Additional aspects are environmental protection (including biogas option) and diversification of fuel for transport sector
- Target customers: commuters, fleet operators, taxi cabs, ...

⇒ **CNG refuelling station network covering Germany**

## Shareholders from gas industry

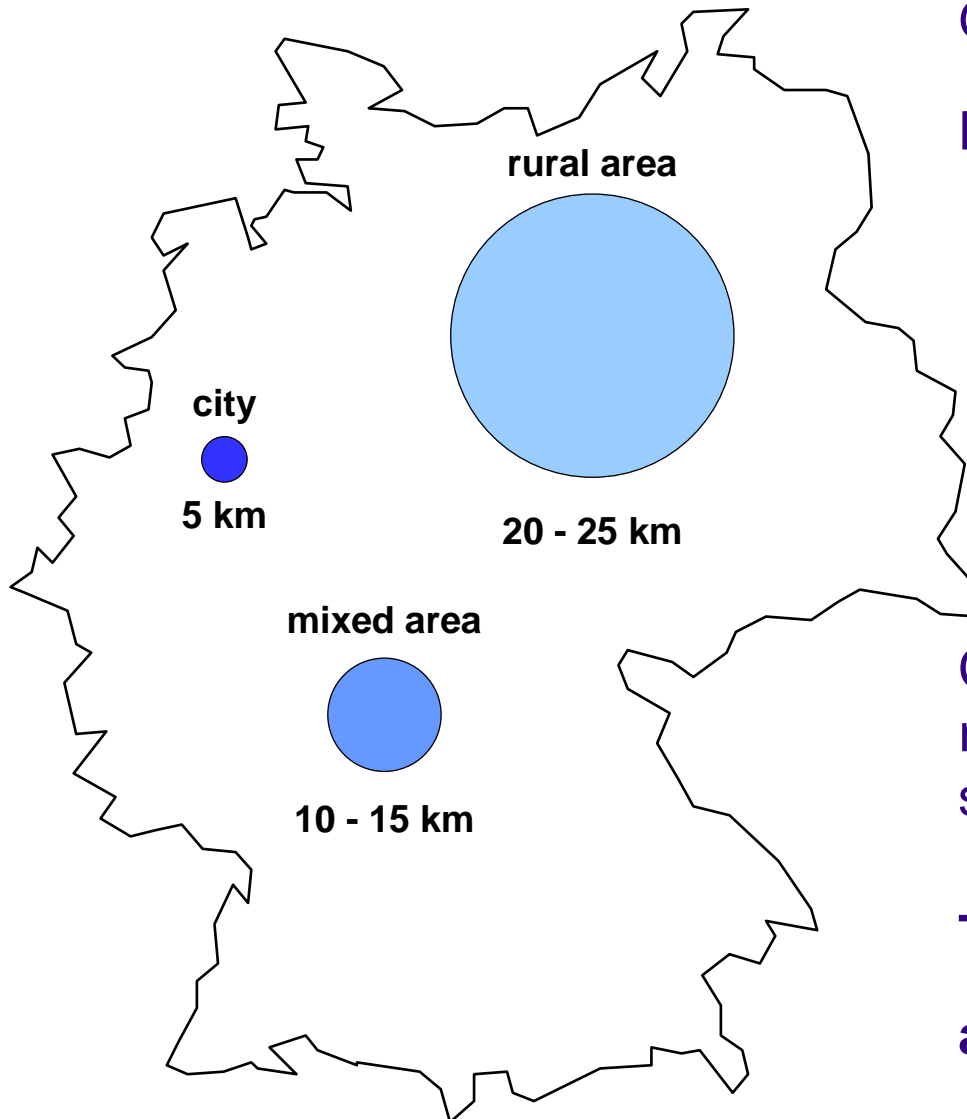


## Partners from oil industry



## Non-brand stations

Established on 15 April 2002



Germany-wide infrastructure for CNG

Distance between refuelling stations in

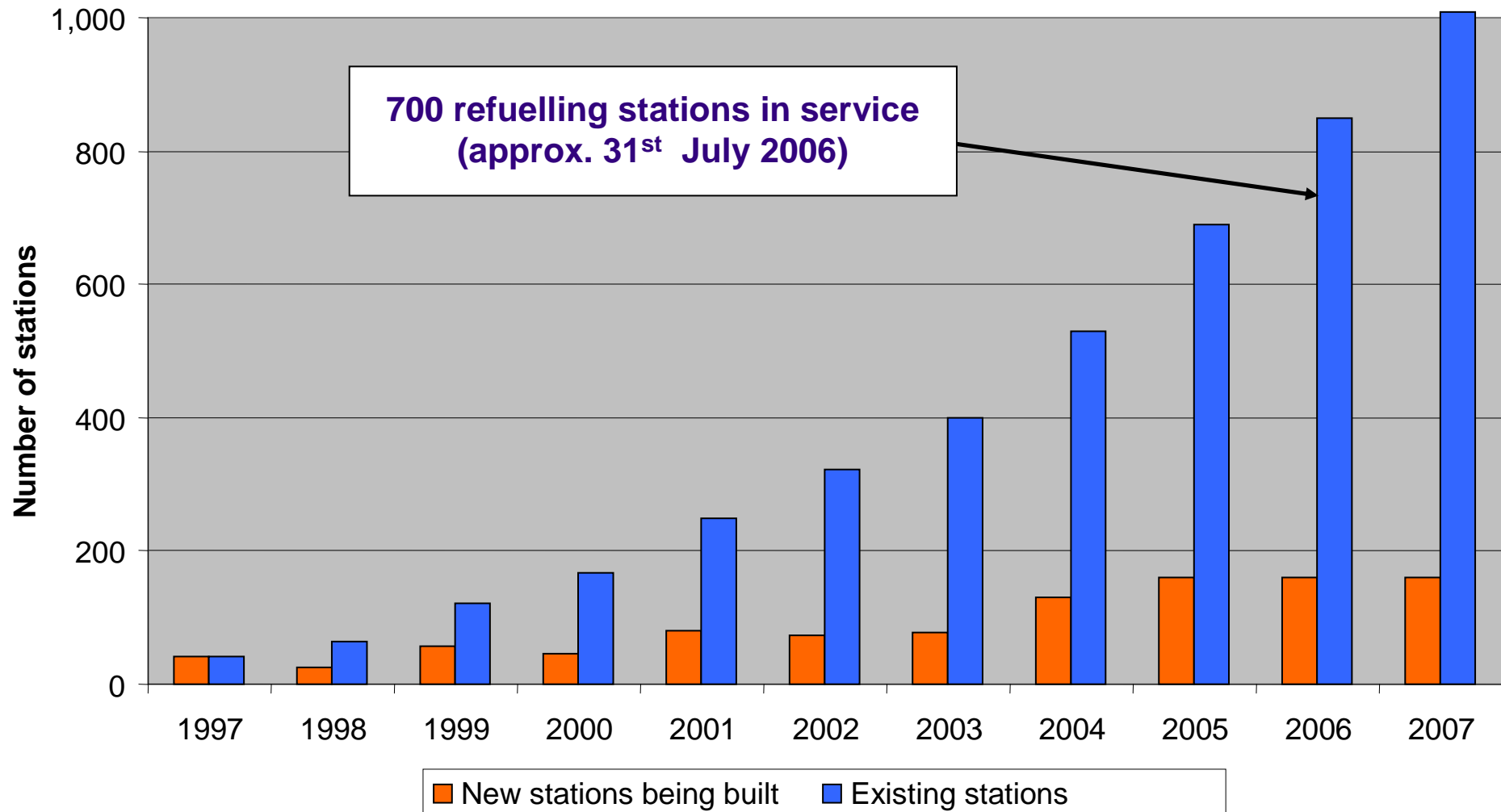
- towns and cities approx. 5 km
- mixed areas approx. 10-15 km
- rural areas approx. 20-25 km

Construction of some 1,000 new CNG refuelling systems at public petrol stations until 2007/2008

**Total capital expenditure:**

**approx. € 250 million**

# Construction of CNG Refuelling Stations



## Commercially Available OEM NGVs

- Citroën Berlingo
- Fiat Multipla/Punto
- Ford Focus
- Opel Zafira/Astra/Combo
- Peugeot Partner
- Mercedes Benz E-Klasse
- Volvo S60/V70/S80
- VW Touran & Caddy



## Caddy 2.0 Bi FUEL

- City van or minibus based on Golf 2.0 Bi FUEL technology
- Virtually mono-fuel NGV



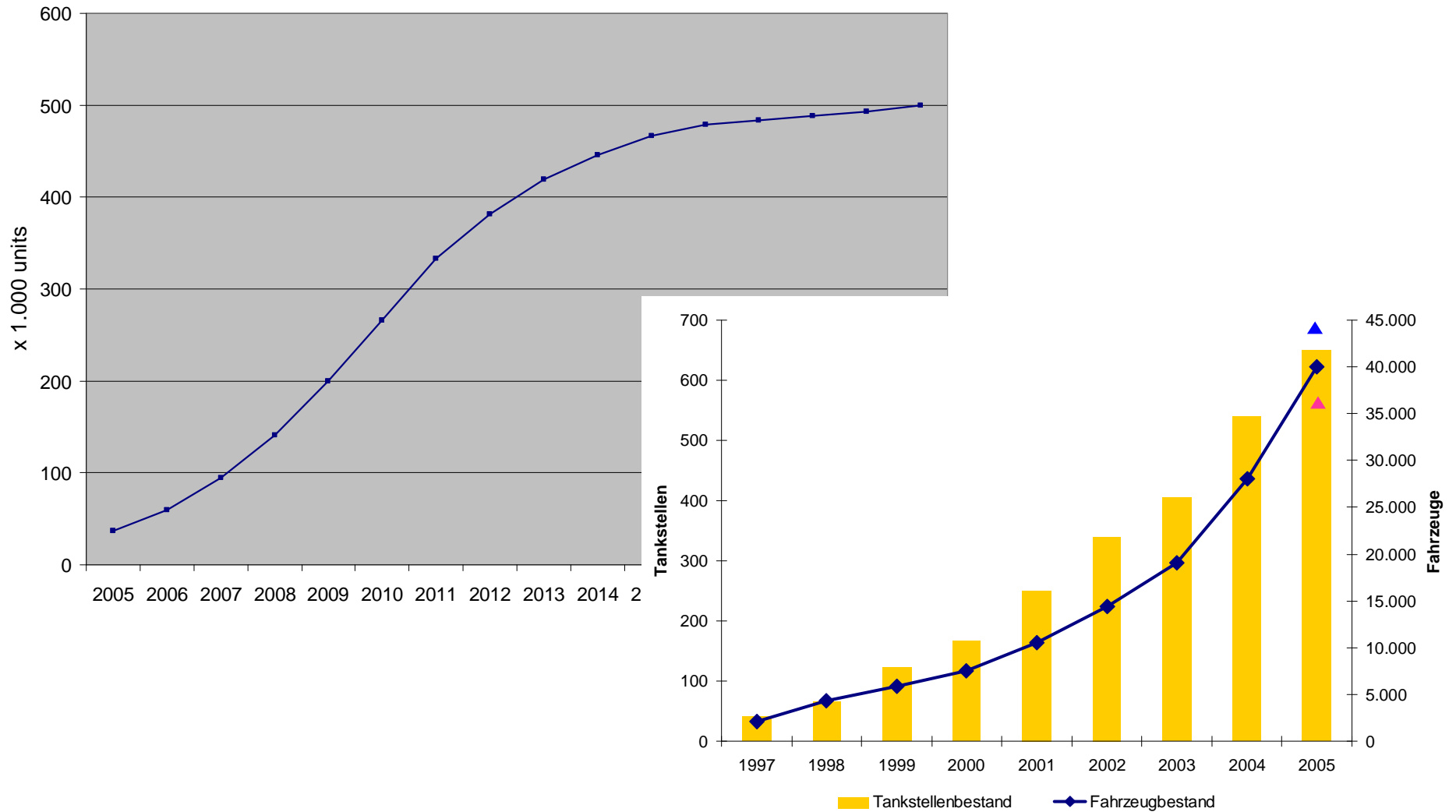
## Touran 2.0 Bi FUEL

- Minivan based on Golf 2.0 Bi FUEL technology with underfloor tanks
- Virtually mono-fuel NGV





## NGVs in Germany - Forecast



- Expansion of CNG refuelling station infrastructure in Germany requires close cooperation between gas and oil industries.
- Basic concept calls for natural gas to be sold as a fuel in the same way as petrol and diesel has proved successful.
- Growing range of NGVs on offer and increasing prices for petrol and diesel provide additional incentives.

## Successful field tests

Weh TK 17 (new design)

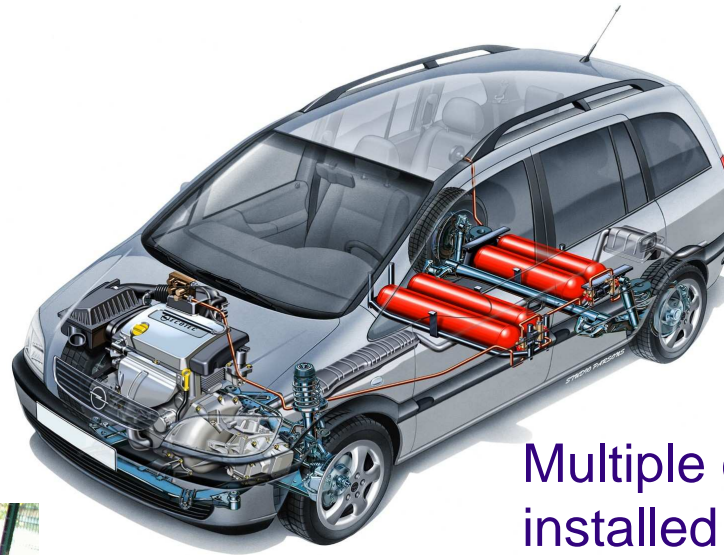
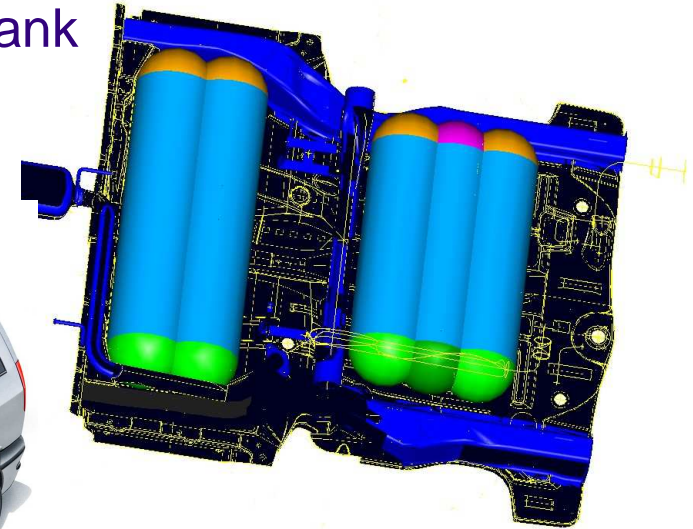


Weh TK 16  
(current standard nozzle)



# Evolution of CNG Storage Tanks

Conformable storage tank installed underfloor



Multiple cylinders installed underfloor



Single cylinder in luggage boot

# CNG Refuelling System at Aral Station





# CNG Refuelling System at Total Station



• <b>Package</b>	€ 150,000
– Compressor (100 kg CNG per hour)	
– Storage (200 kg CNG)	
– Dispenser (2 independent hoses for self service)	
• <b>Engineering</b>	€ 10,000
• <b>Civil construction, pipework</b>	€ 25,000
• <b>Miscellaneous</b>	€ 15,000
<b>Total</b>	<b>€ 200,000 (2,000 €/kg per h)</b>

