

US policy and investment trends

While first generation industries receive mixed support from the US government, investors from private industry and government are voting in favour of next-generation biofuels

In the private sector, next-generation biofuels continue to gain investment, especially when using this formula: (1) start with non-food feedstocks, (2) employ advanced biorefinery technologies (UOP, Neste) or microbes and super-bugs (bacteria, algae) with the goal to produce (3) biodiesel, ethanol and increasingly fungible, drop-in fuels that fit into existing oil and gas infrastructure. This formula demonstrates an adaptation by investors in the market to a confluence of regulatory factors in transition: hard mandates in 2009 for biofuels blending, sustainability criteria, and increasing interest by oil and gas majors seeking solutions for biofuels-petroleum infrastructure integration.

To highlight these transitions in the public sector, the US government is increasingly promoting next-generation technologies and feedstocks in the form of public-private partnerships and grants. This transition has occurred in four phases in the US, starting in 2006 and leading up to 2010.

Policy trends

The first phase occurred back in 2006 in an update to the Energy Policy Act of 2005,

which included a provision for biomass-based diesel contributed at the time by US Senators Obama and Lugar. Prior to this version, the bill defined biodiesel as being produced from oils and fats but did not include other non-food sources of feedstock – the first in four phases of regulatory changes that would prompt increased investment in next-generation fuels.

The second phase occurred in December 2007, by increasing a US mandate for biofuels from 7.5 billion gallons to 36 billion gallons – nearly a 5 fold increase in an update to the US Energy Policy Act of 2006 named the US Energy Security and Independence Act of 2007.

This bill also called for a major push into cellulosic ethanol and advanced biofuels technologies to represent 21 billion gallons of fuel, while putting a cap on corn-based ethanol at 15 billion gallons of the 36 total.

This bill also introduced renewable diesel into the legislation to qualify for tax credits in a heated debate, and left the industry in suspense until the end of the year to renew the biofuels tax credits.

By the end of December 2007, the biofuels industry received the credits it desired, along with new mandates for next-generation fuels, and emerging RFS2 criteria for sustainable biofuels. From these challenges arose new opportunities for next-generation fuels.

The third phase started in May, 2009 with the introduction of the incoming Obama administration's

ambitious biofuels programme between the President's executive departments of energy, agriculture, and environment (EPA). This culminated in a \$786 million (€527 million) commitment by the US Department of Energy to biofuels.

At the time the definition of cellulosic ethanol was broadened to include the term cellulosic biofuels including biomass-based cellulosic diesel. The US government followed suit by rewarding grants to emerging cellulosic and microbial technologies, lead by Energy Secretary Stephen Chu.

At the time Chu noted three generations of biofuels, and hinted at a fourth: first generation from food; second generation from crop waste; and third generation from dedicated energy crops including: energy cane, sorghum, miscanthus, and switchgrass among the new feedstocks that could be processed into ethanol, renewable diesel, and green petroleum or 'grassoline' produced from perennial crops.

Chu's fourth generation fuel referred to carbon negative fuels and followed a series of debates during 2009 between the US EPA and the US Congress, focusing on biofuels indirect land use, GHG lifecycle and sustainability criteria. During this debate, the 'summer of algae' emerged, reflecting each of these issues and witnessing increasing investments into crops that consume carbon dioxide as a feedstock.

The fourth phase in this transition continues to the

end of 2009 as the US Congress prepares for its annual holiday review of biofuels legislation. This year, the annual policy revision includes an update of the definition cellulosic biofuels to include new feedstocks from microcrops: algae, cyanobacteria (blue-green algae), and lemna (duckweed).

The bill also qualifies these aquatic feedstocks to receive the \$1.01 cellulosic biofuels tax credit, but under a different name. This would be in a Health Care Bill, similar to a US Senate move towards the end of 2008 Tax Extender's Package that included and ensured biofuels tax credits were extended for one more year. At the time of publication, the bill was passed in the US House of Representatives at the urging of President Obama, and will be reviewed by the US Senate before heading to the White House just in time for the holidays.

Investment trends

This year was the first year the US required mandates from petroleum companies to blend in ethanol, and for a brief period to meet mandates for biodiesel. It was also an active period of investment for oil and gas majors, culminating in a \$600 million announcement by Exxon into algae, and many oil and gas majors into energy cane, sorghum and switchgrass. ●

For more information:

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