

VOLKSWAGEN

AKTIENGESELLSCHAFT



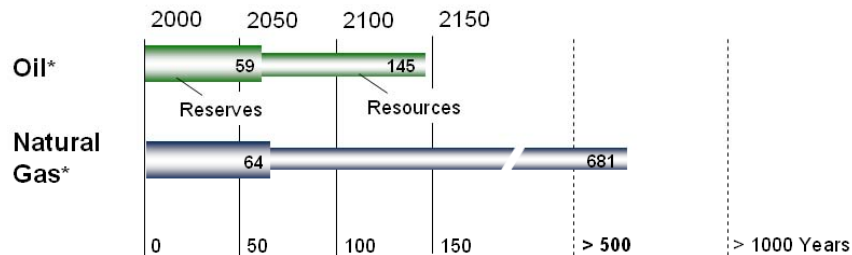
CEPS / low hanging fruits

Natural Gas Vehicles can reduce CO₂ by 25%

May 17th 2011 / Dr. A. Dinse

Advantages of Natural Gas / Large Resources, Low Price, Low Emissions

Security of Energy Supplies [Oil-Peak, Diversification]



* conventional and non-conventional

Source: BGR [2005]

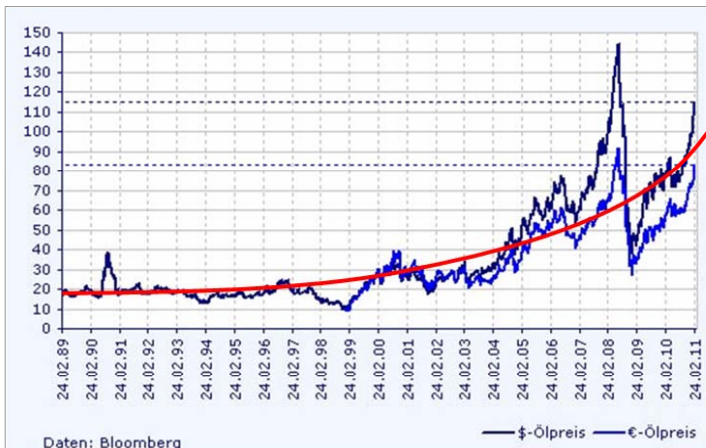
Low Priced Fuel Costs

- Global retail prices* of natural gas low priced:
 - Ø only 25-60% [~0,20 - 0,50 EUR/ kg CNG] of the german state-subsidized retail price
- No complex refinery process necessary
 - only cleaning and drying
- Environment-friendly transport in an established infrastructure of pipelines [energy sector]
 - LNG** transport if required [> 3.500 km cost-efficient]
- Forecast: There will be a natural gas glut next years



LNG-Tankship

Dollar and Euro per Barrel Brent [endless contract]

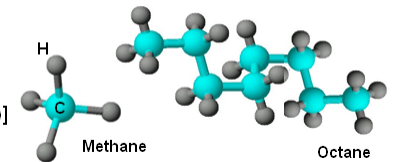


Daten: Bloomberg

Source: faz.net, 24.02.2011

The advantage is based in the nature of natural gas

- ~25% CO₂-reduction [natural gas vs. gasoline]
- intelligent hydrogen storage [nearly twice the number of hydrogen (H) per carbon (C)]
- higher energy content [factor 1,2 - 1,5]
- higher engine efficiency [motor octane number ~120 MON]
- clean combustion [low pollutant emission]
- fully developed and available technology at reasonable costs [advantage vs. Fuel Cell Vehicles, Electric Battery Vehicles, ...]
- unlimited miscibility with biogas/ biomethane ... [advantage vs. Ethanol, Biodiesel, ...]



Natural Gas Cars made by Volkswagen / -25 % CO₂



Touran, Caddy, Passat [... and some more will follow]



Passat Variant TSI EcoFuel 1,4 I Twincharger



110 kW [150 PS] / 5.500 min⁻¹

220 Nm / 1.500 – 4.500 min⁻¹

4,3 kg CNG/ 100 km

117-119 g CO₂/ km

21 kg CNG-Tank

6,8 l / 100 km [Super 95 ROZ]

158 g CO₂/ km

31 l gasoline tank

-25% CO₂/ km

Germany: ~ 100.000 CNG-vehicles [~ 0,25 % of vehicle population > 40 Mio.]

What can we do to improve ?

Policy measures to be undertaken / suggestions

- State-subsidised extension of the natural gas station infrastructure, fuel tax, car purchase and company car taxation until the CNG infrastructure is fully established
- Give-up the price fixing between oil and natural gas
- Better LNG-Tankship access to european harbours [global competition]
- Alleviate the feed-in of natural gas from other parties into existing pipeline grids and standardise the distribution grid carriage
- Better public information regarding the advantages of natural gas cars
- Take CNG-vehicles into account as an eco-innovation [-> CO₂-limit]
- Take Biogas into account regarding the CO₂-limit [e.g. bonus]
- Arrange a steering committee [public authorities, oil and gas providers, consumer associations, car manufacturers, suppliers, ...] to establish a clear roadmap [Germany -> dena (German Energy Agency)]
- ...

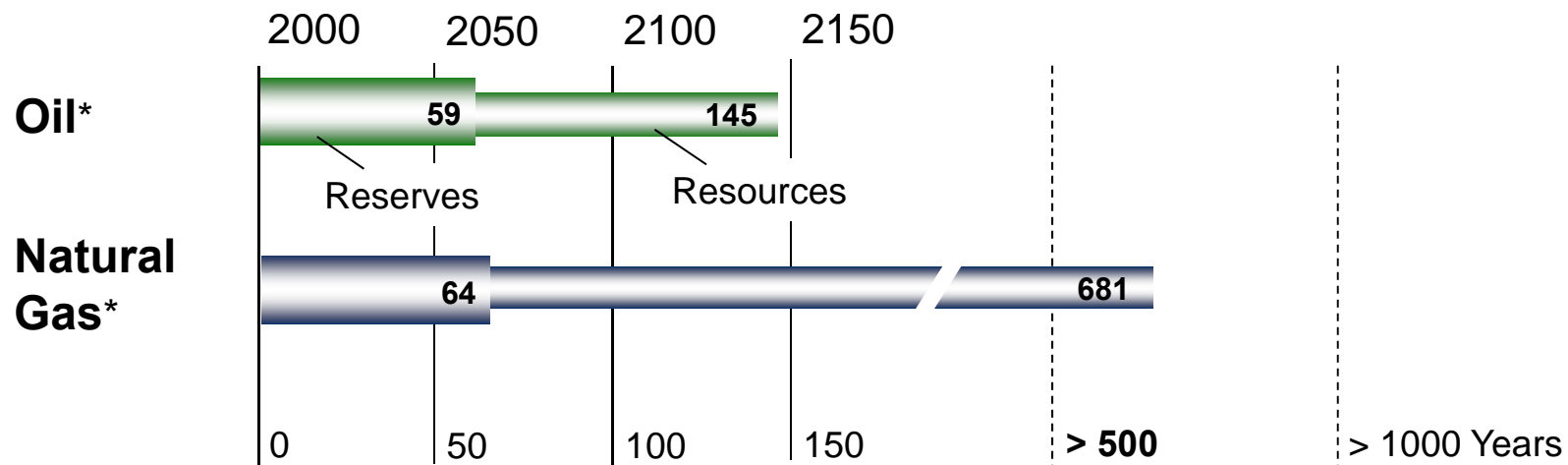


Thank you very much for your attention!

back up

Natural Gas vs. Oil / Reserves and Resources

Security of Energy Supplies [Oil-Peak, Diversification]

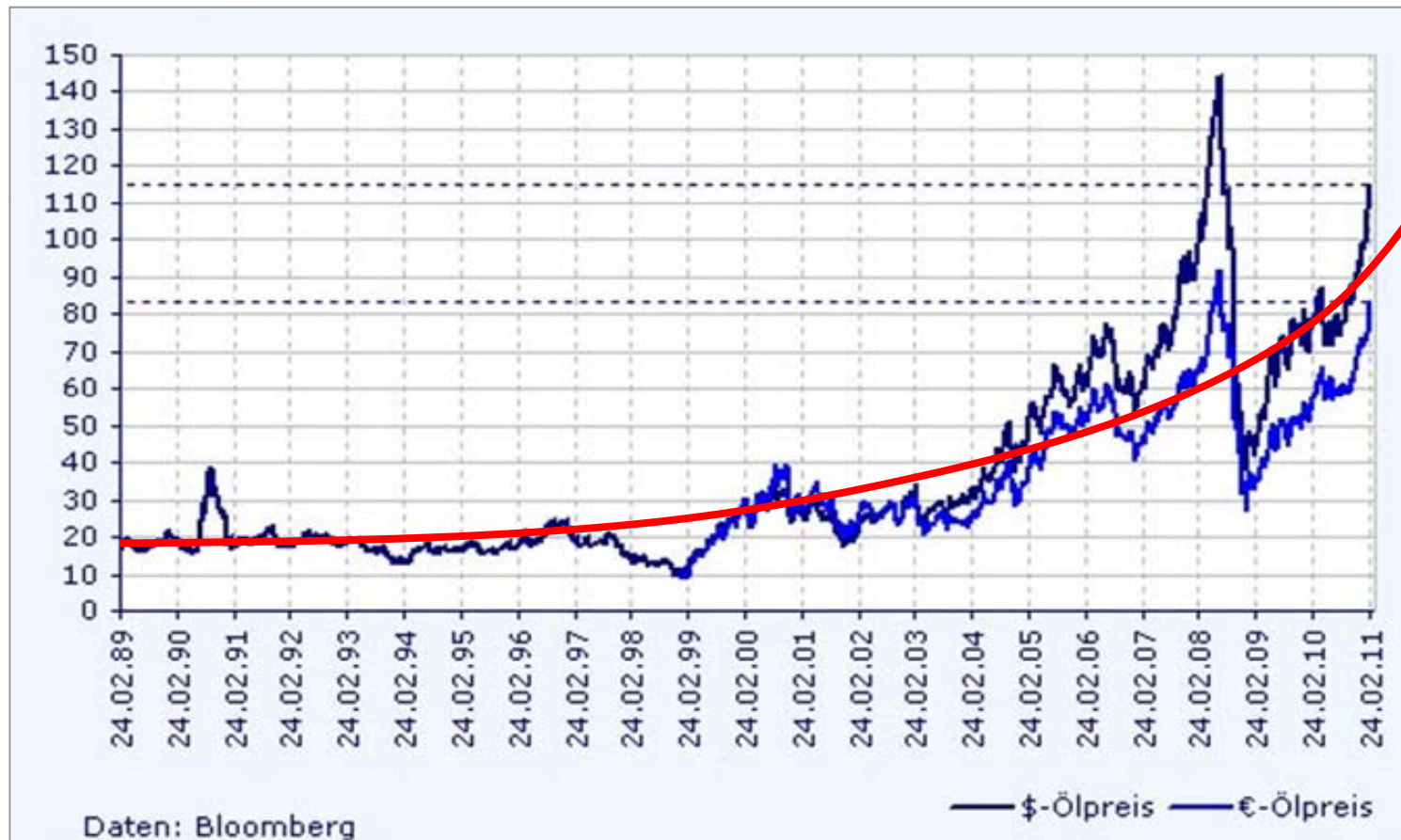


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Source: BGR [2005]

Development of Oil Prices 1989 to 2011 ...

Dollar and Euro per Barrel Brent [endless contract]



„quo vadis?“

Source: faz.net, 24.02.2011

Natural Gas - available, low priced, clean & safe

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* 2008

** liquefied natural gas

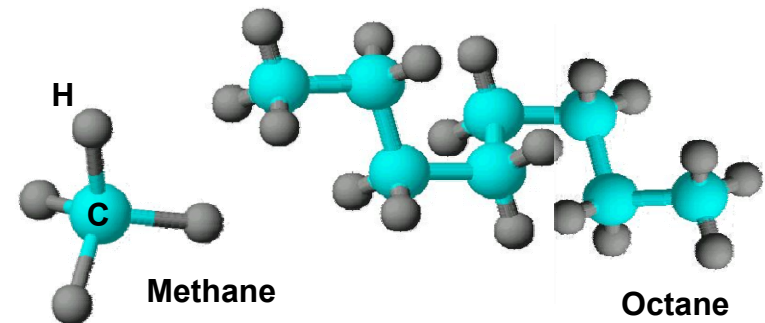


LNG-Tankship

Natural Gas - available, low priced, clean & safe

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Natural Gas - available, low priced, clean & safe

Worldwide Baseline Trend

Countries with a well established CNG fuel station infrastructure have an appreciable market share of CNG-vehicles!

- For example Argentina:
→ 1,65 Mio. CNG-vehicles, market share 21,7 % [2008]

Countries with an increasing CNG fuel station infrastructure show a disproportionately high rate of increase!

- For example Germany:
→ Triplication of the CNG vehicle population 2010 [vs. 2005] to ~100.000 vehicles
CNG fuel stations: 100 [2000], 750 [2007], ~900 [2010]
- But: ~3,5 Mio. vehicle readmissions in Germany per year!
> 40 Mio. vehicle population in Germany! ----- ~0,25%

What can we do to improve ?

Natural Gas Cars made by Volkswagen

Touran TSI EcoFuel



Passat TSI EcoFuel



Caddy / Caddy Maxi EcoFuel

Natural Gas Cars made by Volkswagen

Environmental friendly and powerful

Volkswagen R Cup Scirocco powered by Bio-CNG

2,0 l Turbo

225* PS / 6.000 min⁻¹

1,0 bar supercharging pressure

275 Nm / 3.000 min⁻¹

* 275 PS / 1,3 bar boost pressure

