

Are the oil majors getting serious or is still just a green marketing ploy?

Has big oil finally embraced biofuels?

When ExxonMobil started buying airtime for a new advert on algal-based biofuels earlier this year this marked a major break with the past – if for nothing else, the broadcast text made no challengeable claims (unlike one of its predecessors on liquid natural gas).

The filming was subtle, aesthetically colourful and short: in 31 seconds the essential information on algae, biofuels, lack of competition with the world's food supply, CO2 absorption, and greenhouse gases were voiced sotto voce.

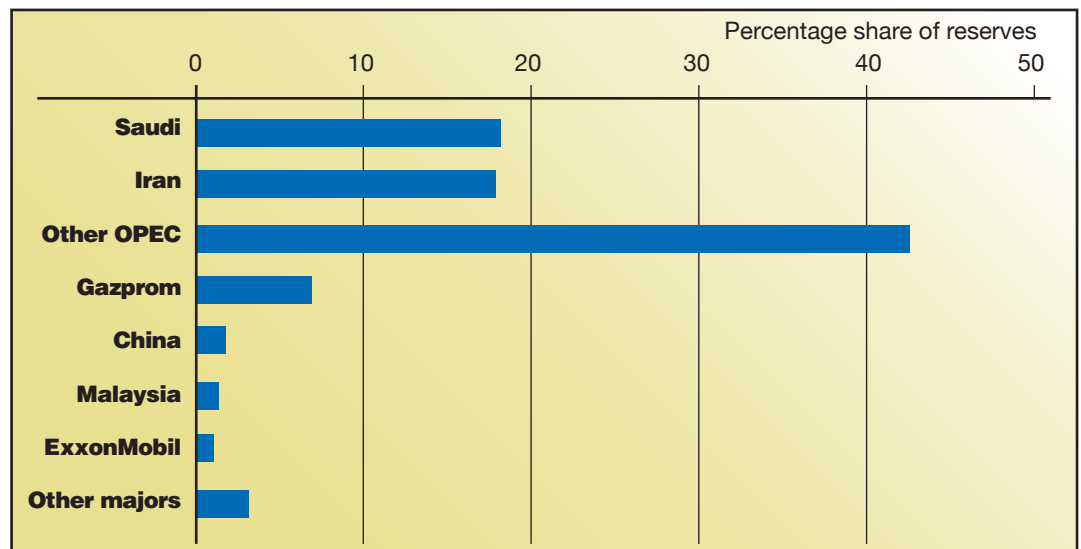
As analysed in the recently published industry analysis, *A Quick Guide to Biofuels*¹ with the late addition of ExxonMobil all of the world's oil majors have now committed funding to biofuels programmes.

Among those oil majors, however, dramatically different conclusions have been reached on exactly which targets for advanced biofuels should be funded.

In July 2009 ExxonMobil announced a \$600 million (€431 million) partnership with La Jolla biotech company Synthetic Genomics to develop new biotechnologies for producing biodiesel transportation fuels from algae.

European oil giants BP (UK), Shell (the Netherlands) and Total (France) have all funded plant biomass programmes. BP Biofuels bought Verenium's US cellulosic

Who owns the future of oil and natural gas



biofuels business for over \$98 million in July 2010.

Shell has partnered with Canadian company Iogen Corporation to produce lignocellulosic ethanol; Iogen opened the world's first biomass-based fuel ethanol demonstration plant in 2004 and has produced 1.5 billion litres of ethanol since then.

Total has interests in biomass gasification for Fischer-Tropsch diesel, methanol and dimethyl ether, production of bio-oil through pyrolysis, and biological conversion of biomass into biofuels. It also has ambitions for hydrotreated vegetable oil and animal fat as second-generation biodiesel.

BP has a rival process for butanol, produced by fermentation, and has partnered DuPont in this venture. Shell has given financial support for biomass-to-liquid R&D and has a

collaboration on marine algae for a biodiesel-type product.

In the US, ConocoPhillips has been involved in a broad range of biofuels research that includes plant biomass (nonfood agricultural residues and grasses), gasification and pyrolysis chemical technologies, and conventional biodiesel production from vegetable oils and animal fats. Chevron has multiple university-based initiatives and has partnered Solazyme in algal biodiesel production.

Such multiple options imply an appreciation of the risks involved. So why all the activity? The financial commitments represented by the oil majors' investments in alternative fuels are small by industry standards. Critics have described the tactic, therefore, as a form of 'greenwash' in an age dominated (until the

Copenhagen conference on December 2009) by fears of global climate drift and catastrophic global warming.

One answer is the scale of market penetration for petrol and diesel by biofuels. If national and international initiatives aim to replace up to 30% of petrol usage by 2030, the implication is a poor outlook for further growth in conventional petrofuel demand – eventually.

Massive expansion in automobile ownership in developing economies such as China, India and Brazil would negate this market shrinkage but it is precisely those countries that also already possess or are planning large-scale domestic biofuels industries.

Biofuels exports are also big business. Shell claims to be the world's biggest distributor of biofuels, distributing 9 billion litres

in 2009. In August 2010, Shell signed an agreement to form a joint venture for producing ethanol from sugarcane in Brazil. BP has invested likewise.

For smaller oil producer nations – including those on OPEC’s fringes – biofuels are an easy route to diversification, and both Indonesia and Nigeria are beginning to produce biodiesel from palm oil and ethanol from sugarcane and cassava, respectively.

But the most pressing long-term strategic reason for investment in biofuels is contained in the preceding sentence: OPEC. Between them, the west’s oil majors control only 7% of known oil reserves – the national oil concerns in Saudi Arabia, Iran and other OPEC nations hold the high cards.

ExxonMobil’s control of and access to oil reserves is dwarfed by that of Gazprom (Russia) and is smaller even than those of CNPC (China) and Petronas (Malaysia). The inevitable conclusions

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are that national and non-western oil producers will dominate even more of the supply of transportation fuels in the coming decades and that those producers would harmonise well with increasing oil prices – to the \$140 per barrel high of 2008 or beyond. The resulting massive profits would be highly acceptable to oil majors but the fear of diminishing oil stockpiles refuses to go away.

If there is a vibrant long-term future for the oil majors, they must diversify

and exploit their massive knowledge and ownership of oil refining capacity – oil and biomass streams can be merged in future hybrid bio/conventional facilities. Petrobras (Brazil) has its H-Bio process in which a vegetable oil stream is blended with petrodiesel fractions and the mixture hydro-converted with hydrogen; the product is a diesel with a reduced sulphur content. Direct hydro-treatment of pure vegetable oils has started in Europe. This logic drives continued

experimentation with mixing plant oil and oil fractions in industrial chemical engineering and – in time – the gradual replacement of oil by biomass-derived liquids as inputs to (perhaps only marginally modified) refinery sites.

Intelligent forward planning combined with some degree of retrofitting of existing facilities would greatly reduce the ‘pain barrier’ of transforming oil refineries to function efficiently in a world with dwindling oil supplies, political backlash to rocketing oil producers prices and continued calls for energy independence. The oil majors may find themselves optimally positioned to provide realistic and very large-scale solutions to global advanced (bio)fuel provision by 2030 or earlier. ●

For more information:

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1. Mousdale DM, *A Quick Guide to Biofuels: When the Oil Runs Out*, BioPlan Associates, Inc., Rockville (2010).

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