

H2 Rome – Bio-ethanol and FFV Technology

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Introduction

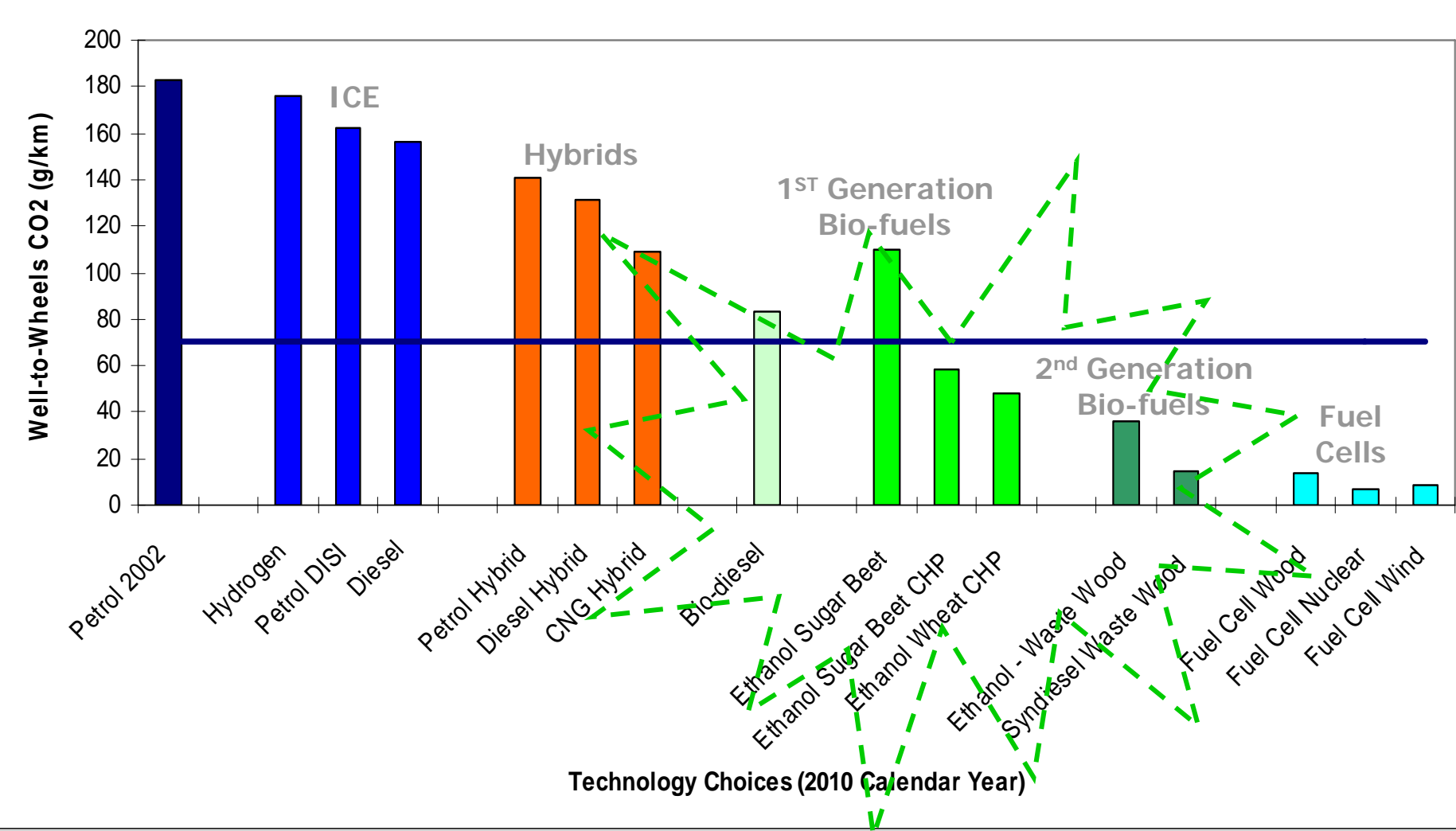
- Responding to Climate Change is a business necessity not just a matter of being socially and environmentally responsible
- No technology “silver bullet” -- a range of technological solutions required
- Ford Motor Company investing in hybrids, flexible fuel vehicles (FFV), advanced clean diesels, hydrogen-powered internal combustion engines and fuel cell vehicles
- Technology by itself won't solve climate change, need an integrated approach of all stakeholders

Transport's "Oil Addiction"

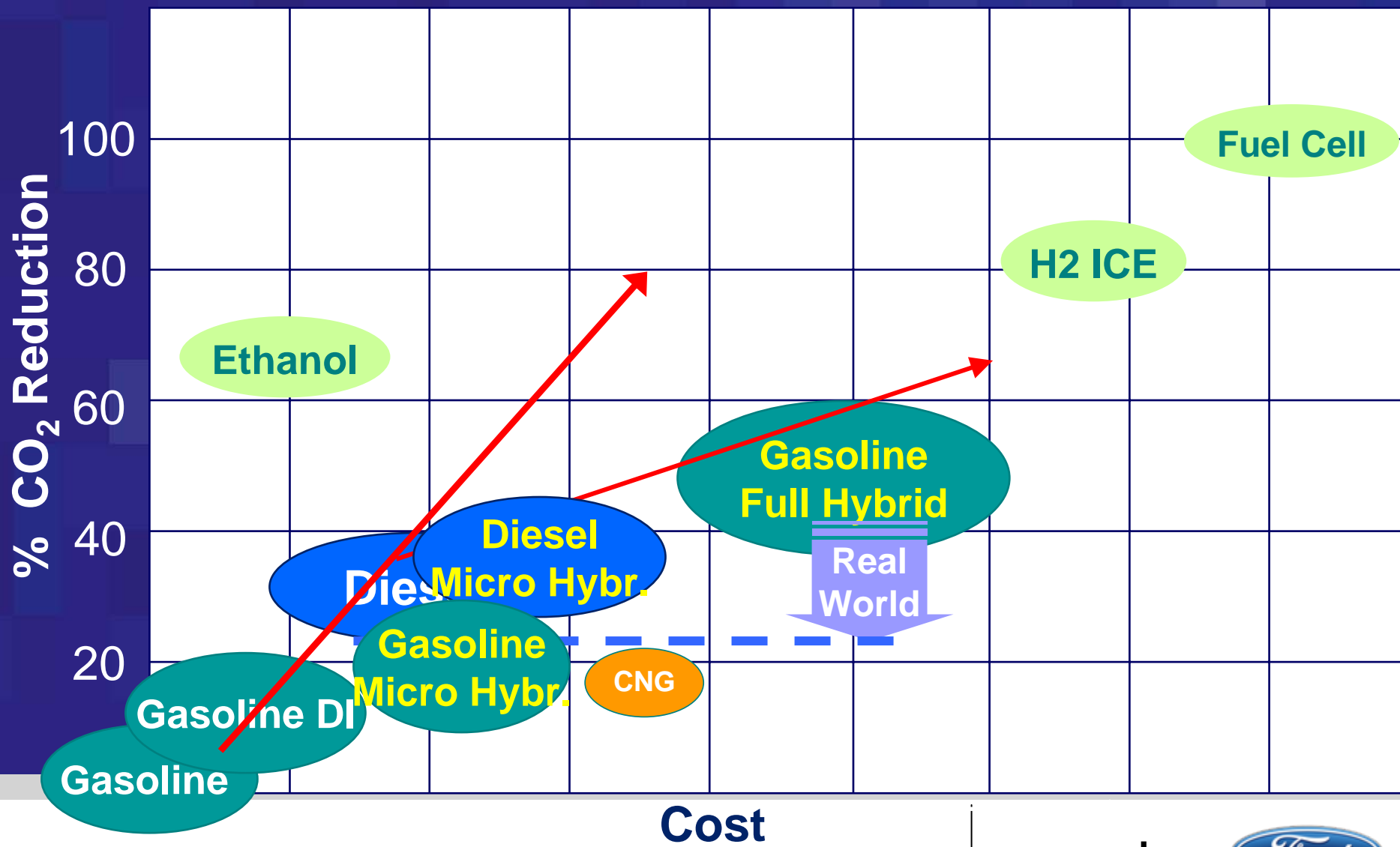
- Within the EU, transport is the only sector in which CO₂ output is growing
- Transport is virtually totally dependent (98%) on oil
- Transport now accounts for 70% of all oil usage – in late 1970's/early 1980's was 30%.
- EU imports 70% of its oil today; by 2020 will be importing around 90%

CO₂ Footprints of Technology Choices

WTW CO₂ Emissions (g/km) from Different Fuel/Powertrain Combinations: 2010+



Cost/Benefit (NEDC) of Technology Choices



NEDC – New European Drive Cycle

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Bio-ethanol as a transport fuel

- Bio-ethanol (alcohol) is a renewable fuel manufactured from starch/sugars e.g. wheat, sugar beet, sugar cane, etc.
- In addition developments are underway to manufacture bio-ethanol from cellulose materials e.g. forestry residue, straw and household / commercial organic wastes.
- Because it is a bio-based fuel it has the potential to be “carbon-neutral” – in that the CO₂ emitted at tailpipe is equal to the CO₂ absorbed during plant growth.
- Bio-ethanol is a low toxicity and a cleaner fuel than gasoline.
- Bio-fuels can form part of a transport solution to address climate change, fuel security and energy diversification.

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Ford Focus flexifuel



- “Flexible” vehicle using E85 or gasoline
- E85 = alternative fuel i.e. 85% ethanol and 15% gasoline
- 1 fuel tank for E85 or gasoline
- E85 and gasoline can be mixed freely in any combination
- Same power output as conventional 1.8 litre gasoline
- Equal acceleration and top speed with gasoline version
- Typically 30% less range than gasoline – bio-ethanol has 30% less energy per litre

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FFV/E85 Market Developments

- 25,000 Ford Focus flexifuel sold in Sweden – 550 E85 fuel stations (by 2009 60% of all fuel stations). 80%+ of all Focus sales and 13% of all new cars are FFVs
- On sale in Germany, UK, Spain, Netherlands, Norway, Austria, Ireland, etc.
- E85 infrastructure zero as at Jan 1, 2006 – now Germany 65 fuel stations, UK 12, Ireland 6, Netherlands 2, Switzerland 1
- France to have 500+ E85 fuel station by 2007 and 1,500 by 2008 – E85 priced 30% less than gasoline
- Ford Italy sells first 2 Focus flexifuel to La Spezia municipal authority October 2006

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Summary

- Broad range of automotive technologies available
- Short term actions strictly limited -- but need action now
- FFV and high blend bio-ethanol offers significant and efficient opportunity to reduce CO₂
- Technologies by themselves not the solution – need oil co, Local and National Gov't support, and consumer engagement