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POLICY

Fuelling politics

Biofuels have been hailed as key to reducing our fossil-fuel dependence, yet their environmental and social impacts remain uncertain. A complex task lies ahead for policy makers.

BY MARTIN ROBBINS

In recent years a consensus of sorts has developed around energy, signalled most strongly in 2006 when George W. Bush admitted that the United States had an "addiction" to oil. Petroleum has come under attack from almost every point on the political spectrum, from people concerned about the effects of fossil fuels on the environment to right-wing patriots alarmed at their nation's dependency on a resource imported from some of the world's most troubled nations.

The effects of this addiction are especially apparent in the developing world, where petroleum often makes up a significant proportion of total imports. Conflict in Libya sent petrol (gasoline) prices soaring in Nairobi, with taxi drivers increasing their fares daily to match the increases in pump prices. In Kampala recently drivers were forced to tour local fuel stations in an attempt to find the few that hadn't run dry. Coupled with anger at rising food prices, their frustrations rapidly boiled over into riots. Oil isn't just an economic problem; increasingly it's a major security issue.

Biofuel is seen by many as the answer: a renewable source of energy that can be grown locally, exploited with existing technology and pumped straight into cars. A recent Eurobarometer report showed 83% public approval for encouraging sustainable biofuels across the European Union (see 'Incentives and targets').

Yet nobody has come up with a set of policies that can make biofuels a viable near-term substitute for petrol and diesel. Regulations, incentives and penalties are scattered across countries and often serve to shift problems from a highly regulated country to a less regulated one. Moreover, a growing collection of non-governmental organizations, scientists, politicians and even some biofuel producers have expressed concerns about the rapid and largely unchecked growth of biofuels, focusing especially on the need for adequate regulation in the developing world, impacts of land-use and food security.

BIOFUELS TARGETS

Globally, governments are providing billions of dollars in subsidies for bioenergy, but the amounts pale into insignificance next to the spend on fossil fuels. Bloomberg New Energy Finance estimates that in 2009 governments provided subsidies worth at least US$43 billion to the renewable energy and biofuel industries combined, but the International Energy Agency's figures for 2008 show global fossil-fuel subsidies of $557 billion. This imbalance places biofuels at a significant disadvantage. The "higher pricing of biofuels versus fossil fuels" is a considerable obstacle to development, says Matti Lehmus, executive vice president of biodiesel producer Neste Oil.

The most generous government support for biofuels development comes from the United States. The International Food and Agricultural Policy Council (IPC) estimates US subsidies of biofuels to be worth nearly US$7 billion a year (see 'Incentives and subsidies'), compared to nearly US$5 billion from the European Union. Financial aid includes a direct subsidy of 12 US cents per litre and tax credits for blenders worth 26 US cents per litre. Meanwhile, the US Food, Conservation and Energy Act 2008 has stimulated public investment in the form of grants and loan guarantees through the US Department of Agriculture.

Quantifying the exact level of government spending in any country is difficult, however, and estimates are often politically spun. True figures are obfuscated by a complex mixture of direct and indirect support largely inseparable from wider agricultural policy. In the United States and European Union this picture is complicated further by the variety of policies pursued by different states. Lack of transparency is also an issue, although the IPC notes that fossil-fuel policies suffer from a similar opacity.

Globally, the policy with the largest impact on biofuel production is the blending quota (see

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'Incentives and targets'). Governments in at least 17 countries have provided a huge stimulus to biofuel demand by introducing targets requiring the blending of 5–10% bioethanol with petrol, or 2–5% biodiesel with diesel fuel — mixtures that most cars and vans can run on with ease.

The US Environmental Protection Agency's Renewable Fuel Standard sets clear, long-term targets for quadrupling biofuel use in transport to 36 billion gallons by 2022 while also curbing greenhouse gas emissions. Europe is on target for biofuels to make up 10% of transport fuel by 2020, but progress varies wildly between member states (see 'Incentives and targets').

Meeting the increased demand that biofuels targets stimulate will require imports from major producers like Brazil. Both the United States and the European Union, however, have erected protectionist barriers; high tariffs on imports hamper competition and disconnect sustainability from cost. The United States, for example, imposes a 14 US cents per litre tariff on Brazilian bioethanol, even though this type of fuel is widely considered more sustainable than domestic, corn-based fuels. And Lehmus argues that if biofuels are to become a global reality, policy makers in Europe need to understand that "a significant share of its biofuels and biofuel feedstock will come from outside the EU".

The dominance of corn in the US biofuel scene has frustrated those advocating more advanced solutions. "The reason we founded Advanced Biofuels USA is that so many people we spoke to defined biofuels as corn-based ethanol, if they knew what they were at all," says Joanne Ivancic, executive director of the lobbying outfit based in Frederick, Maryland. "Very few people have heard that biofuels might be made from a wide variety of feedstock using a wide variety of technologies."

Although the United States is the world's largest producer of bioethanol, the country's biofuel policies might be hindering progress. For one thing, the United States is over-reliant on inefficient first-generation corn technology. In addition, Environmental Protection Agency policy dictates that fuel can only be 10% ethanol (recently increased to 15% for post-2007 vehicles) — a 'blend wall' that places a limit on future demand and will remain in place until the effects of more aggressive fuel blending on vehicles and the environment are clearer.

Europe has made its own policy missteps. In 2009, the European Union became the producer of the majority of the world's biodiesel (60%), yet EU lawmakers are wrestling with a growing sense that targets have been rushed through without full understanding of the wider impacts on land use and food prices. Although there is still political support for biofuels, Lehmus voices a common complaint when he says that "legislation within the EU is becoming increasingly fragmented" and bogged down in indecision. Britain, for example, requires electricity suppliers to meet renewable energy targets (which means more consumption of biomass) and favours biofuels by setting a lower road-fuel tax than is imposed on fossil fuels. But what the UK government gives with one hand, it takes away with the other: subsidies for biofuel producers were scrapped in April 2010.

With pressure from producers and advocates to scrap blend targets, Europe's politicians are due to decide what action to take on the issue of land use in July 2011 (see 'Next generation biofuels', page S2). Two serious options are on the table — adding penalties to biofuels based on their land-use impact, or raising the environmental standards that fuels must meet to qualify for support. Confounding the difficulty, European policy and existing transport infrastructure are heavily geared not for bioethanol, as is the case in Brazil, but for rapeseed-based biodiesels that require more intensive use of fertilizers. With many farmers heavily invested in rapeseed cultivation, significant change in policy will enrage many in the agricultural industry, creating a headache for European leaders.

Producers need consistent government support that levels the playing field with fossil fuels.

Developing nations have different concerns, given their lesser reliance on fossil fuels. India and China, with their huge and growing populations, face the most intense pressures on energy supply over the coming decades. China is the world's third largest producer of bioethanol, and provides around US$2 billion in direct subsidies for renewable energy alongside a programme of low-interest loans to support R&D and capital investment by producers, and an ethanol blending target of 10% by 2020. Although India's biofuel industry currently lags behind, the country has set an ambitious target to meet 20% of its diesel demand with plant-derived fuel as early as 2017.

The key problem for both countries is the scale needed to support their vast populations. China is experimenting with a variety of crops, but most of its ethanol is produced from fairly inefficient corn — a reliance that could trip political sensitivities at a time when crop prices are rising. India, on the other hand, is staking its biofuels future on jatropha (*Jatropha curcas)* — an oil-rich, perennial shrub seen by many as a perfect biofuel crop as it can grow in semi-arid or saline areas not suitable for food production. India plans to set aside 140,000 square kilometres for jatropha — more than three times the area of all UK food crops. The success of the country's jatropha policy will depend on where that land is, how productive it turns out to be and what varieties of the crop are used: it is still unclear whether the yield or oil quality will be sufficient for large-scale biofuel production.

Brazil is blessed with vast tracts of arable land in a subtropical climate, and its sugarcane has an energy density several times greater than corn. The military government of the 1970s pushed hard to make the nation energy-independent in the wake of the oil shocks of the period. As a result, Brazil today is a global leader in bioethanol production, second only to the United States. But things have not always run smoothly. Demand for sugar for food consumption competes with sugar for biofuels, a tension that has forced the Brazilian government to take heavy-handed measures: the partially state-owned producer Petrobras is forced to adjust production to prevent upsetting ethanol prices. The Brazilian model has been successful but, with its reliance on government intervention and abundant natural resources, it may not be suitable elsewhere (see 'Lessons from Brazil', page S25).

The International Energy Agency recently claimed that biofuels could meet 27% of global transportation fuel demand by 2050, but for that to happen key economic, political and technological conditions need to be met. Producers need consistent government support that levels the playing field with fossil fuels, with longer-term policies obviously providing greater certainty for investors. Ivancic points out that many of the benefits of moving away from fossil fuels are predominantly public-sector gains: for example energy security, economic development, military flexibility and climate change mitigation. Without economic incentives, she contends, "private industry can't get a return on investment equal to the value of biofuels".

THE HUMAN ELEMENT

Biofuels are ultimately a way to harness energy from the Sun. Unfortunately, many of the sunniest parts of the world are among the poorest, and lack governments able to introduce effective policies or deal with endemic corruption. Without proper regulation, biofuels could perpetuate human rights abuses.

Among producers, opinion is divided on whether the best regulatory approach is global or local. Annegrethe Jakobsen, communications manager for Danish enzyme producer Novozymes, suggests that "the best way to ensure the global sustainability of biofuels is by an ISO standard", that is, a guideline established by the International Organization for Standardization, comprising private and public institutes in over 150 countries. Similarly, the UK-based Nuffield Council on Bioethics advocates a 'Fairtrade' type of scheme, with certification for sustainable producers. Others prefer local solutions. "In an ideal world, countries would develop indigenous laws and regulations that best fit their own economic, environmental and social goals," says Ivancic.

Land-use change for biofuel production is another focal point for debate, both for increased carbon dioxide emissions and for its

potential impact on food prices (see 'Beyond food versus fuel', page S6). Some biofuels will be more sustainable than others, but the current flat-rate subsidies and blend targets tend to promote all biofuels equally, regardless of how environmentally friendly — or otherwise — they might be.

Lehmus advocates legislation that is "technology neutral and feedstock neutral, and that emphasizes the importance of emission reductions and sustainability". Similar concerns are top of the environmental advocates' agenda: Kenneth Richter, biofuels campaigner at Friends of the Earth, calls for policies "that guarantee sustainability and significant carbon savings from biofuels". Many fuels currently fall short; the Nuffield Council on Bioethics claims that only a third of biofuel used in Britain meets any kind of environmental standard, and that current EU policies for transport fuel are "unsuitable and unethical" as they neither protect the environment nor avoid human-rights abuses.

The trouble is, no-one is sure how to measure biofuel impact. The UN Environment Programme called for further research on sustainability in a 2009 report that lists many of the key issues surrounding biofuels and essentially scrawls "citation needed" next to them. Within the industry there are frustrations with existing research: recent US and EU studies on Brazilian ethanol derived emissions values varying from 3.8 g of carbon dioxide per megajoule of fuel energy to 17 g or even 46 g. "It is the same crop and the same country," Jakobsen observes. "Such different results are a clear indicator that the science is not mature."

Policy makers are all too aware of the knowledge gap, and Norman Baker, UK undersecretary of state for transport, recently conceded that "there have been shifts in biofuels policy in the past" and that future policy decisions need to be "robust and stable" to give businesses enough confidence to invest. Hampering these decisions, though, is "scientific uncertainty about the sustainability of biofuels and their wider socioeconomic impacts", said Baker. Until this is resolved, it will be a huge challenge to create policy consistent enough for investors, yet flexible enough to deal with our improving know-ledge.

For consumers, a complex network of subsidies and tariffs has obscured the connection between a fuel's sustainability and its cost. Meanwhile policy makers need better-quality research to draw on so that they can identify suitable, sustainable crops and production methods to support over the longer term and encourage investors. For everyone, better information about the consequences of biofuels use is the key to weaning us off our fossil fuel addiction. ■

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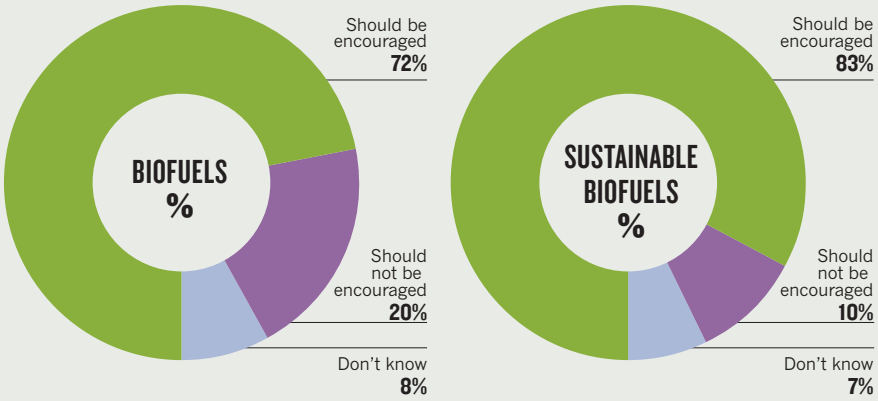
INCENTIVES AND TARGETS

Sustainable biofuels have strong public support, but governments worldwide differ in the financial support they offer and their progress towards meeting targets.

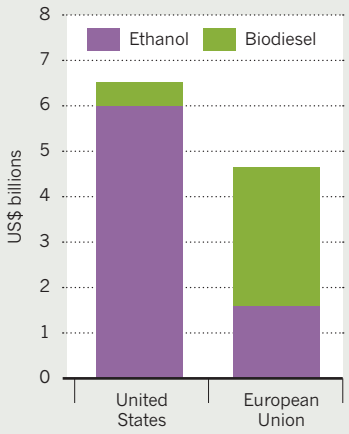
PUBLIC SUPPORT

Biofuels enjoy considerable public support within European Union nations, and sustainable biofuels even more so.



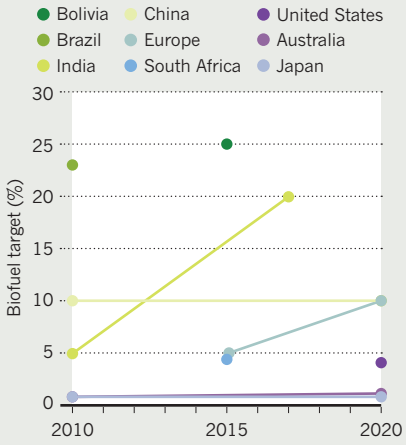
EUROPEAN AND AMERICAN SUBSIDIES

Estimated support for bioethanol and biodiesel in 2006.



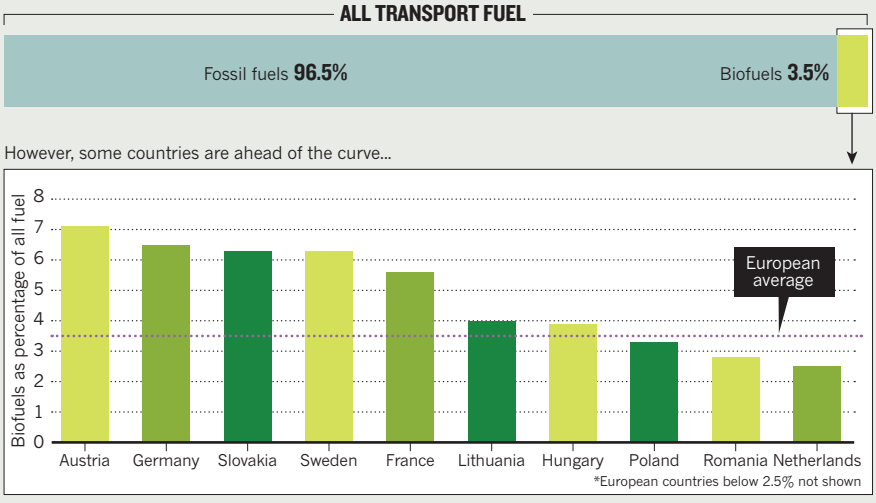
BIOFUEL TARGETS BY NATION

Many of the world's most developed countries have less-ambitious targets for biofuel blending.



EUROPEAN BREAKDOWN

Biofuels represent a small fraction of total transport fuel in Europe.



SOURCES: PIE CHARTS: EUROBAROMETER SURVEY, 2010.SUBSIDIES: GLOBAL SUBSIDIES INITIATIVE TARGETS: VARIOUS, COMPILED BY BIOENERGYWIKI BREAKDOWN: EUROSTAT.