



*'It's the Fuel Stupid!'*

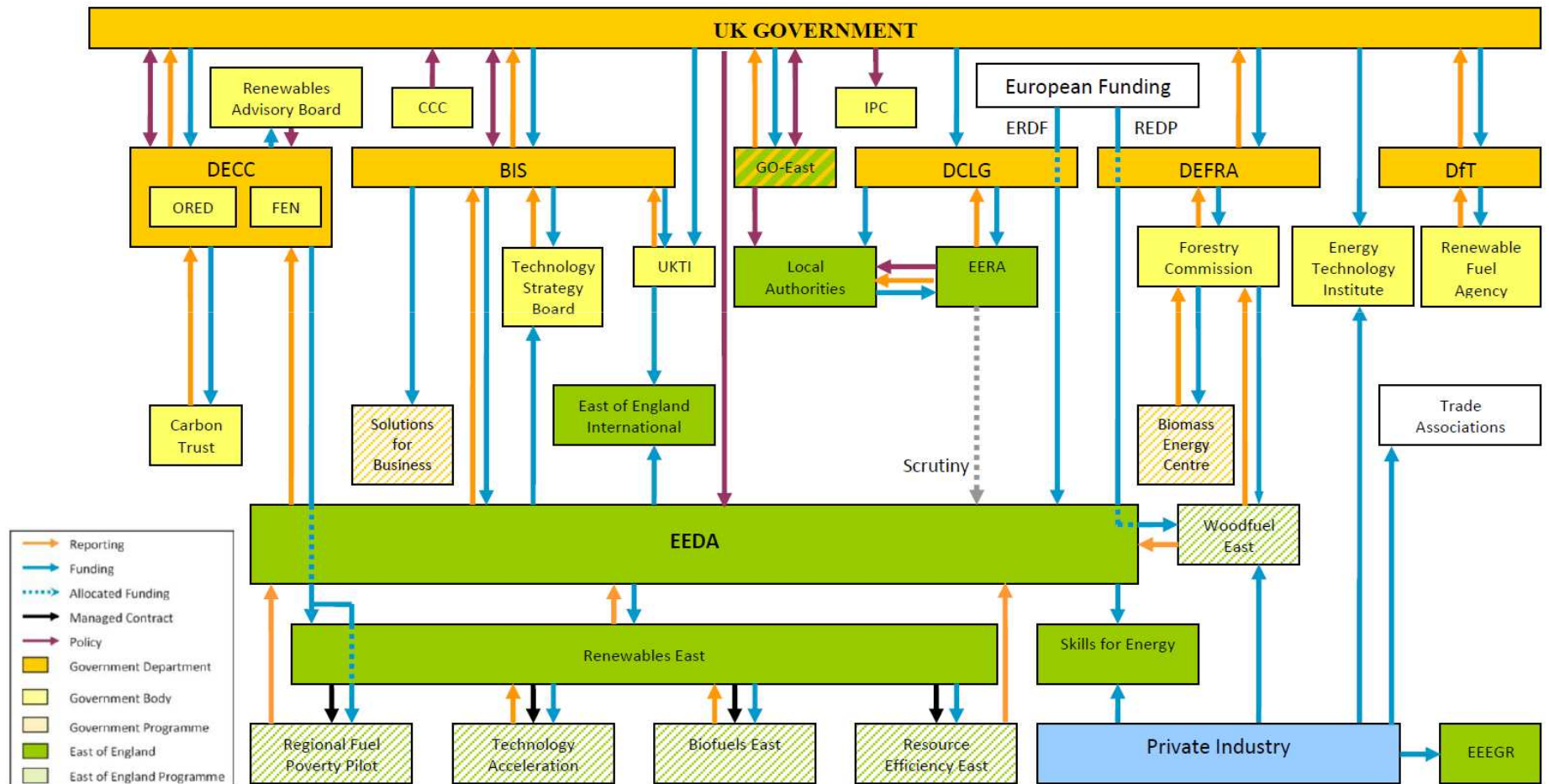
**Sustainable Transport Fuels  
in a Low Carbon Environment**

Glyn Owen  
3<sup>rd</sup> December 2009

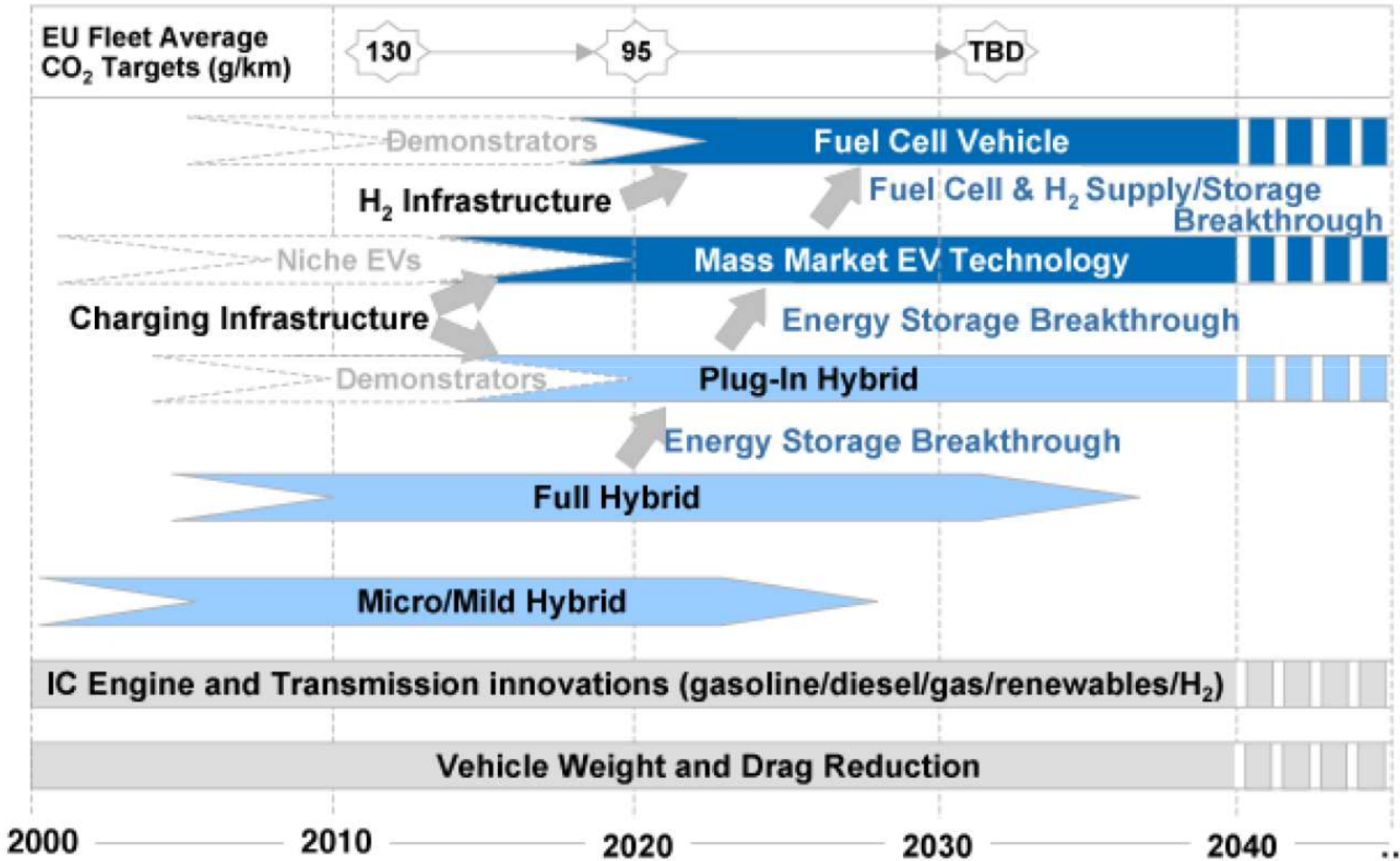
# Let's Start With the Strategy!



Figure 1: The current regional energy delivery framework in the East of England (non-exhaustive)



# NAIGT Transition "The Compromise"



**An Independent Report on the Future of the Automotive Industry in the UK**  
New Automotive Innovation and Growth Team (NAIGT)

- Making cars that use electricity rather than liquid fossil fuel as source of fuel more affordable - via premium and niche offerings gain development learning and move towards scale;
- Switching the generation of electricity away from fossil fuels;
- Providing a charging infrastructure with adequate capacity and density; and
- Developing second-generation bio-fuels as a fossil fuel independence for vehicle type - electric cars can't be made.



**Sainsbury's gains award for green retail innovation**  
Written by Harpers Editorial team  
Tuesday, 04 December 2007  
Food and drinks retailer Sainsbury's has received an award from the Energy Saving Trust for its commitment to eco-friendly product delivery methods.  
The supermarket will have 20% of all urban home-shopping delivery vans electric by September 2008 and wants the whole fleet of around 100 vehicles electric by 2010.

**BMW and Marks & Spencer in Electric Vehicle Trial**

TUESDAY, 13 OCTOBER 2009 11:17 News  
Marks & Spencer have announced that they have agreed a partnership with Mini to introduce 'top-up' electric charging stations for electric cars at town sites in the South East of the UK. The UK Government's 'Electric Vehicle Strategy'...

**TESCO WINS GREEN 'GOLD STANDARD' AWARD**

05 June 2009

Environmental gains delivered after massive green investment by Tesco have secured the coveted 'Carbon Trust Green Standard' award. The UK's greenest supermarket chain.

**Volvo Trucks takes next step in Bio-DME**  
Volvo Trucks is now taking the next concrete step towards carbon dioxide-neutral road transport. Within the framework of a broad-based joint project, field tests are being conducted with trucks running on Bio-DME - a 6% improvement in energy efficiency.

Low Carbon Transport: A Greener Future

Department for Transport

**Technology Strategy Board**  
Driving Innovation



**KOGAS Announces 300,000 TPY DME Plant in Saudi Arabia**  
21 October 2009 | The world's largest corporate buyer of biofuels has announced that it will invest US\$ 344 million to build a DME plant in Saudi Arabia. The plant is to be built in Jubail, will produce 300,000 tons per year of DME from 2013. James McCandless, CEO of IDA member company Alternative Fuel Technology stated that he is 'not surprised' that KOGAS would spend over \$344 million on a DME plant of this size.

**There is no clear direction!**

DME News

**BioDME Project Launched to Deliver Biofuels in 2010**  
11 August 2009 | Chemrec's pulp mill-integrated bioDME biorefinery demonstration plant project will break ground in September in Piteå, Sweden, with expected biofuel production by mid-2010. Chemrec CEO Richard LeBlanc announced today. The project will demonstrate the production of an advanced diesel fuel DME from forest biomass over the black liquor route and will also demonstrate the...

**Japan's DME Vehicle Promotion Committee (DMEVPC) Receives 2009 DME Clean Fuel Achievement Award**  
The group received the IDA's DME Clean Fuel Achievement Award in a ceremony in Seoul in September for the consortium's commitment and substantial contributions to the development of DME as a diesel fuel in Japan.

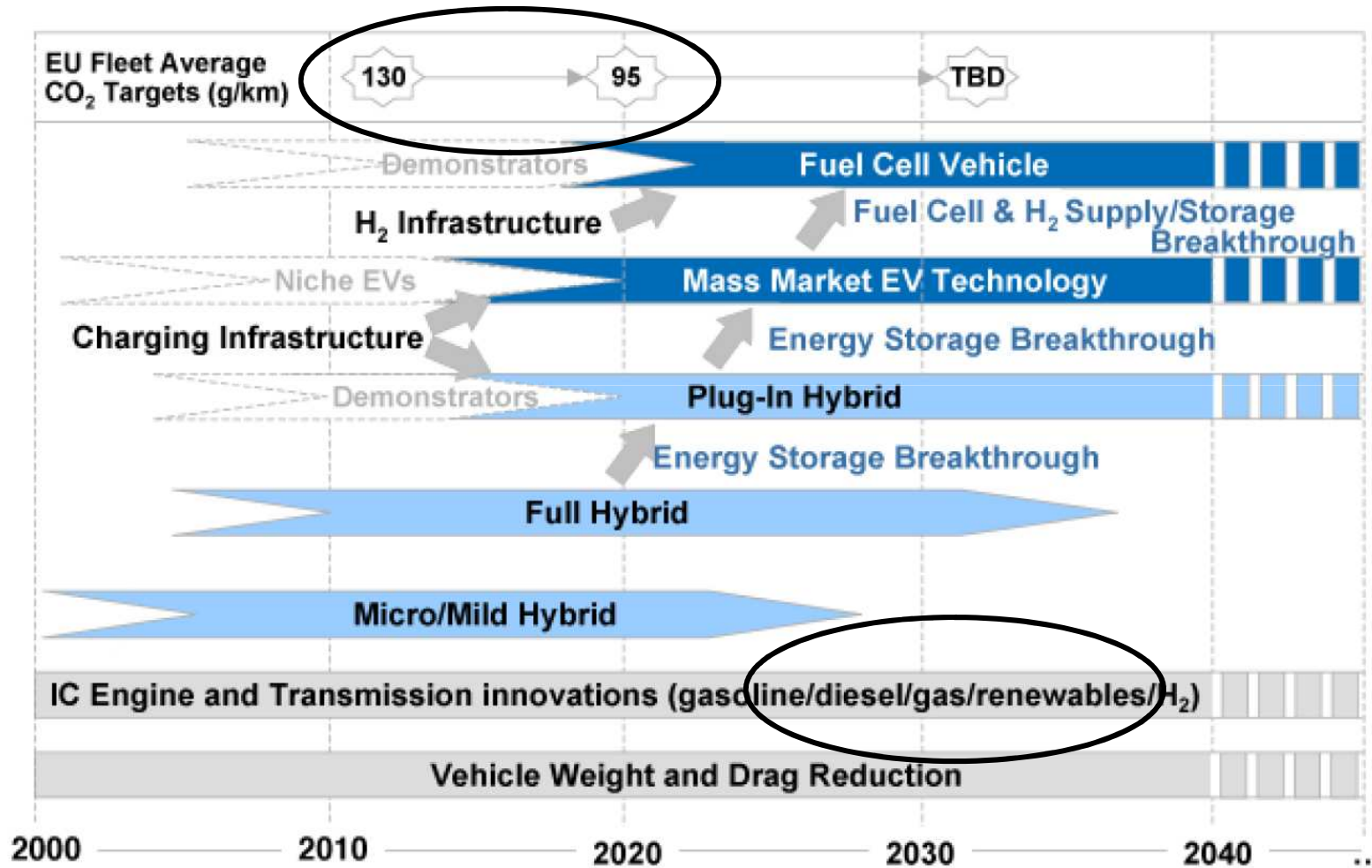
**Indian Affairs Committee Launched**  
A new committee representing the interests of Indian industry and governmental entities involved in clean fuel production has been created within the IDA to promote the development of DME in India. B.M. Banerjee, Director of Business Development at Indian Oil Corporation, will be the committee's Chairman.



Nissan DME Truck - 2005

International DME Association  
DME: 21st Century Energy

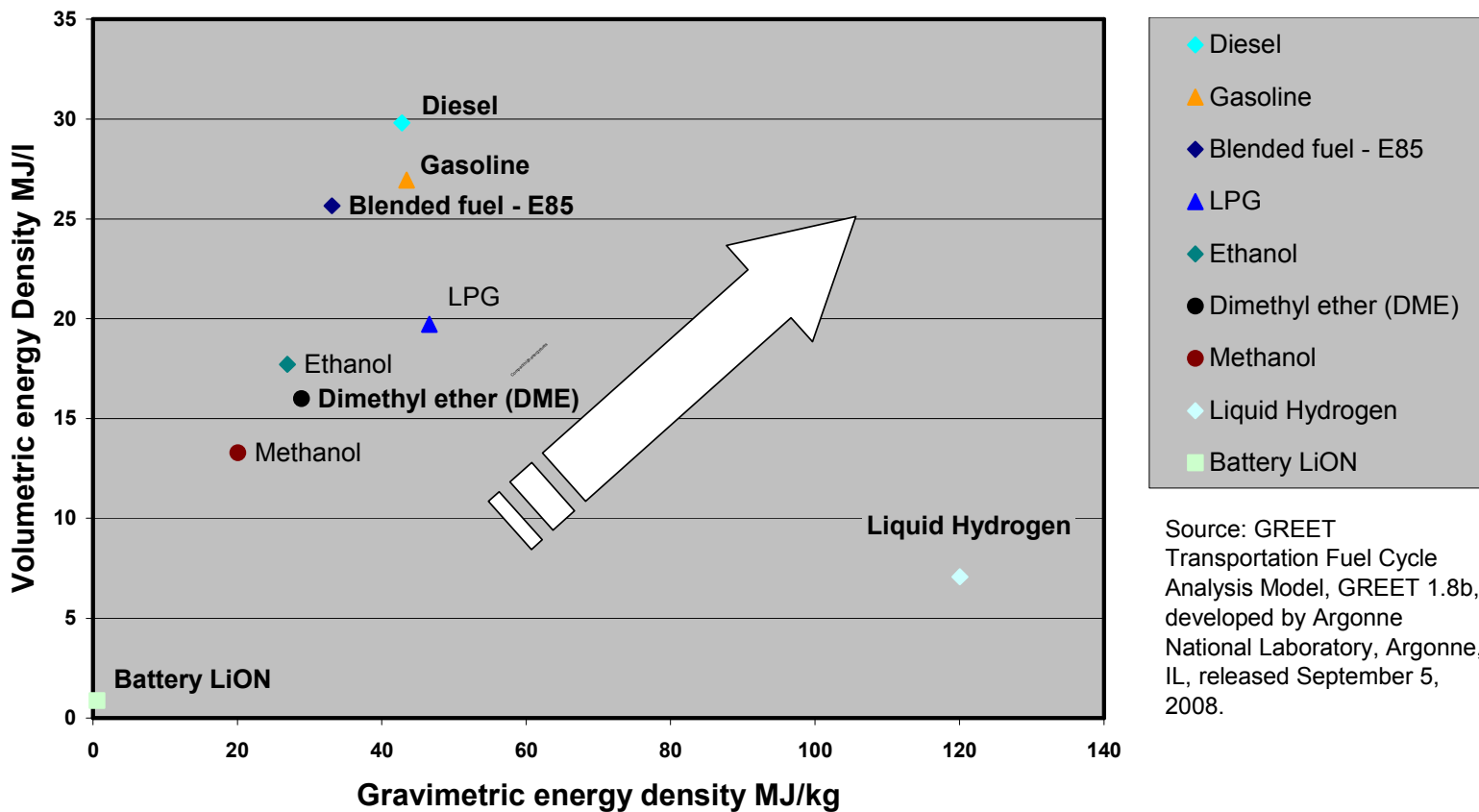
# NAIGT Transition *Hidden Opportunities*



# So what's the Energy Choice?



## Energy Density Comparison



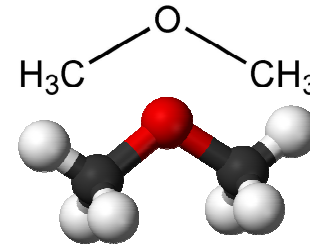
Source: GREET  
Transportation Fuel Cycle  
Analysis Model, GREET 1.8b,  
developed by Argonne  
National Laboratory, Argonne,  
IL, released September 5,  
2008.

# Where next?



EEDA commissioned Scoping Study<sup>1,2,3</sup> of economic potential for sustainable transport fuels suited to the East of England referenced to global research trends.

- Use feedstock that is locally available
- Multi feedstock sources
- Dimethyl Ether (DME) available second generation fuel
- Clean burning with trace GHG contribution
- Performs like diesel, handles like LPG
- Most mature option
- Proven application usage; aerosol propellant to transport to domestic fuel to power generation

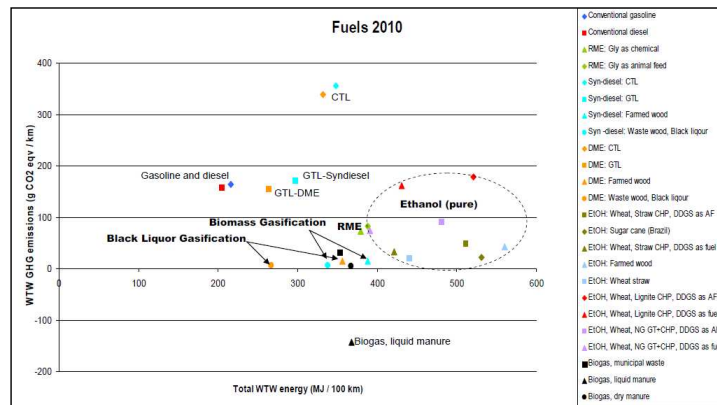
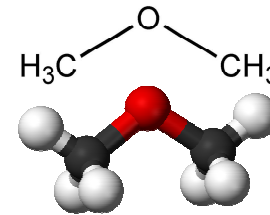


<sup>1</sup> HECV/0903/02 Research Overview, <sup>2</sup> HECV/0903/03 Research Application, <sup>3</sup> HECV/0904/01 Development Strategy

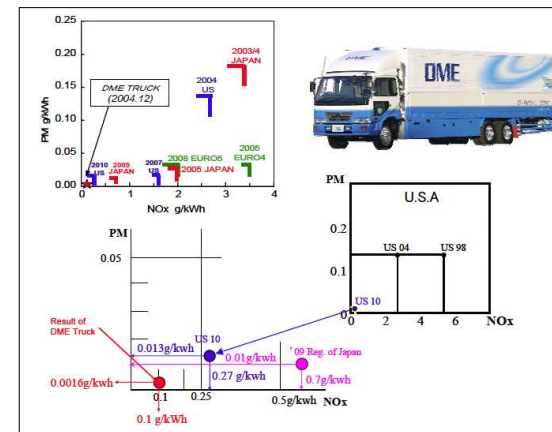
# Dimethyl Ether?



- Clean, compression ignition combustion - Low NOX & Particulates
- Low well-to-wheel CO<sub>2</sub> equivalent emissions
- Handles like LPG
- Slightly more corrosive, with less lubricity than diesel
- Backed by Governments in Japan, China and South Korea
- Proven transport applications

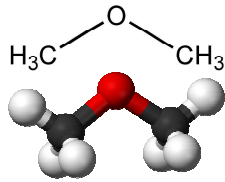


Environmental impact - CO<sub>2</sub>

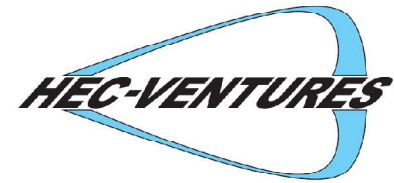


Environmental impact - NO<sub>x</sub>

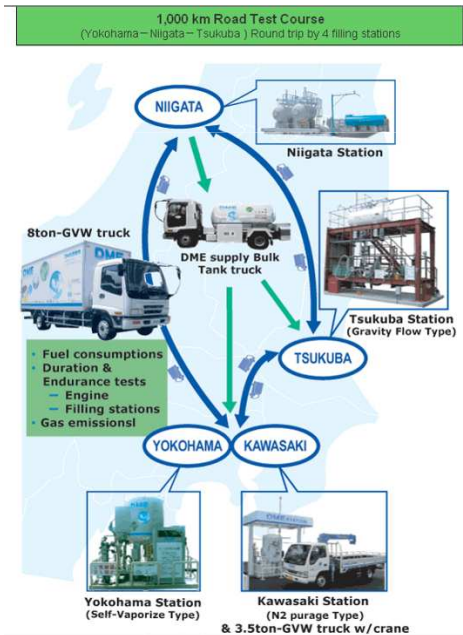




# Is DME Real



## Japan



## Field test

**VOLVO** Partners: DELPHI, TOTAL, green

- 14 Volvo DME trucks in customer operation
- Demonstrate and verify DME technology in real applications
- Planned yearly distance 100 000 km per truck (average)



European Project BioDME 7th Framework Programme 16

## Sweden



BioDME

## China



**China to build largest dimethyl ether project**  
(Danhua)  
Updated: 2008-08-18 13:42

China is to start construction of its largest dimethyl ether (DME) project with an annual output of three million tons to reduce rising oil consumption. Coal-based DME is a clean-burning alternative to liquefied petroleum gas, liquid natural gas, diesel and gasoline.

A city of north China's energy-rich Inner Mongolia Autonomous Region, valued at 21 billion yuan (2.6 billion U.S. dollars), the Shanghai Securities Exchange will be built to transfer the DME from Ordos to the port city of Tangshan in Hebei Province.

It will then enable it to be shipped to provinces in east and south China which are short for energy sources. Participants in the project include power giants China National Coal Group Corporation, China Petroleum and Chemical Corporation and the Shanghai-based energy group.

Due to oil shortages, China is speeding up efforts to develop an oil substitution program to reduce its reliance on oil imports and offset the effects of rising oil prices. But as a sustained coal supply has remained a challenge for China, NDRC has banned any coal-based DME project with a design capacity lower than one million tons.

# HEC Ventures



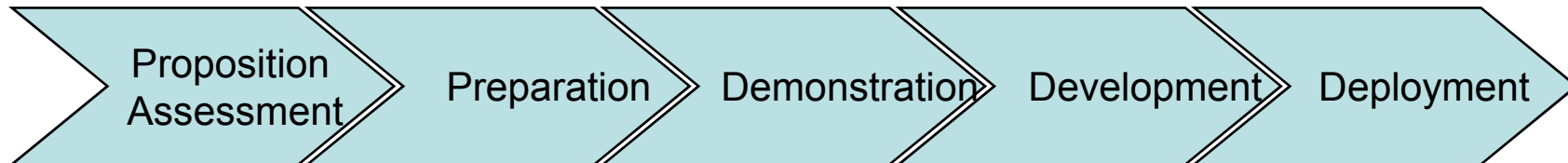
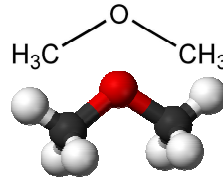
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- Accelerate deployment of sustainable transport fuels through promotion, enablement and application
  - Independent body that believes in 'doing'
  - Network of technical competence with deliverable experience
  - Maintain an orderly programme roll out
  - Embrace 'skunk work' and 'demo' activity that is complementary to our core objectives
  - Hethel Engineering Centre, Norfolk

# Talking or Doing?

- HEC Ventures  
'the catalyst'

East of England;  
- the supply chain components  
- 'the Trial Location'

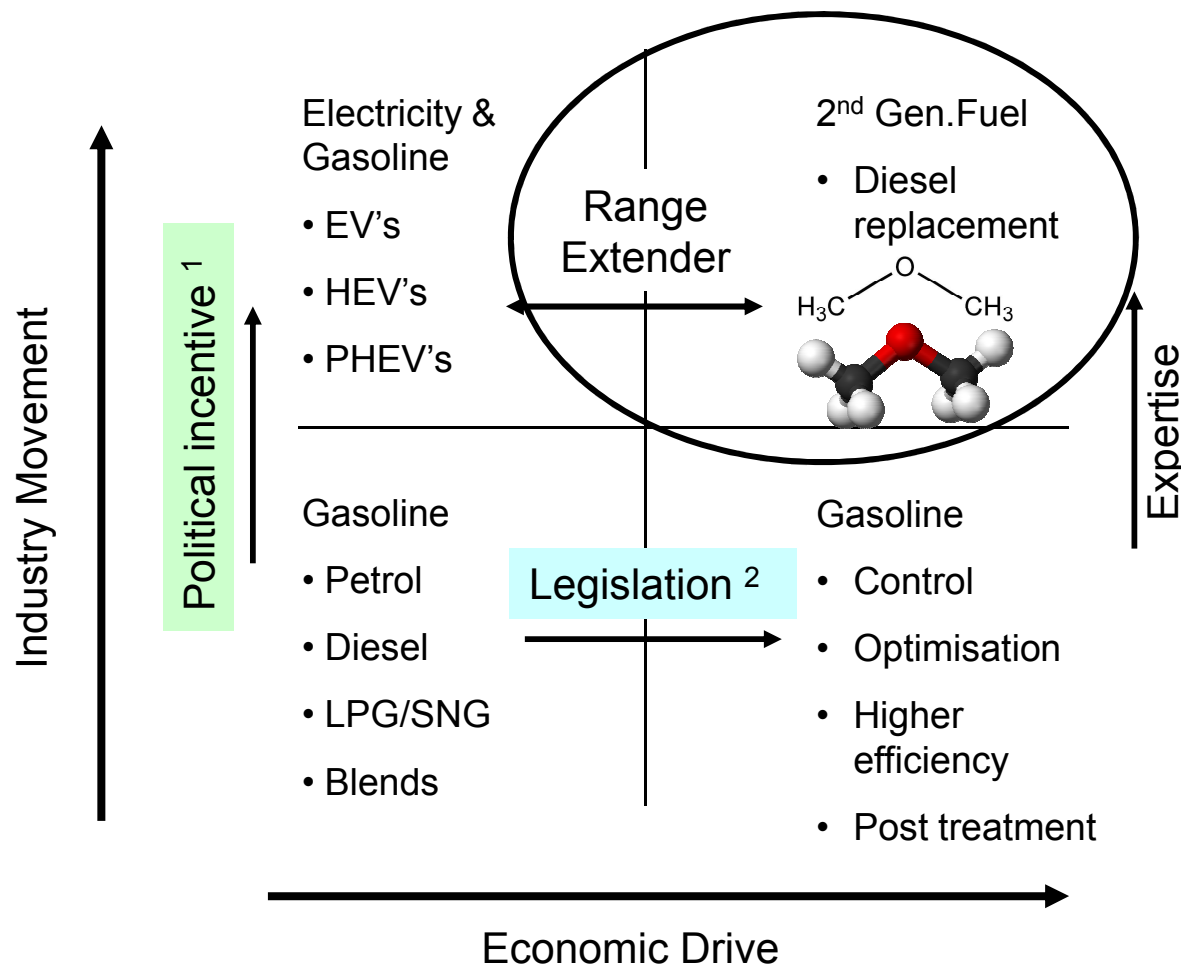
## The DME programme



## The 'Next' fuel



# Transport Opportunities



<sup>1</sup> The UK Low Carbon Industrial Strategy

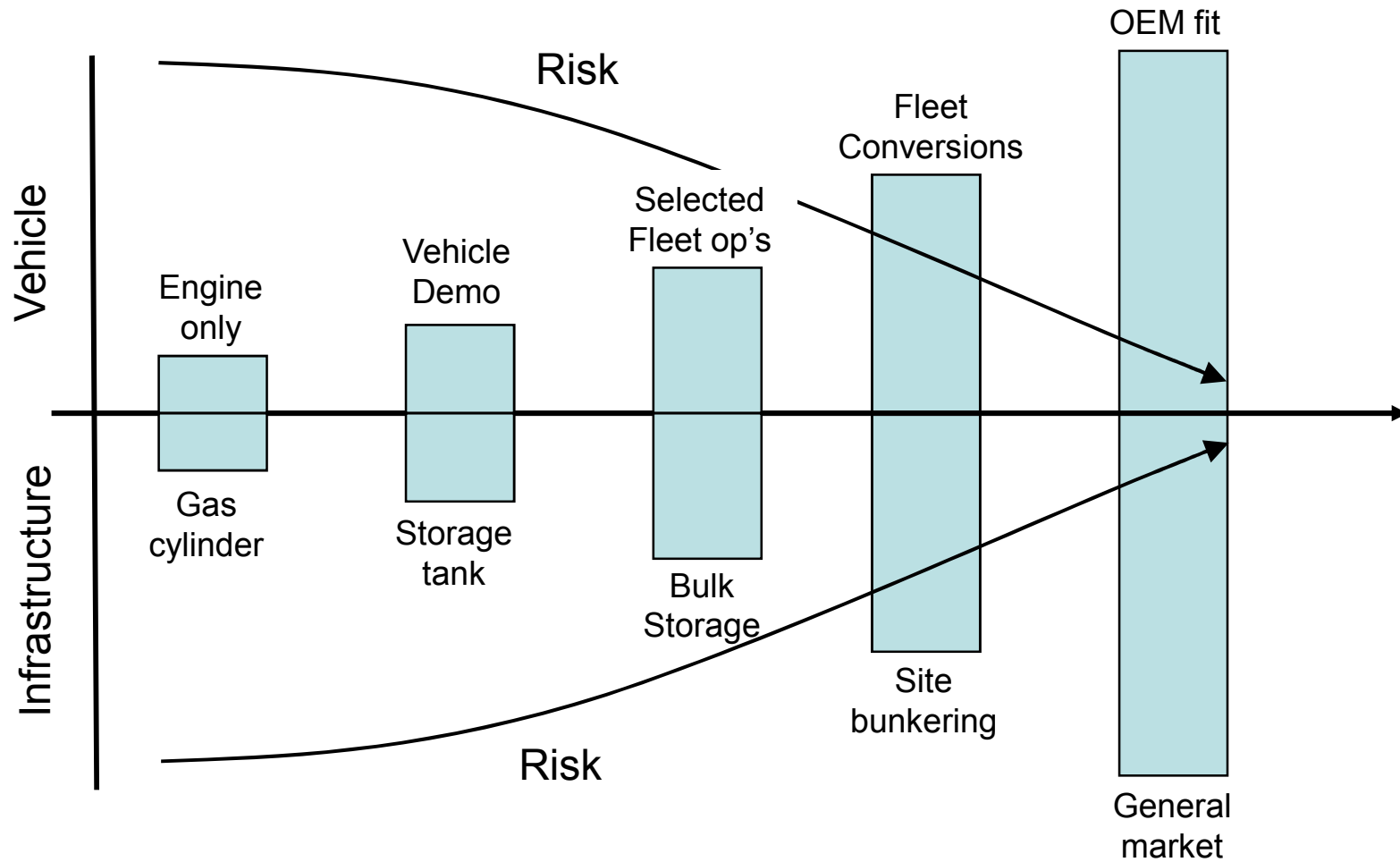
A Carbon Reduction Strategy for Transport

The UK Low Carbon Transition Plan

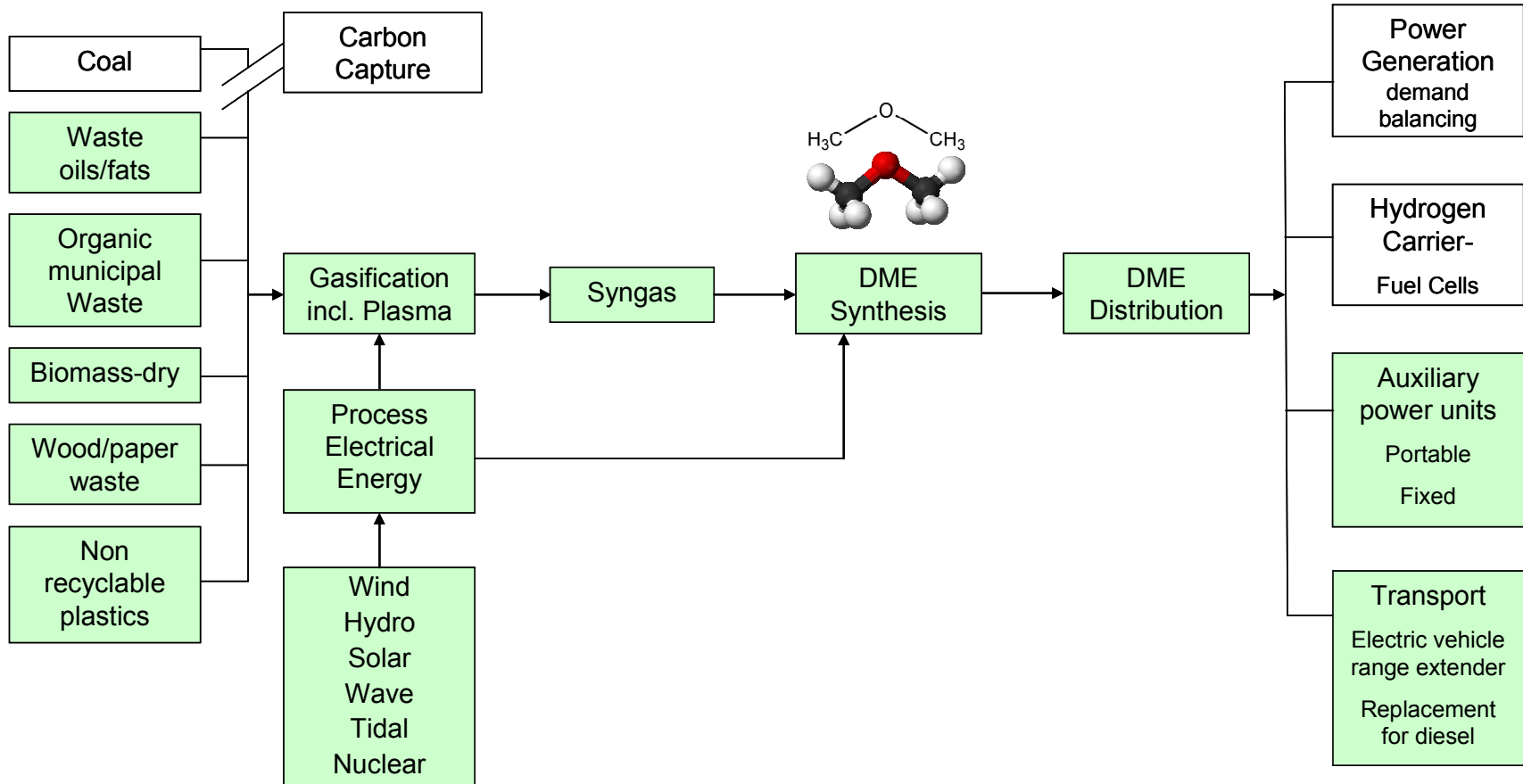
UK Government commitment of £400m to Technology Strategy Board and Department of Transport Programmes for Ultra low carbon vehicles

<sup>2</sup> EC443/2009 –Emission Legislation

# Demo Diesel Replacement Opportunities



# Supply Chain Opportunities





.... *But We Still Need*

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- Partners *for demo and fast track projects*
- Supply Chain *to develop the role out plan*
- Investment *to maintain the core and identify opportunistic 'gaps'*

Contacts :

Glyn Owen

Tel +44 (0)1953 859139

Mob 07809 660075

Email [owen\\_192@hotmail.com](mailto:owen_192@hotmail.com)

Web [hecventures.weebly.com](http://hecventures.weebly.com)

David Thomas BSc C.Eng FIMechE

Tel +44 (0)1953 859148

Mob 0776 6141761

Email [DTsapeng@aol.com](mailto:DTsapeng@aol.com)

Web [hecventures.weebly.com](http://hecventures.weebly.com)