



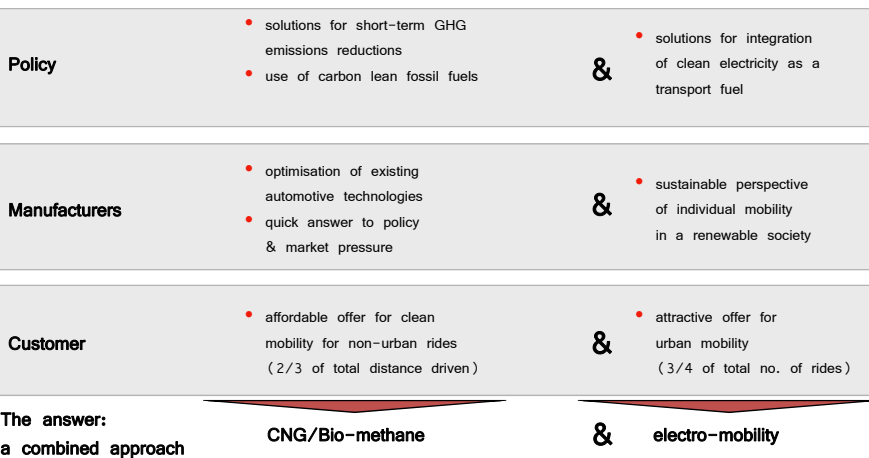
## Natural Gas Vehicles – the German Business Development Case

**Strategic Panel 7:**  
**Natural Gas – An Accomplished Driver for Vehicles Around the World**  
9<sup>th</sup> October 2009

Dr.-Ing. Stephan Ramesohl  
E.ON Ruhrgas AG

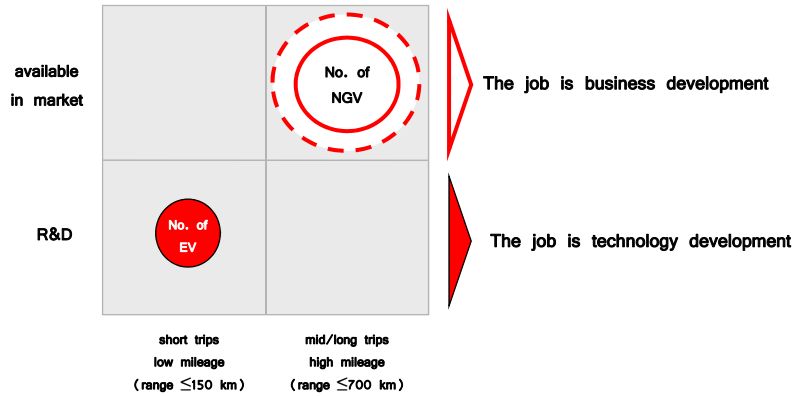


### New automotive fuels – what is needed?

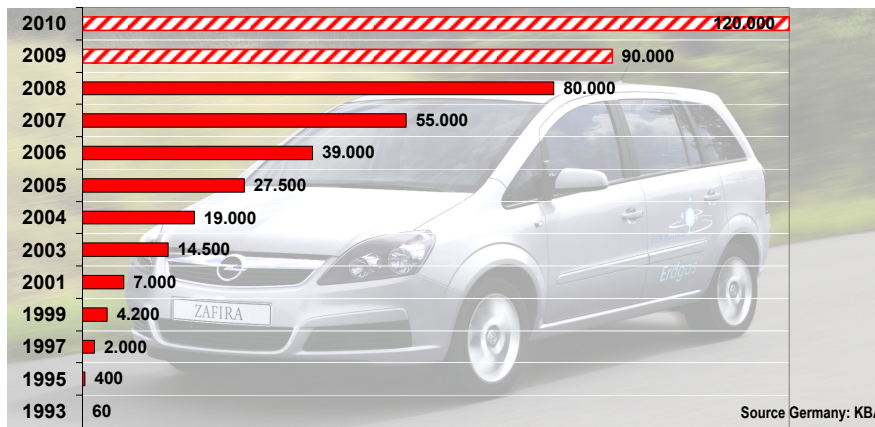




## Different development stages require different strategies

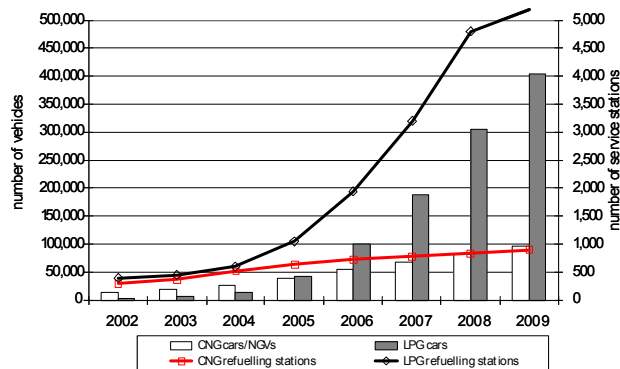


## Present CNG-Fleet in Germany





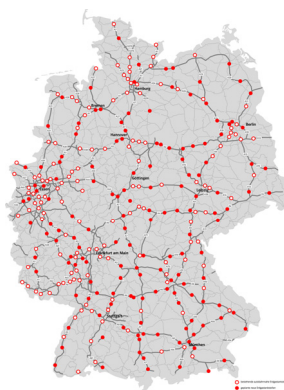
## Development of NGVs and infrastructure in Germany compared to LPG



- CNG: mostly new OEM cars; refuelling station investment: € 250,000
- LPG: mostly converted petrol cars; refuelling station investment: € 70,000



## CNG infrastructure still inadequate - especially along German motorways





Approx. 150 CNG filling stations needed  
to close the gap

Further development of CNG infrastructure  
in towns & cities and mixed areas  
(200/400)





## CNG-Vehicles: Present Portfolio in Germany/EU

Car Manufactures	Current Model	Up Coming Model
 	Touran, Caddy/Maxi Passat	Touran update + Golf TSI
 	Combo, Zafira	Zafira TNG + Astra TNG
 	Panda, Doblò (Cargo), Fiorino, Ducato	Grande Punto
 	E200, Sprinter, B 170	
 	Focus, Focus C-Max, Transit	Mondeo
 	C3	
 		<i>i 10 blue CNG</i>
 		<i>A4 under discussion</i>



## A new type of CNG-Vehicle: VW Passat TSI EcoFuel

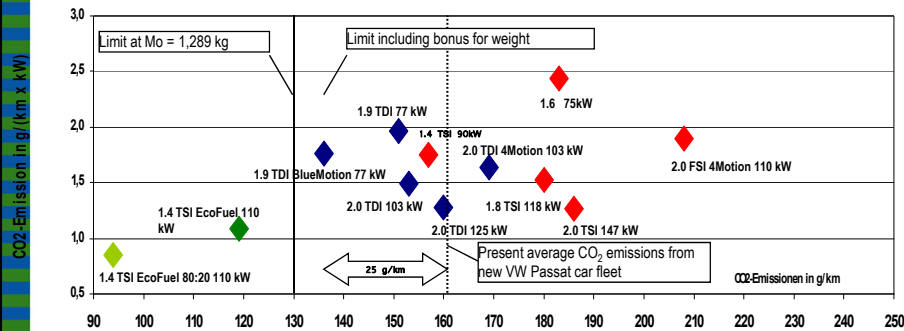


Source: Volkswagen AG

<b>Engine</b>	1.4l TSI CNG Achieves future Euro-5-Norm standard
<b>Power</b>	110 kW / 150 PS
<b>Torque</b>	220 Nm (1.500 – 4.000 U/min)
<b>Speed</b>	210 km/h
<b>Consumption</b>	<b>4,6 kg / 100 km</b>
<b>CO<sub>2</sub>-emission*</b>	<b>119 g / km</b>
<b>Equipment</b>	Instrument panel including Filling level for gasoline and CNG
<b>Distance</b>	Total ca. 900 km <b>CNG &gt; 460 km</b>
	3-underfloor-bottles, 135 Liter (22 kg) plastic-gasoline-tank 31 Liter (400 km)
	available since January 2009



## CO<sub>2</sub> emissions from a VW Passat powered by petrol ◆, diesel ◆ and CNG ◆ engines



- CNG and biomethane can reduce CO<sub>2</sub> emissions very significantly
- Present average CO<sub>2</sub> emissions from **VW Passat fleet** (approx. 200,000 cars per year in the EU) are 25 g/km above the limit and would result in penalty payments of **€ 100 million** in 2012, **€ 175 million** in 2013, **€ 300 million** in 2014 and **€ 475 million** in 2015 and thereafter.



## Summary and Conclusions

- CNG is **commercially available** and technically established along the complete chain (distribution, vehicles).
- Further **expansion of the CNG-infrastructure** – especially along the motorways – is needed (long- distance trips).
- CNG offers the **highest CO<sub>2</sub>-reduction effect** among the fossil fuels  
⇒ short-term contribution to the **political targets** of vehicle fleet CO<sub>2</sub>-reduction
- In short-/mid-term there will be **no bio-fuel with better GHG-reduction than biomethane**. **Policy will increasingly support biomethane** (e.g. Germany: novel of biofuel quota law; EC: Bio Fuel directive).
- A **more advanced OEM vehicle portfolio** can be expected.  
At present, the interest shown by car manufactures is extremely high.
- For **CNG-customers** - based on the essential lower fuel costs - CNG-vehicles are **economic advantageous** and the **driving-performance is attractive**.

**Strategic window of opportunity to strengthen the business case in central Europe and to expand to Eastern (South-western) Europe**