



Diesel and Hybrid Cars in Europe

Automotive World Briefing
29th January 2008

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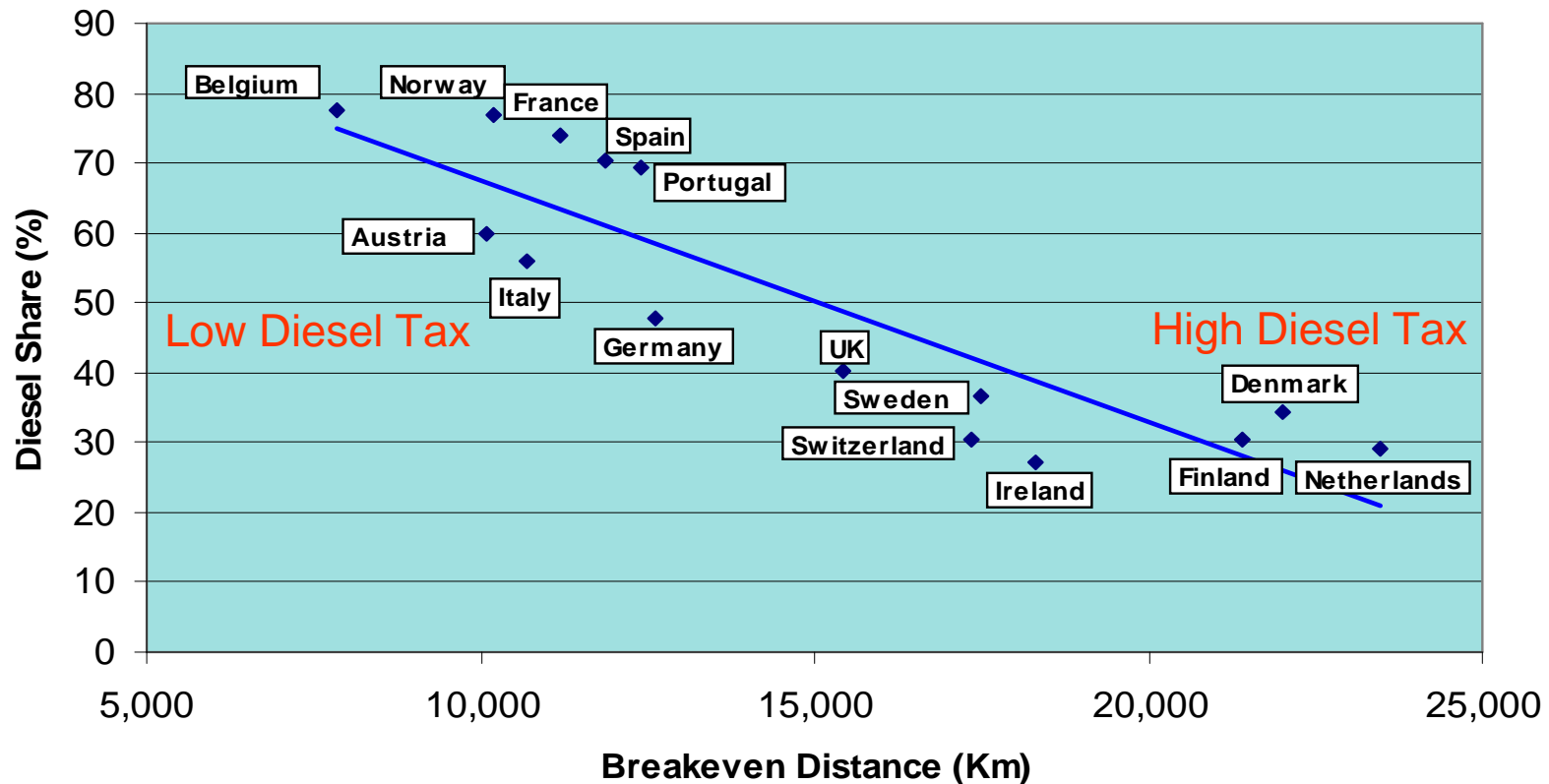
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Introduction

- Strategies for reducing CO₂ output from personal vehicles include improved traffic management, modified driver behaviour and technical improvement to vehicles
- Despite growing awareness of global warming and CO₂, drivers are unwilling to change their habits
- So carmakers are increasingly being required to produce low carbon vehicles at little/no extra cost or performance penalty
- Powertrain solutions have provided most of the CO₂ reduction over the last decade – will this continue to be the case?
- Diesel is here to stay, but how much more growth will we see?
- The climate for hybrids in Europe hasn't been right so far, but will pressure for better FE move them from niche to mainstream?
- If so, which technology will win – gasoline or diesel hybrid?

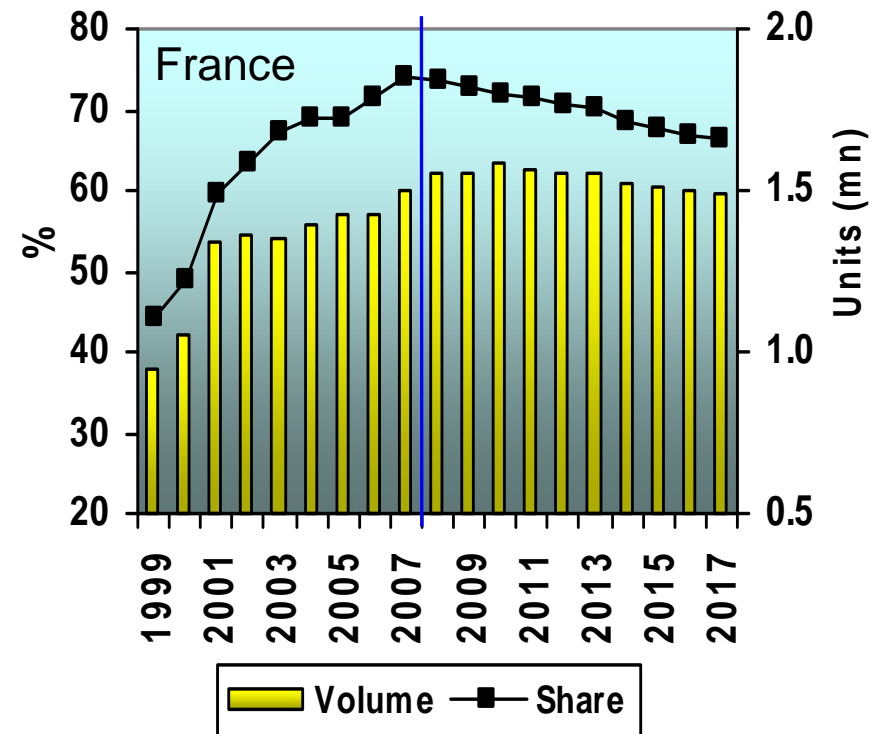
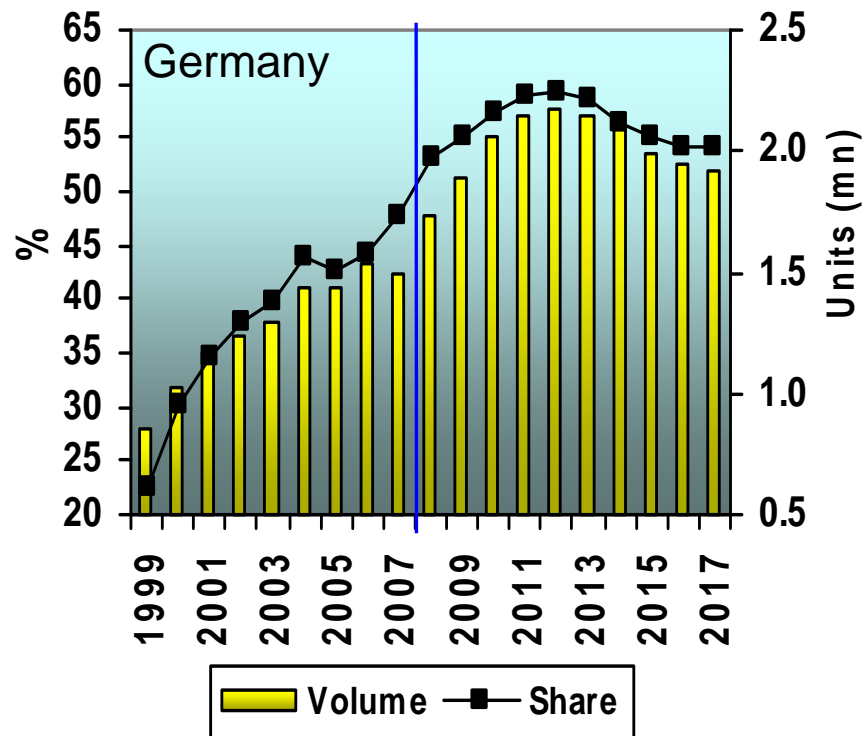
WE Diesel Share is a Function of Tax

W Europe Diesel Passenger Car Shares & Breakeven Distances 2007



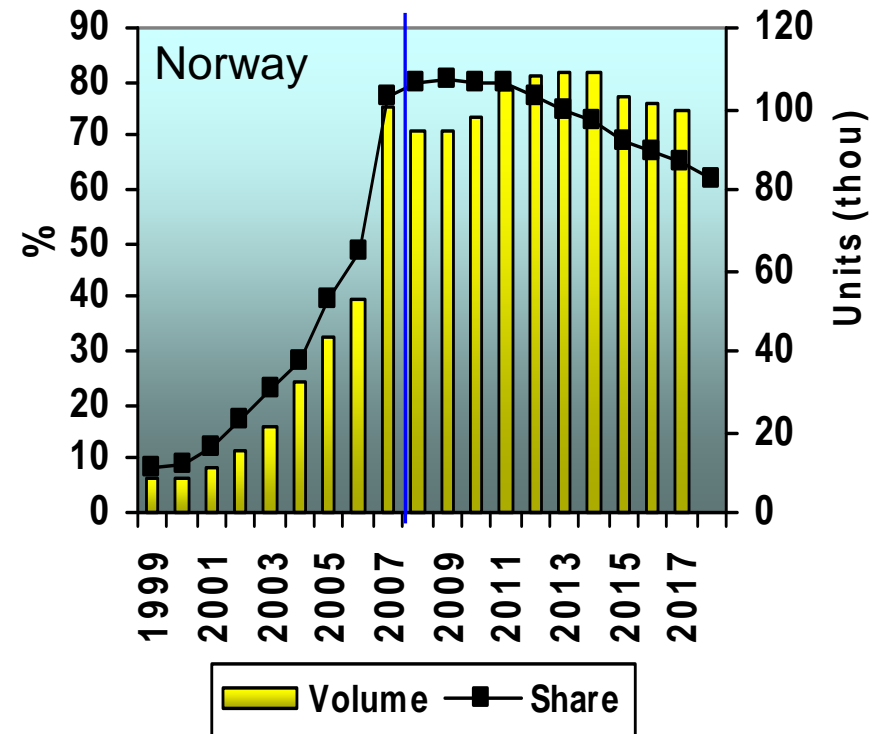
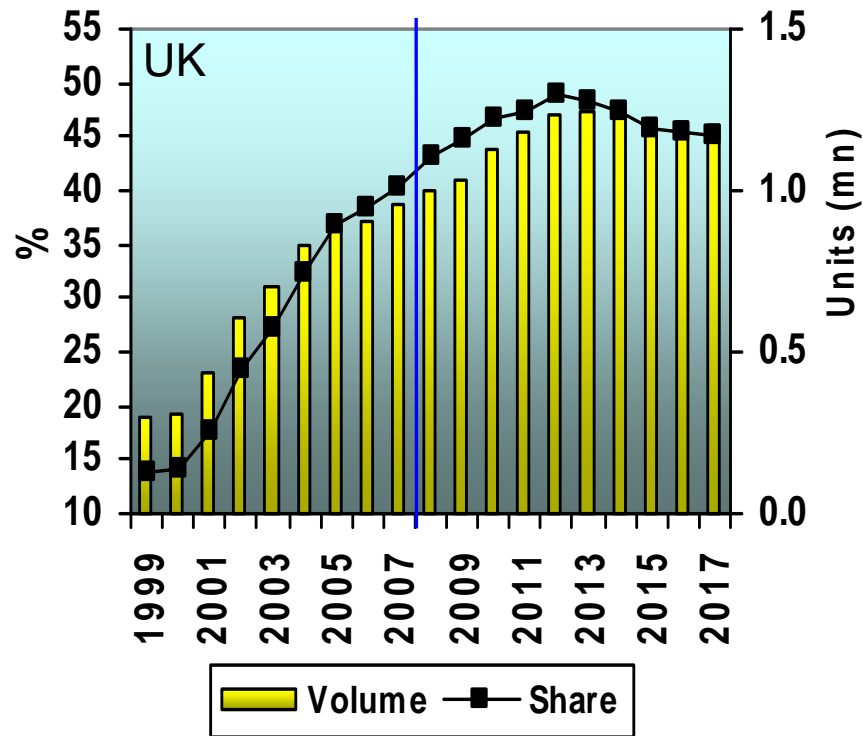
Diesel Car Outlook, Germany & France

Diesel Volumes & Share of New Passenger Car Sales



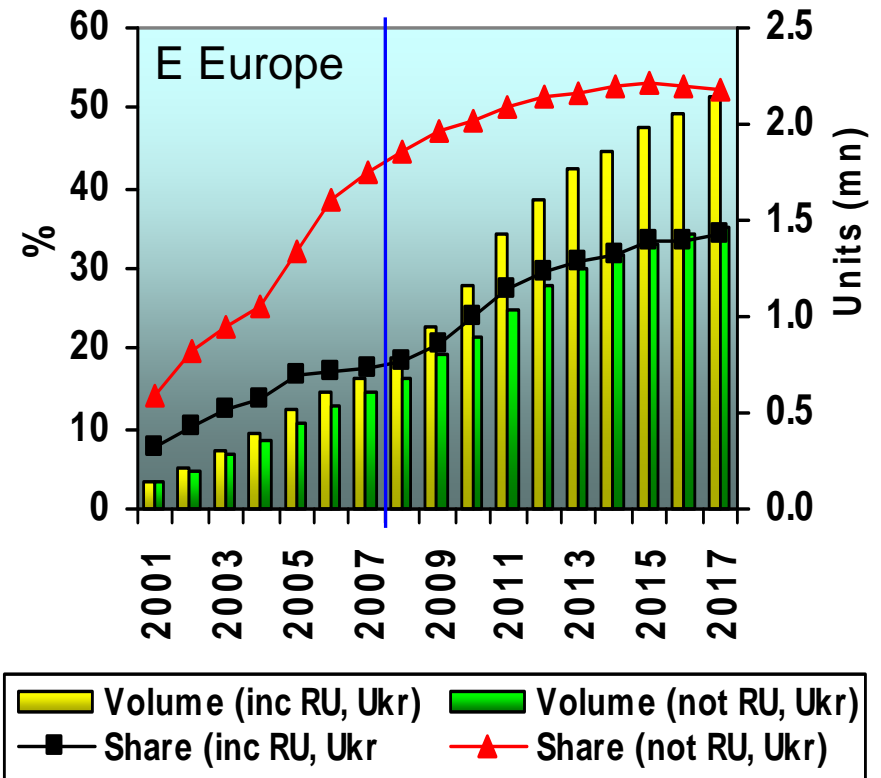
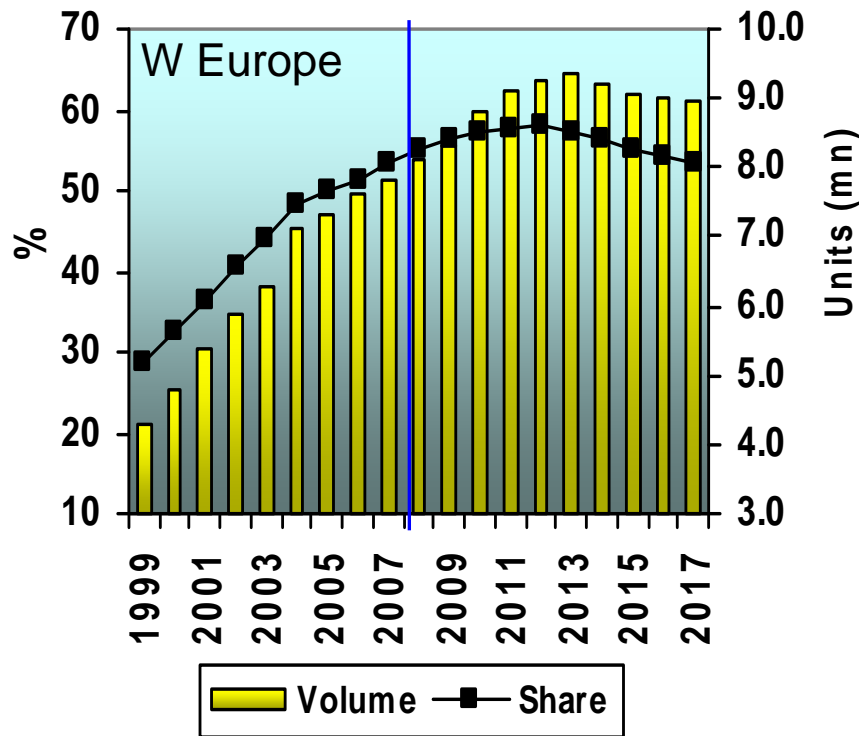
UK &...Norway!

Diesel Volumes & Share of New Passenger Car Sales



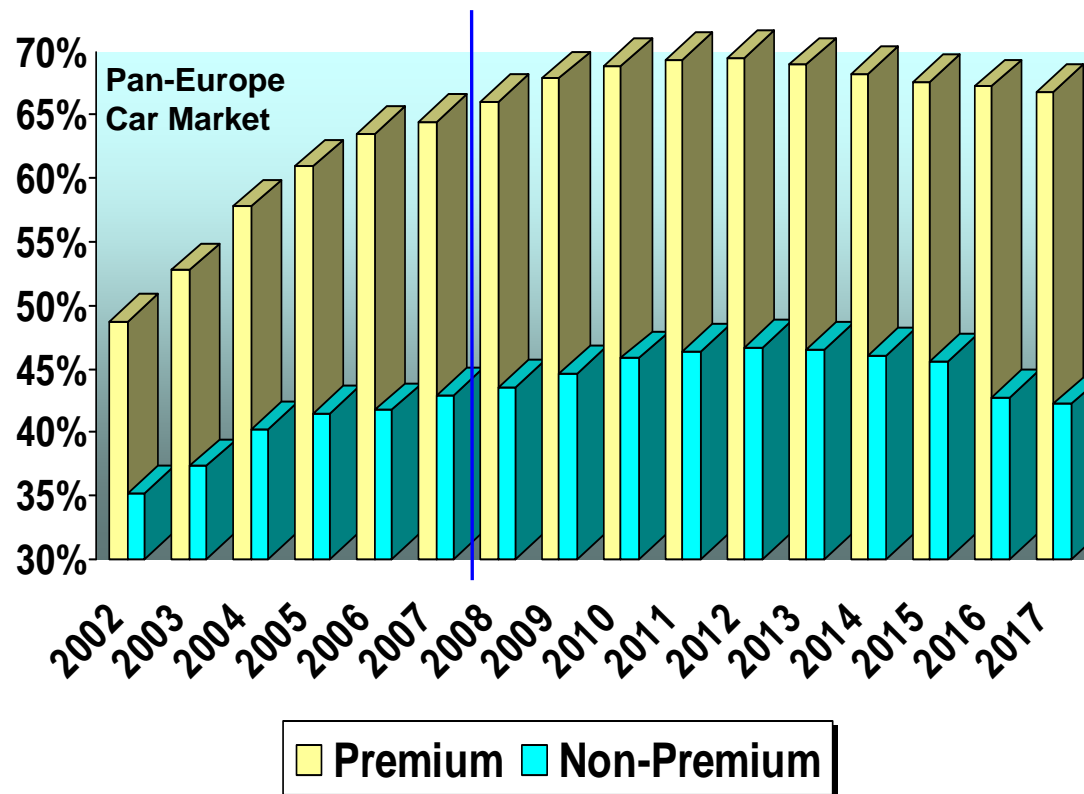
Western, Eastern Europe Diesel Outlook

Diesel Volumes & Share of New Passenger Car Sales



Diesel Premium Segment is More Robust

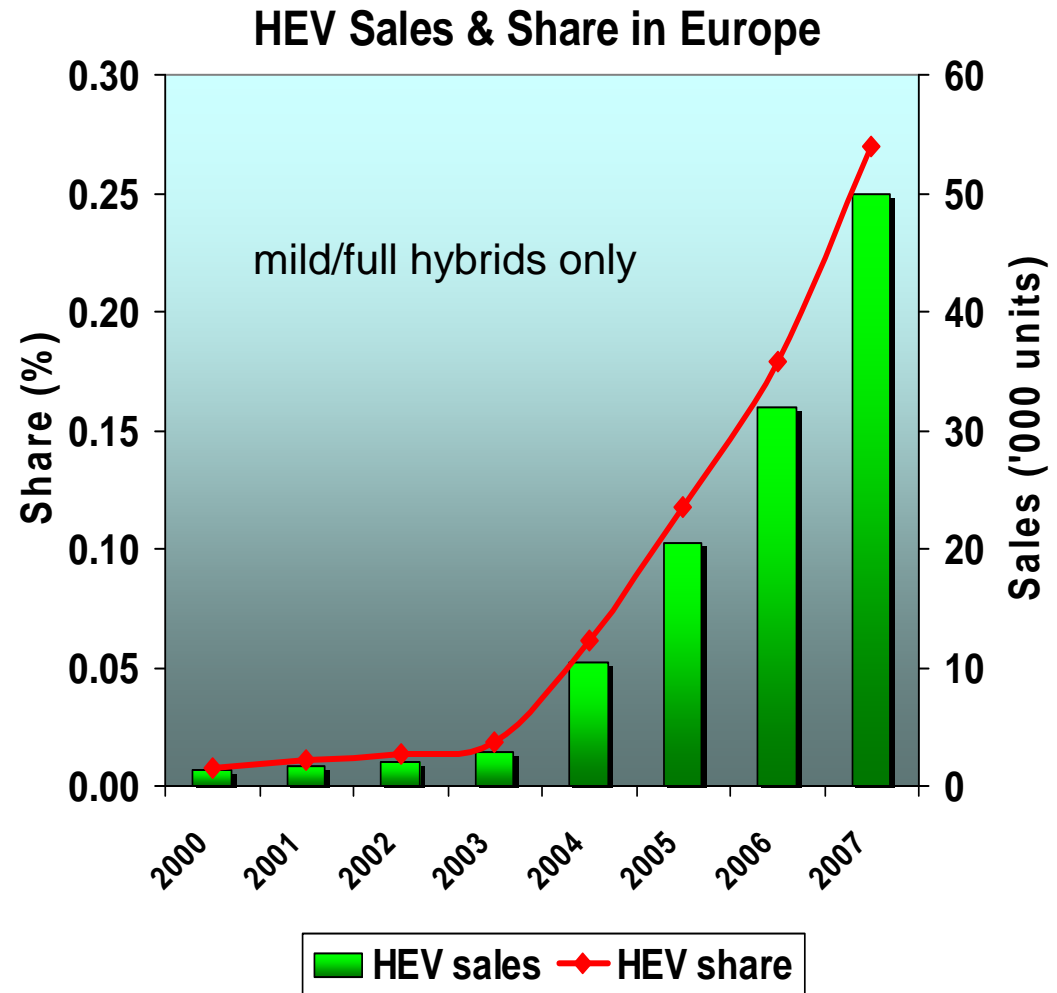
Dieselisation of Market Sectors



- Peak Premium sales – 2.3mn (1.8mn 2007)
- Peak non-Premium sales – 9.2mn (6.8mn 2007)
- Premium is more resilient to future rises in diesel powertrain costs
- Premium may benefit more from company car tax policy
- Typical distance driven is greater than for non-premium
- Absolute financial savings are greater in larger (Premium?) cars

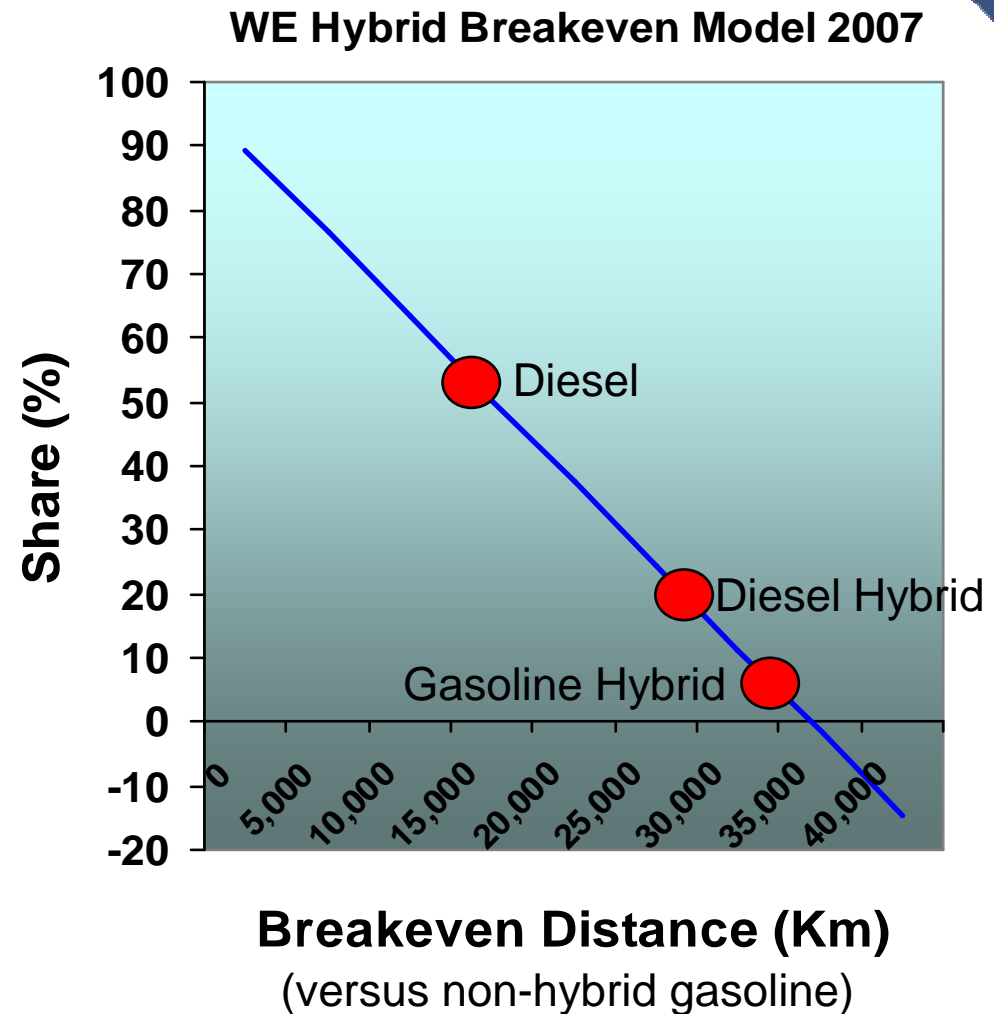
HEVs in Europe – Niche or Mainstream?

- Small volumes, but strong growth
 - Sales in 2007 just 50k, but up 2,000% from 2002!
- Market is constrained by lack of choice
 - Only a few HEVs available, most segments not covered
- Price premium v Gasoline
 - 20% or more, diesel circa 8%
- Hybrid FE is no big deal
 - Diesel is default for those worried about FE/CO₂
- Can hybrids offer value for money?



The Financial Case for Hybrids

- Assumptions:
- Gasoline hybrid costs 15% more than non-hybrid gasoline
- Diesel hybrids cost 20% more than non-hybrid gasoline
- Diesel/gasoline hybrids pay 50% of annual circulation tax/congestion charge of non-hybrid gasoline
- Mature market – gasoline & diesel hybrid model availability similar to non-hybrid diesel
- Gasoline hybrid fuel efficiency same as non-hybrid diesel
- Diesel hybrids achieve 20% better fuel economy than non-hybrid diesel



Medium Term OEM Hybrid Activity - Europe

OEM	Comments	2007	2008	2009	2010	2011	2012
Toyota Group	Target 10% of sales 2010. Isuzu link for DHEV	Prius, Lexus (existing)			Target 100k HEV sales		Toyota DHEV?
Honda	Will introduce hybrid-only model in next few years	Civic (existing)		Hybrid-only CR-Z?	Target 40k sales		HEV 'major alternative in Europe'
M-B	Partner with BMW, GM in two-mode project			ML450	S400		
				E300 BlueTec	S300 BlueTec	C300 BlueTec	S400 BlueTec
BMW	Will lag M-B and GM for hybrids				X6		5 Series BluePerformance
VW Group	Hybrid for large SUVs first. Little DHEV activity so far		Q7 (end '08)		Touareg		VW DHEV
PSA	Pioneer non-premium DHEV. €2,000 premium over diesel					306 HDI, C4 HDI	
R-N	Infiniti introduce GHEV. R-N follow PSA DHEV later?					Infiniti	Renault
Ford Group	Volvo to get PSA technology?				Kuga		Volvo?
GM Group	Saab to get 2-mode system? Opel DHEVs shown				Saab		Saab 9-5?, Astra, Corsa
Fiat Group	Has least need for hybrids, but could share GM tech.						Punto?
Hyundai Group	Working on in-house GHEV system. Intro delayed						SUV/Large cars
Porsche	Will use GHEV to boost performance & lower CO ₂				Cayenne		Panamera
Tata Group	Land Rover needs CO ₂ -reducing technology						XF hybrid?
					Land Rover LRX		

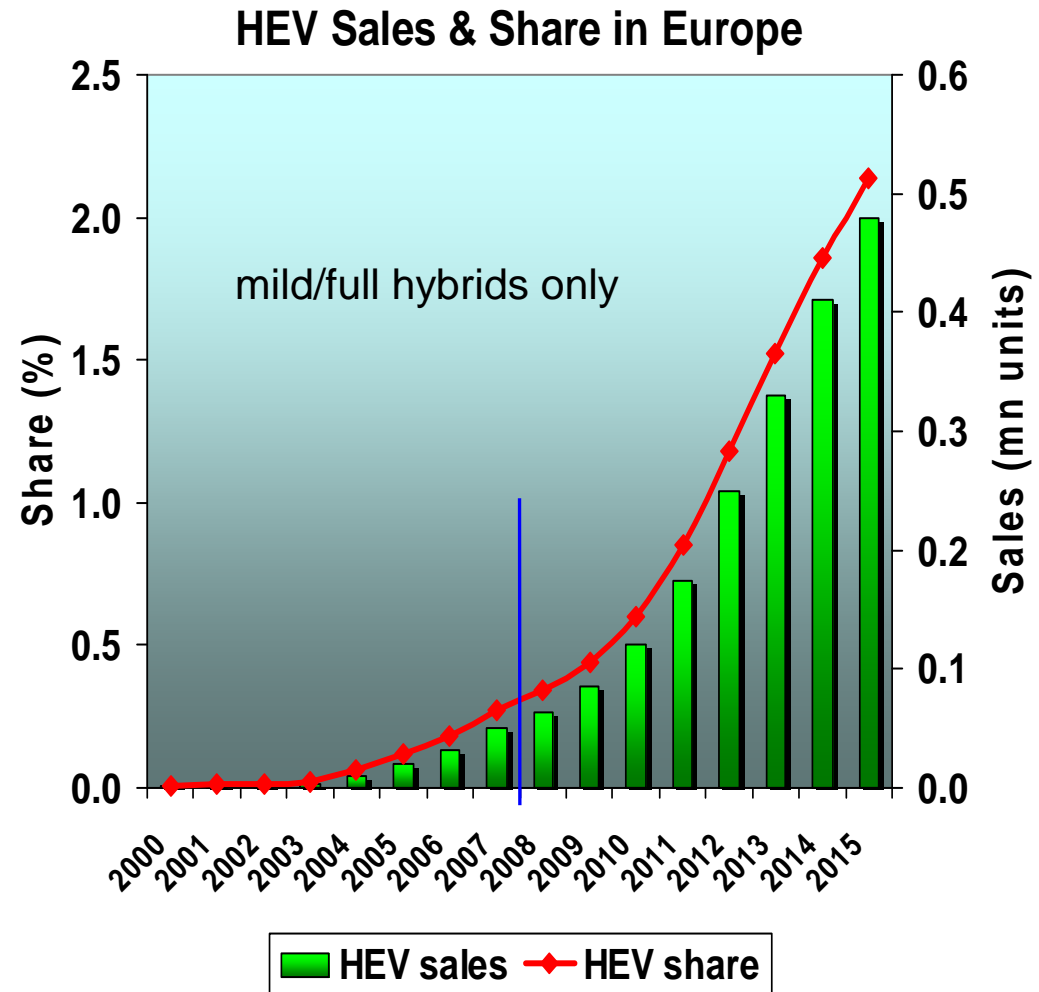
Gasoline

Diesel

Europe HEV F'cast – Pessimistic Scenario

Early Adopters Only

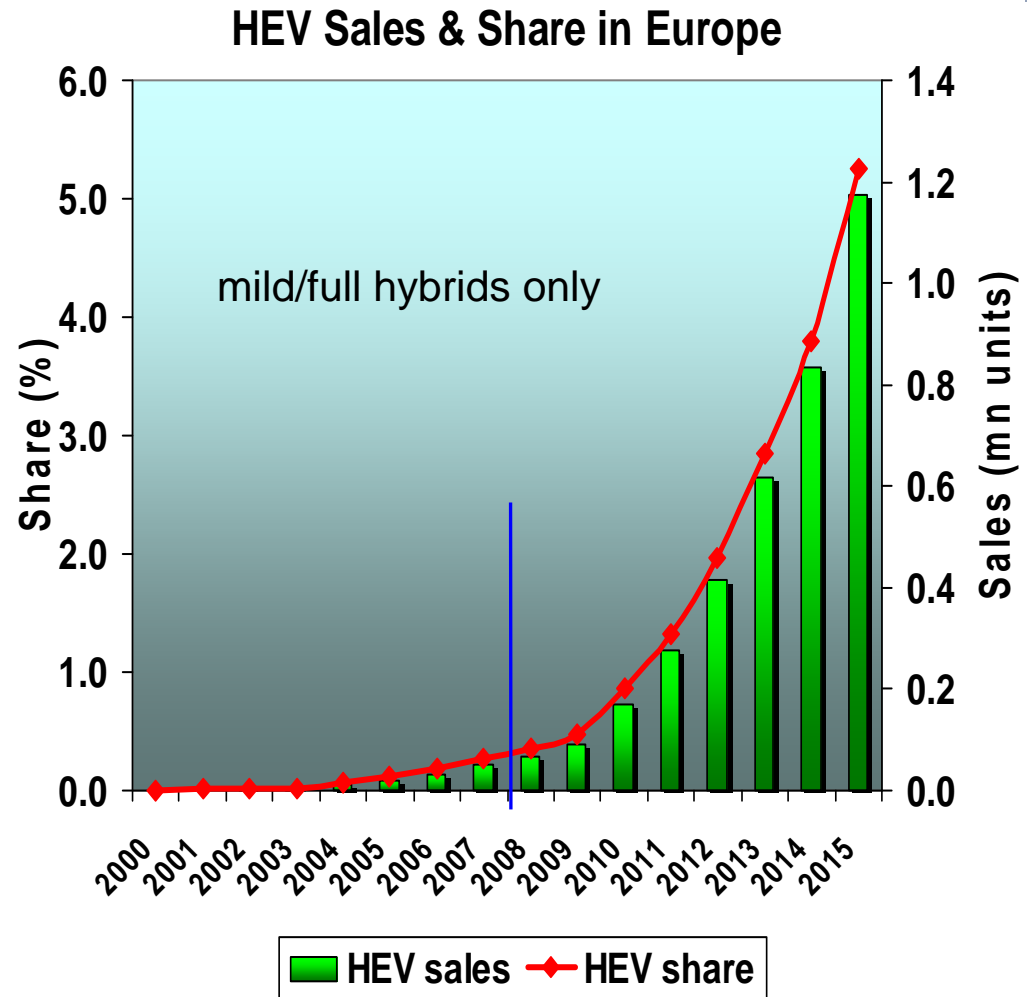
- Premium for full GHEV versus gasoline remains at 20%
- Only a few OEMs enter HEV market
- Not all major market segments covered
- No long term hybrid incentives
- Hybrids are part of the 'basket' of choice for a portion of buyers only
- Diesel hybrid too expensive for mass market



Europe HEV F'cast – Optimistic Scenario

Mass Market Opportunity

- Price premium for full GHEV versus gasoline falls to 10%-15%
- Diesel hybrid premium at 15% to 20% over gasoline
- Most OEMs enter HEV market
- Most market segments covered
- Hybrids are part of the 'basket' of choice for most buyers
- Hybrids retain incentives in medium term



Conclusions

- The rate of expansion in the W Europe diesel car market has peaked but further growth will take place
- Some diesel markets are saturated but others are constrained by tax and so have pent-up demand
- Pressure will come to bear on the diesel sector in the next decade from both gasoline sector improvements and EU-6
- Hybrids could play a significant part in CO₂ reduction, but are not yet fully commercially tested in Europe
- Diesel hybrids are better suited to Europe than gasoline hybrids
- Consumer appetite for low carbon vehicles will need suitable government policies
- Continuous improvement of existing powertrains offers the most cost effective medium term solution to CO₂ reduction

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