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Networking Session on

***“Composite materials for the
automotive industry”***

InCrops Launch – Promoting Green Innovation

Chilford Hall, Cambridge, 29 June 2009



LCIC Low Carbon Vehicle Innovation

Trialling dual-fuel biomethane-diesel technology in Norfolk



A pathfinder to enable a transition to low-carbon, low emissions urban transport in Norfolk and in the East of England



Low carbon vehicles

Key opportunity for the East of England



- UK Low Carbon Vision 2009 requires low carbon vehicles
- Low carbon vehicle design demands radical innovation
- Key to everything is weight reduction – plant-based materials?
- Major opportunities for East of England
 - Light weight materials from crops
 - Fabrication – e.g. EcoTechnilin
 - Design – e.g. ADP



Key Message: Low Carbon Vehicles “Design to win the future”



"Design to win the future not perpetuate the past"

Amory Lovins, Rocky Mountain Institute



Toyota 1/X concept car
1/3 weight of Prius – same room
Double fuel economy



Future challenges: Low-carbon transport



- **Agriculture/transport/climate change**
- **Peak oil**
- **Weight reduction – plant-based materials?**



Complement not compete with food

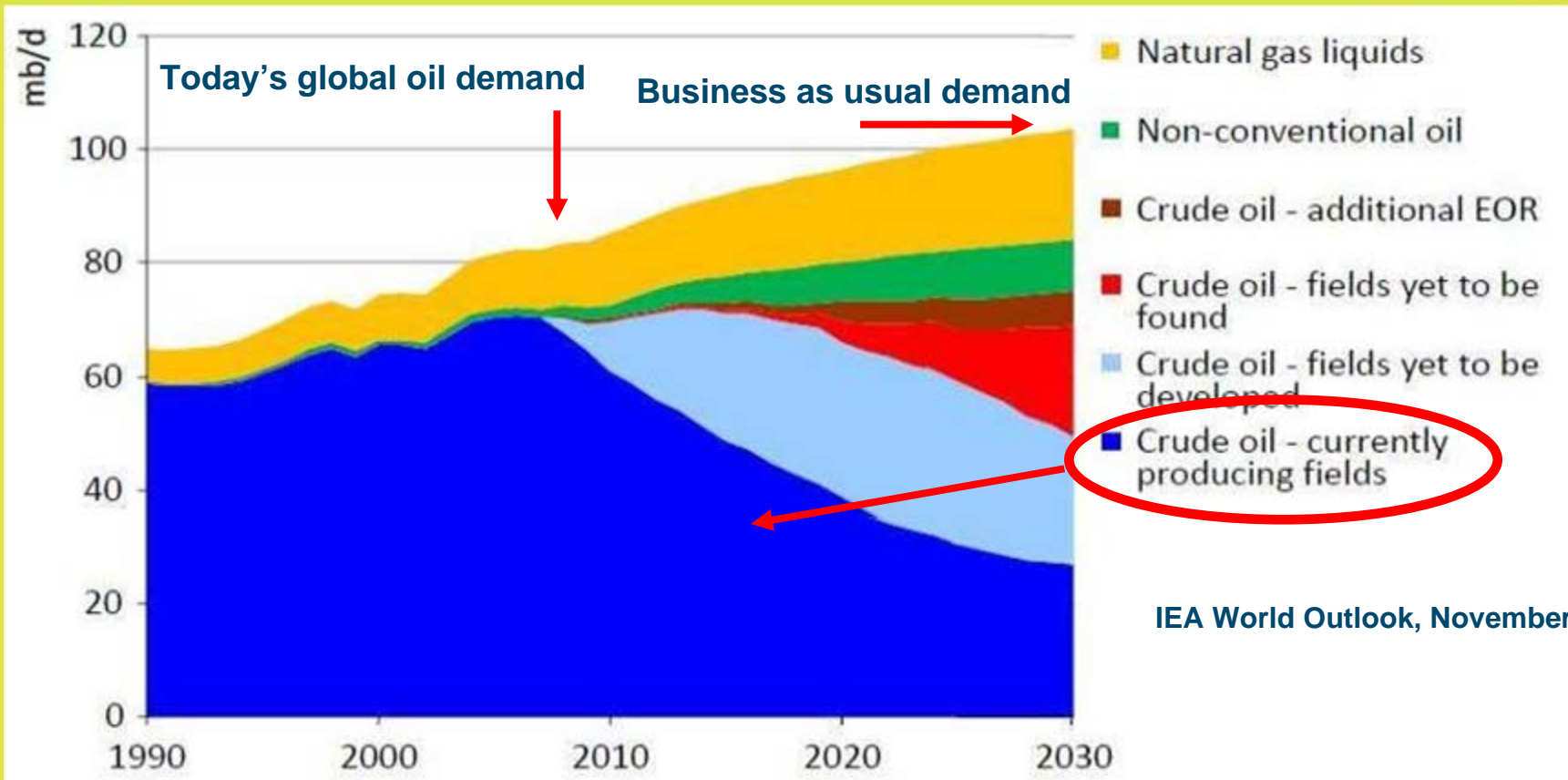


*“We have got to deal with increased demand for energy,
increased demand for food, increased demand for water,
and we've got to do that while mitigating and adapting to
climate change. And we have but 21 years to do it”*

Professor John Beddington
Chief Scientific Advisor to HM Government and
Head of the Government Office for Science,
March 2009



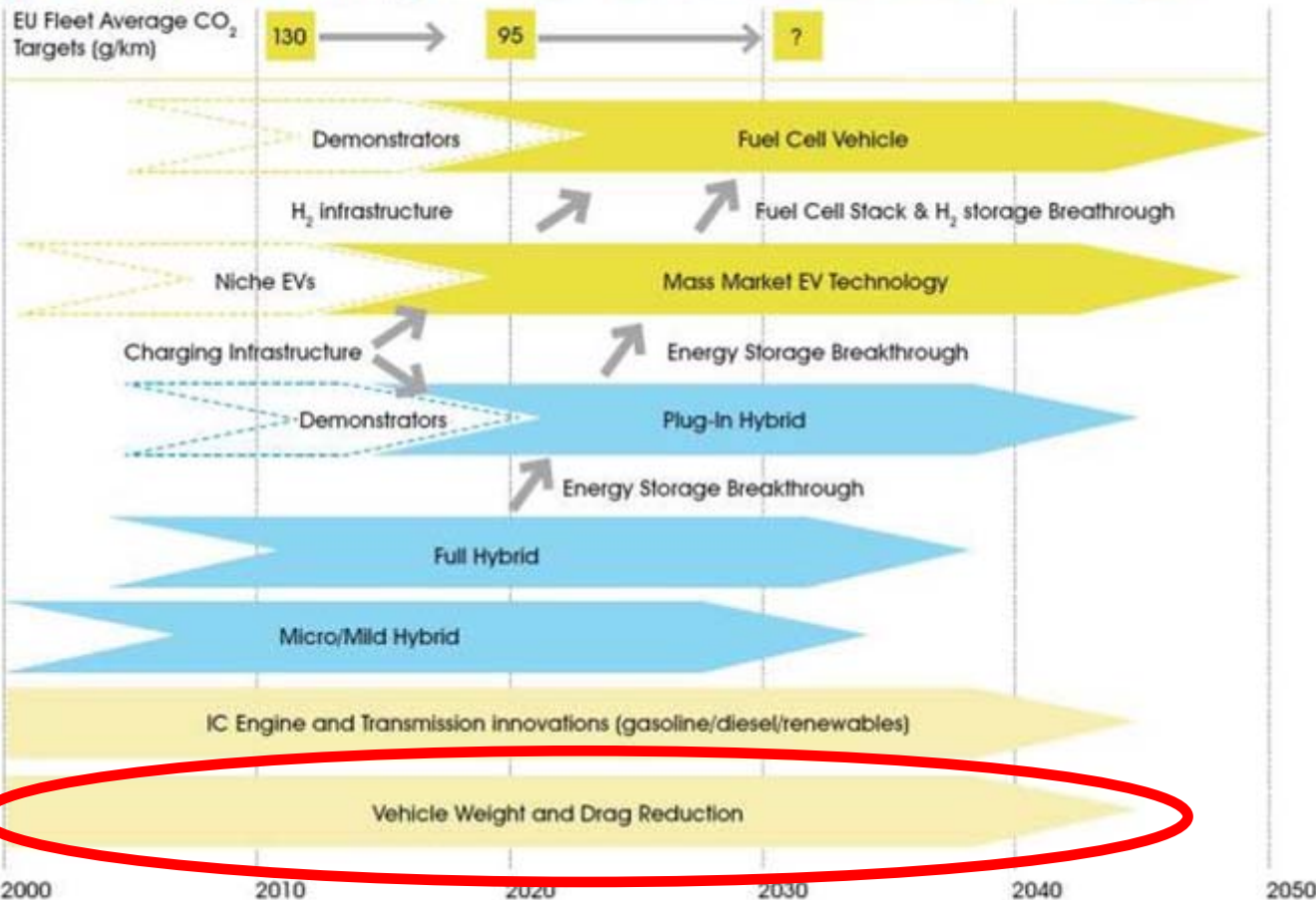
Peak Oil impact Next ten years?



Even flat oil demand requires four Saudi Arabias to be discovered and developed!

Decarbonisation Road Map

Figure 3: A high level technology roadmap for the UK's de-carbonisation of road transport



April 09

Current technology: The Iron Age



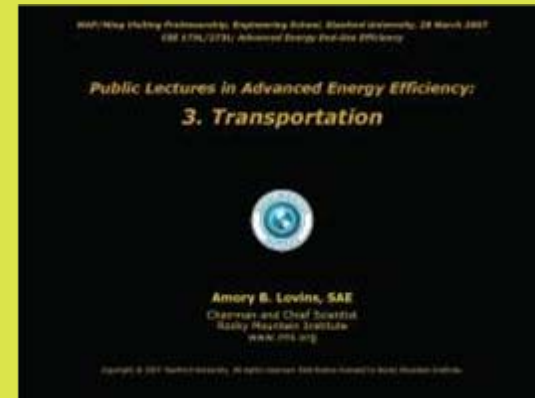
Where does a car's gasoline go?

13% tractive load

87% of the fuel energy is wasted



- 6% accelerates the car, 0.3% moves the driver
- Three-fourths of the fuel use is weight-related
- Each unit of energy saved at the wheels saves ~7–8 units of gasoline in the tank (or ~3–4 with a hybrid)
- **So first make the car radically lighter-weight!**



Compound gains from ultralight construction



Assuming an engine/drivesystem efficiency of 15–20 percent, it takes five to seven units of fuel energy to deliver one unit of energy to the wheels of a conventional car. Turning this around by saving energy at the wheels offers immensely amplified savings at the fuel tank.

The single biggest opportunity for making the car lighter is to replace much of the steel in the body and chassis with new materials such as advanced composites.

<http://www.rmi.org/sitepages/pid194.php> describing the Hypercar concept

“Lotus studied and analysed the concept intensively: *“This is feasible and should be prototyped”*”

Compound gains from ultralight construction



- **Compounded fuel saving**
- **Hybrids and EVs become economic and viable**
- **Factories simpler and cheaper**
- **Vehicles safer**
- **Decarbonisation of transport becomes possible**



East of England already prominent - a few examples



East of England Low Carbon Vehicles Innovation challenges



- Support innovative companies
- Engage across and up the supply chain
- Promote the low-carbon vehicle agenda nationally
- Encourage multiple uses for plants and plant components
- Facilitate cooperation and skills transfer across sectors
- Stimulate innovative thinking in biomaterials and design

