Policy capacity for the transition to a biofuels economy: a comparative study of the EU and USA

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Introduction

The scale of the challenge to the policy capacity of the modern state of decoupling emissions growth from energy consumption in the economy is formidable. Indeed, the scale of the ambition runs counter to several decades of public administration debates and literatures on government overload, the shift from government to governance, the hollowed out state and government failure. The concept of policy capacity is variously defined, and enjoys currency because it encompasses two linked governance concerns; (i) the recognition of increasingly complex interdependence in the international economy imposing limits on traditional government activity, and (ii) a prominent discourse about the development of steering capacity as an essential feature of effective, contemporary governing (Osborne and Gaebler 1992; Dror 2000).

Transport biofuels are an early and influential case of the policy capacity challenge in the transition to low-carbon economies. Notably in standing analytically for the situation where longer term policy goals must be both clearly enunciated and remain viable over time as credible commitments, even though considerable flexibility and adaptability in policy-making is required to reach those far horizon goals under conditions of high technological and market uncertainty. In such terms, policy is an intertemporal choice in which there is capacity for the benefits of a low carbon future to enter current policy processes; because if the pathway to their achievement is uncertain and politically contested in the implementation phase, then those future benefits may be heavily discounted, shortening policy-maker horizons and rendering the overall transition process politically vulnerable.

The first part of the paper presents a review of the recent literature on policy capacity in order to adumbrate five critical dimensions of policy capacity with respect to the challenge of governing the transition to a low carbon economy. The second part sets out liquid transport fuels as an important example of this challenge by providing a comparison of EU and US biofuels policy-making – both design and implementation - over the last decade, drawing on qualitative data from semi-structured interviews recently undertaken with leading policy actors in both jurisdictions.

The third part of the paper locates the EU and US processes on the policy capacity schema set out in part one. It also introduces evidence from thirty years of Brazilian biofuels policy-making as a point of contrast; here policy capacity in biofuels consumption is much more developed. The dimensions of policy capacity offered in the present paper offer a means to identify and analyse key processes in biofuels policy-making in the EU and US, even if they fall short of a valid and reliable measurement of policy capacity. By investigating a policy sector that overlaps agriculture, energy and transport policy fields, this paper is able to offer distinctive public administration insights into the feasibility of environmental policy integration to achieve sustainability goals, widely advocated in the specialised field of environmental studies (e.g. Dovers 2001, 2005; Buhrs 2009).

Policy capacity for the transition to a low carbon economy

The salience of the ambition to build policy capacity is related to Osborne and Gaebler's (1992) oft-invoked view that governments 'steer and do not row' in the contemporary international political economy. Parsons (2004, p.44) develops a nautical version of the steering metaphor, arguing that map-making and navigating are

core elements of the capacity to govern, 'the ability to chart the voyage, plot coordinates, set direction and take a long term view – in short, to navigate.' The academic literature on policy capacity offers subtle definitional variety. An indicative selection includes the ability of governments to make intelligent choices (Painter and Pierre, 2005); to scan the horizon and set strategic directions (Howlett and Lindquist, 2004); the faculty to weigh and assess the implications of policy alternatives (Bakvis, 2000), as well as aptitude in making the effective use of appropriate knowledge in policy-making (Parsons, 2004; Bakvis and Aucoin, 2005).

Davis (2000) makes specific reference to the ability of governments to implement preferred choices of action as well as decide upon them, which introduces the cognate concept of policy co-ordination or coherence which is rooted in the same set of concerns as policy capacity (Di Francesco 2001; Bardach 1998; Rhodes 1997). Parsons (2004) describes this dimension of policy capacity as the 'weaving' function of modern governments, the ability to weave together the multiplicity of organisations and interest to form a coherent policy fabric, which is robust enough to survive the politics of policy implementation.

We extract five specific dimensions from the literature on which to dissect analytically and specify policy capacity in terms of governing a transition to a low carbon economy. These are introduced here and will be employed in part three, in the analysis of the data available in the case of biofuels policy-making.

Value agreement capacity

This dimension refers to the facility of government in reaching agreement about the values that underpin policy. This contributes to policy capacity by enabling governments to introduce significant policy changes without risking societal backlash and electoral defeat. This feature of policy capacity is noted in the advocacy coalitions literature (Sabatier 1987; Sabatier and Jenkins-Smith 1993). However, as contributions in Adger and Jordan (2009) suggest, this may be an unrealistic standard: many areas of the governance of sustainability are marked by conflicting values and sharply divided public attitudes. Here the capacity of policy-makers is better understood in terms of managing the conflicts inevitably arising from the incommensurable values involved in the transition to a low carbon transport fuel mix.

Selection capacity

Following the literature, this dimension is the varying ability of governments to forge authoritative choices which commit relevant governmental and social actors, notably private enterprises in the case of biofuels, to implementing policy alternatives. As the environmental policy literature suggests, the goal of sustainability imposes a set of requirements across a wide set of cognate policy areas. This leaves governments with the challenge of coherent, joined-up policy making in a context where power may be diffuse, political consensus difficult to achieve and implementation requires strong co-ordination between multiple policy and market activities.

Operational capacity

A key proposition emerging from the network governance literature is that open and inclusive policy networks, although fluid in membership and often difficult to institutionalise, actually contribute to effective policymaking because they are able to

absorb complexity and are more resourceful and resilient in delivering outcomes than closed and exclusive networks (see, for example, Bovens *et al.*, 2001, Klijn and Koppenjan 2004). Policy-makers trying to effect a transition to a low carbon economy must deal with political, technological and market uncertainties that require they act within existing sector-specific networks, as well as across different networks that are being linked by novel biofuel policy agendas.

Foresight capacity

The ability of governments to look forward and anticipate is often doubted, and the attribution of myopia brought about by electoral timetables or media cycles is common. However, even amidst pervasive uncertainty, effective policy-making requires a capacity to identify 'known unknowns' in order to map a future path for policy. Foresight is a distinct dimension of policy capacity; for analytical purposes, there is a relevant difference between unconscious and conscious incompetence amongst governments. Understanding the capacity to anticipate potential political as well as private enterprise 'hold up' problems is important independent of evidence of the ability to resolve them.

Reflection capacity

Even if the far policy goal (defined as part of a government's Foresight Capacity) is fixed, Reflection – as a map-reading exercise – requires governments to monitor on an on-going basis where they have come from, where they are going, and how they might get there. This dimension encompasses the faculty for detecting problems with current policy settings (Deutsch (1963), Argyris and Schon (1978)), as well as the ability to learn both cross-nationally and longitudinally in order to respond to

evidence of failings. The capacity of policy-makers to avoid mere 'muddling through' behaviour when faced with existing policies identified as ineffective and/or unpopular (Klein 2009) is an important element of the steering mechanism available to governments. The extent to which the policy-making system as a whole has access to, and can utilise, institutions that allow current policies to be critically examined, to look back to recover historical lessons and scan the international horizon for alternative policy change options is constitutive of policy capacity.

Strategies governing the transition to a biofuels economy in the EU and US

In both the EU and US, biofuels policy over the last decade represents the transformation of a relatively minor, niche aspect of energy policy into a central, economy-wide plank of future energy strategy in the transport sector. Despite their dissimilarities as political systems and the dissimilar constellation of political interests in sustainability policy, both jurisdictions arrived at a shared objective, at roughly the same time, of promoting a dramatic increase in the production and consumption of biofuels in the liquid transport fuel market. This section compares the processes of policy design in both jurisdictions that lead to this common objective; as well as their experiences in policy implementation, including the processes of error adaptation, learning, new political alliance formations, as well as shifts in the broader policy environment which have all contributed to test the policy capacity of the EU and US in the implementation of biofuels policy.

Policy Design

The salient episodes in the two biofuels policy processes under scrutiny are the enactment of the US 2007 *Energy Independence and Security Act* (EISA) and the

EU's 2009 *Renewable Energy Directive* (RED), the latter being part of a 'climate and energy package' consisting of several Directives. Each of these two pieces of legislation builds on earlier policy initiatives reaching back to the 1970s in both jurisdictions and various responses to the extreme oil and commodity price volatility of that decade. However, for the subsequent twenty or so years, biofuels remained a niche concern in US and EU energy policy. It is the ambition to increase biofuels consumption in the US after the *Energy Policy Act* 2005 and in the EU with the 2003 *Biofuels Directive* that act as the proximate bases for the 2007 and 2009 policy adoptions.

Both EISA and RED impose mandates for the use of renewable fuels in transport well above current domestic production levels and above the levels set down in the earlier legislation. Moreover, to help delivery of policy goals both turned to mandates rather than rely on the ultimately-ineffective voluntary biofuel usage targets of the earlier legislation. The EISA and RED also involve – in implementation – the development of sustainability criteria that need to be met before supplies can be counted as contributing towards the mandated figure. These mandates represent a significant part of expected liquid transport fuel consumption (most of the 10% renewable target in the EU by 2020, and 36 billion gallons in the US by 2022, which could equate to 20-25% of liquid transport fuel consumption).

In the US policy design, this 36 billion gallon mandate is divided explicitly between different types of biofuel. 21 billion gallons are mandated to come from advanced biofuels (capable of delivering at least a 50% reduction in GHG emissions, as opposed to 20% for conventional (eg corn-based) ethanol. Of those 21 billion gallons,

at least 16 billion must come from cellulosic biofuels; and at least 1 billion must come from biomass-based diesel. The remaining 15 billion gallons can come from either conventional or advanced ethanol.

The general energy policy ambition to reduce reliance on oil has particular resonance in the transport sector, and is one of the reasons why biofuels attract attention as an early policy step towards a more sustainable economy. In both the US and EU it is forecast to be a major source of future carbon emissions increases. Currently, the US transport sector accounts for around a third of total energy demand in the US and oil provides upwards of 95% of energy consumed in the sector. As for the EU, according to Kavalov (2004) transport, at that time, represented 50% of energy consumption imports, but this could rise to 70% by 2030. Transport also represented 32% of all energy consumed, 98% of which was oil-based (equivalent to 67% of EU final oil demand). Transport generated 28% of EU CO2 emissions, but is expected to be the source of 90% of the projected increase in CO2 emissions.

Our primary research suggests multiple reasons were active in binding different advocacy coalitions together in favour of a policy to expand biofuels production; however, these differing reasons implied quite different *types* of biofuels policy. This ambiguity in policy objectives was accommodated by adopting a policy design in which there was a demarcation between first generation and advanced biofuels; in essence, both the US and EU introduced two different types of policy to satisfy the incommensurable values in the policy process. This distinction between first generation and advanced biofuels is explicit in the US mandate, as noted above. In the EU advanced biofuels count double towards the usage mandate, but the role foreseen

for advanced biofuels is more implicit. That said, our primary research revealed a range of projects aimed at developing and bringing to market advanced biofuels, albeit without specific target dates or roles within the biofuels mandate.

Policy implementation

Although designed to promote domestic policy objectives, the biofuels policy environment has attracted the attention of non-domestic political actors in the implementation phase: international institutions like the OECD, international research institutes such as IFPRI with a focus on trade and development, and advocacy groups of non-state actors organised cross-nationally. This was manifest in the politics around the world food price spike in 2008 – and the resulting international opposition to biofuels – which came as biofuels production was accelerating (total world production of BF trebled 2000 and 2007).

There were also specific market factors for expanding ethanol demand, related to MTBE Methyl Tertiary Butyl Ether (MTBE).[1] It is also worth noting that this take-off followed a period of oil price rises: from the start of 2003 to the middle of 2006, crude oil prices rose by 2.5 times, falling back to (just) double January 2003 levels at the start of 2007, rising to 4.5 times January 2003 levels by the middle of 2008. The higher the price of oil, the more likely biofuels are to be cost competitive, even

[1] MTBE and ethanol were both used as oxygenates in gasoline. The 1990 amendments to the US Clean Air Act mandated the use of oxygenates in areas with high air pollution levels. Growing concerns over groundwater pollution by MTBE led, in 2005, to the removal of MTBE liability protection and the removal of the obligation to include oxygenates in gasoline. Interviews revealed that, given this latter policy change and partly in response to lobbying from the corn and ethanol sectors, the Energy Policy Act introduced the Renewable Fuel Standard as a way to maintain policy support for ethanol.

without subsidies. It is estimated that Brazilian sugarcane ethanol can compete with a crude oil price of around $45 a barrel. With corn ethanol, a corn price of $2 a bushel is competitive with oil at around $50-60 a barrel, although if the corn price rises to $4, oil would have to be closer to $120 for ethanol producers to be able to buy the corn and still break even on their ethanol.

The international scrutiny of biofuels policies is related to their entanglement with many different societal values (energy, the environment, economic development, agriculture, and trade). The unprecedented media scrutiny over the first seven months of 2008 to the role of biofuels in the global South's food security crisis brought international attention to biofuels policy in the US and EU; and shaped the implementation politics by directing attention to the impact of biofuel production on food security and the heightened incentives to convert lands in the developing south to biofuels production. This sits alongside environmental sustainability, with various attempts (from both inside and outside of government) to model the net energy benefit of biofuels over their life cycle versus conventional fossil fuels, including the direct and indirect land use impacts of biofuels on GHG emissions (see, for example, Searchinger et al. 2008; Bouët et al. 2010; Edwards et al. 2010, the last comparing multiple models and their results).

Although these models are subject to controversy, their impact is to suggest to policy-makers that greater environmental gains will come from advanced biofuels whose GHG savings are larger, and which avoid the food-fuel trade-off. This reinforces the panaceaic properties assigned to advanced biofuels; they perform the function of separating incommensurable values in the policy process and assuaging opposition to

biofuels by promising that any harmful effects will be dissipated by technological change in the advanced biofuels policy. This is an important element in the deliberate tolerance of ambiguity of policy goals, in combination with the conscious design of market and technological uncertainty into the policy process.

Reflecting at this point on Brazilian ethanol policy, one significant point of difference is the absence of production or consumption mandates, other than the setting of a blending percentage for ethanol in gasoline. The programme of liberalisation through the 1990s which embedded a free-market philosophy in Brazil, the cost competitiveness of Brazilian sugarcane-based ethanol against gasoline, and the maturity of the domestic ethanol market, are all likely factors precluding or obviating the use of mandates as deployed by the EU and US.

That said, a market development in Brazil that, coincidentally, also happened in 2003, was crucial: The introduction of flex-fuel vehicles (FFVs). These can be fuelled using any combination of gasoline and E100 a driver chooses. Economic liberalisation removed sugarcane production quotas, a move which resulted in an expansion in sugarcane production sufficient to produce greater quantities of sugar and ethanol. On the demand side, FFVs boosted ethanol use *per se*. In a liberalised marketplace, both supply and demand of ethanol respond to market signals, such as ethanol prices relative to sugar prices (on the supply side) and oil prices (on the demand side). There are variations in taxes on different types of fuel and in different states, but demand and supply of ethanol in Brazil are essentially subject to market forces.

It is important to contrast this with the situation of Brazil's emergent biodiesel market. Here, whilst the market remains essentially free, it is underpinned by a series of measures designed to help it establish. In this regard, there are some similarities with US and EU markets and policy. A gradually-rising blend percentage is specified on the demand side, in the context of a country where demand for diesel is expected to double in ten years. This is further underpinned by biodiesel auctions. On the supply side, a system of contracts is enforced to ensure the biodiesel blenders obtain a quantity of biodiesel feedstocks from small producers at terms conducive to delivering the social goals the Brazilian government has set for the policy. Thus, in Brazil, minimum prices are enforced to deliver social goals on the supply side, rather than using delivery mandates, subsidies or tax breaks to stimulate demand.

Assessment of policy capacity in the transition to a biofuels economy

Value agreement capacity

The development of biofuels policies in the EU and US has been underpinned by reference to common factors, albeit with varying emphasis reflecting different domestic political constituencies. The three dominant factors have been energy security, climate change mitigation and rural development. In the US, the greatest emphasis has been given to energy security. In practice this means reduced imports of Middle Eastern oil (noting also the tariffs on imported biofuels). This has had particular resonance in the context of 9/11 and the subsequent military engagements in Afghanistan and Iraq. EU policy has referenced energy security but, with limited domestic production capacity relative to longer term mandates, the emphasis has been more on diversifying imports, in terms of both fuels and source countries.

US policy has referenced climate change mitigation, for example in later State of the Union Addresses given by President Bush Jr. In the EU, however, this has had greater emphasis, especially with the role the EU has given itself as a global leader in climate change politics and policies (see, *inter alia*, Oberthür and Pallemaerts, 2010; Wurzel and Connelly 2010). Rural development has also played a notable, but arguably a subordinate, role in the EU and US. That said, related to the greater domestic production potential of biofuels feedstocks in the US, there has been relatively more emphasis placed on biofuels as an aspect of agricultural policy than in the EU.

The political tensions inherent in the value conflict between rural development, energy security and climate change mitigation have been exacerbated by a commercial environment characterised by market uncertainty (price of oil, commodity prices) alongside extreme technological uncertainty about the blend wall for first generation ethanol (in the US) and the feasibility of industrial scale production of advanced biofuels (in the US and EU).

Thacher and Rein (2004) provide a typology of practical solutions to managing value conflicts in policy-making (see also Stewart 2009); the US and EU biofuels cases reveal a novel variant of the structural separation or firewalling strategy, where value conflict is mitigated through organisational design: different public organisations involved in a policy are guardians of different values. In the biofuel cases, the novelty exists in policy designed to separate conflicting values intertemporally. In both the US and EU, there are short to medium term goals of increasing the production of first generation (1G) biofuels, alongside longer term goals for advanced biofuels production.

Politically, the advanced biofuels policy element functions as a superordinate policy goal to describe the overall direction of travel. This helps to persuade those concerned with values of food security and ecological sustainability to tolerate large increases in first generation biofuel production – which use known agricultural feedstocks, with associated land use changes and food production effects – as a necessary bridging step to an advanced biofuels economy. Reflecting this intertemporal aspect of policy, mandates increase certainty for those investing in advanced biofuels technologies; but also seek to commit future policy-makers to the values (and policies) determined in the present.

The two-part policy design enacted in both jurisdictions has had to evolve in implementation due to endogenous tensions associated with technological and market uncertainties, as well as, since 2008, significant shifts in the broader policy environment. Neither the EU nor the US have solved the problem of reconciling the ambiguity of policy values by the 1G/advanced biofuels design separation. The novel requirements of environmental sustainability have begun to enter into the 1G policy debate rather than being confined to the advanced biofuels element, expressed for example in concerns around the net energy benefits of biofuels on a life cycle analysis accounting for direct and indirect land use changes (DLUC and ILUC). Relatedly, pressures grew on policy-makers and pro-biofuels advocacy coalitions from rising food prices in 2008, precipitating the emergence of large scale international opposition to biofuels production, as well as a strong ‘food before fuel’ campaign in the US.

The key design feature of policy in both jurisdictions in accommodating ambiguity in policy goals, through a sequence of temporal targets to guide the transition to mass biofuels consumption, alongside profound market and technological uncertainties about the feasibility of the targets, has set the conditions for implementation politics. In both jurisdictions the demand side policy was enacted *without* coordination with supply availability, import security concerns, sustainability concerns and *with* substantial hope invested in the development of an industrial-scale, commercially viable advanced biofuels industry. Furthermore, in the implementation phase land use change requirements and the demands of WTO rule compliance have entered the policy process but without their potential constraint on policy being institutionalised.

Selection Capacity

Recent work by Patashnik (2008) on the political dynamics of major reforms offers insights into the factors which explain why some reforms stick and others are unpicked. In particular, reforms that endure through the implementation process typically destroy an existing policy subsystem and reconfigure the political dynamics. This insight is highly relevant to the ability to commit societal actors to a policy direction, or selection capacity in our terms. Biofuels is a new policy domain in the EU and the US (at least in terms of its political salience), and overlaps with several existing policy domains with their own particular networks and legacies. The policy capacity challenge is to be able to reorganise these in the direction of achieving long term mandates for biofuels use.

The conflict between interests/actors in the biofuels processes under scrutiny were not resolved in a single policy act, but rather have continued beyond adoption or

enactment. The two-part biofuel policy design (1G/advanced) enacted in both the US and the EU was a strategic move to commit to - or 'select' - a path in a dynamic policy system rather than a one-off choice in some classic textbook way. The promise or foreshadowing of a radically changed policy environment, notably a mass market and international industry in biofuels, has provided policy logic in the system, and favours some interests or values over others. Nevertheless, this selection has not determined uniquely the subsequent policy path, which instead remains open and contingent to shifts in policy preferences which arise from political competition.

There are important intertemporal dimensions in both jurisdictions in terms of selection capacity. The strategy has been to agree policy objectives in the short term, and accommodate different and conflicting values involved in biofuels expansion by legislating guides to future policy change in the advanced biofuels sector. This adoption of two separate types of biofuels policy has precipitated a distinctive implementation situation. There is a superordinate goal of a substantial biofuel component in the liquid transport fuel market but there is no explicit policy guidance over the sources of future advanced biofuels, only complementary superordinate constraints such as sustainability criteria, discussed below. Uncertainty over what industry actors are willing and able to deliver raises the question of whether, and how, this acts as a constraint on the evolution of policy, in which actors are committed to a certain policy direction?

The early 2000s marked a profound watershed in US ethanol policies. Following the 9/11 terrorist attacks President Bush, in every subsequent State of the Union Address, referred to the need for the US to reduce its dependence on imported oil. The 2005

Energy Policy Act, partly in response to changes in the policy on oxygenates in gasoline, introduced the RFS to create a (voluntary) usage target for ethanol. This was followed, just two years later, by a shift to usage mandates in the EISA, introduced via RFS2.

In the EU, 2001 saw the publication of proposals for what would become the 2003 Biofuels Directive. This had complex roots in ongoing policy discourses on sustainable development, the Lisbon Strategy and the embedding of environmental considerations into a range of common EU policies. As with the US, initial voluntary biofuels usage targets were replaced soon after (2009 in the case of the EU) with mandated usage targets. In both jurisdictions, the mandates represented a significant increase in the targets over the previous voluntary targets; but for a policy to be delivered over a longer timeframe. Mandates, as already noted, help increase investor certainty and seek to bind future policy-makers. This would be consistent with Parsons' notion of 'weaving', discussed above. It also creates increasing returns pressures in path-dependent policy processes.

This is highly pertinent to the biofuels case, as our analysis of the data shows that reformers' attention has waned in the US (for example, key individuals in the Senate – Daschle, Dole and Grassley – are gone or less influential) and in the EU, that the initial spirit of the reforms that held the reform coalition together has been contested by novel, unanticipated concerns in the implementation process. Notably, both the US and EU cases reveal that the discourse of sustainability, far from helping to integrate various policy objectives in the implementation phase in a common concern, can (i) add complexity to initial policy design, and increase the number of objectives,

interests and players in policy implementation; (ii) be used as a key resource by institutionally-embedded actors in existing policy legacies to protect their autonomy against the ambitions for a coordinated implementation of the initial policy design.

Of course policy is always made under conditions of uncertainty, but the degree of market uncertainty and technological uncertainty that attends biofuels policy is central to selection capacity. For example, ethanol in the US is a valid outlet for some of the 'awful lot of corn' produced there, whilst ethanol and biodiesel are valid outlets for EU agricultural production, in the context of a decoupled CAP. These are 'market' reasons for this use of US/EU feedstocks that exist independently of 'policy' reasons. Policy is being implemented in conditions where various agricultural commodity markets are volatile, oil prices likewise, competition domestically and internationally is variable, in the context of a credit crunch for capital. Thus in trying to create appropriate incentives for a new biofuels industry, policy settings are not the only relevant factor (nor indeed perhaps the dominant factor).

Operational capacity

The design of biofuels policy in both jurisdictions requires flexibility and adaptation in operation, to ensure success in meeting the 10 year and longer targets. In the US, 1G ethanol is restricted by the blend wall. Advanced biofuels are limited by the lack of domestic commercial production – although that target could be met through imports of, for example, Brazilian sugarcane-based ethanol. Currently, the policy response to the blend wall is to seek agreement on raising the ethanol blend percentage in gasoline; whilst, for advanced biofuels, the current response is for the EPA simply to reduce the annual targets in RFS2, in line with estimated production

each year. There are already several million FFVs on the road in the US, but interviews indicate this is in response to tax breaks and thus lower purchase prices; meanwhile availability of E85 remains limited and relatively localised.

The EU mandate target of 10% of transport fuel from renewables in 2020 is somewhat more modest than the US target, perhaps half of the US figure, based on current projections for US gasoline demand for 2022 (although the environmental impact may offset this, given the greater GHG emissions reductions demanded in EU policy). Given also that the mandate does not distinguish between ethanol and biodiesel, offering both flexibility in delivery and reducing potential ethanol blend wall concerns, the EU target appears, currently, to be more achievable. Countries' progress towards their individual targets, however, remains mixed at this stage (European Commission, 2011).

Given the current status of debate in the US over the blend wall, a significant exportable surplus of ethanol is emerging from what was intended primarily as a domestic policy. Furthermore, whilst the policy specification of advanced biofuels includes Brazilian sugarcane ethanol, Brazil has recently become an ethanol importer, given cane production levels and price developments on the sugar market. In the EU, however, domestic production potential has meant its mandate would always require imports. Despite this, neither Brazil nor the US policy pursues production explicitly for export: both simply export such quantities as may be available. It is beyond the scope of the present paper to analyse market developments in other countries where production may have been promoted specifically for export to the EU. At the time EU

policy was being developed, however, the understanding that imports would be needed was not matched by knowledge of where those imports were to come from.

Beyond trade concerns, we consider also the extent to which domestic biofuels policies are influenced by transnational politics. Our data on the scope of the networks in which the EU and US are actively involved casts doubt on the extent to which domestic biofuels policies are immutably subject to the influence of transnational politics (cf. Skogstad 2010). The principal inter-governmental biofuel body is the Global Bioenergy Partnership (GBEP). Interview data reveal very little transnational political impact on domestic policies in this forum. Instead, for example, it provides a forum for countries to 'learn about' each other's jurisdictions, policies, the repertoires of instruments and methods, rather than representing epistemic communities in a Haas (1992) sense. The domestic politics are so competitive it seems that this 'soft' power is attenuated and does not redistribute existing power in the policy system.

A notable difference between US and EU experience does arise, however, as a result of the different trade needs arising out of their domestic biofuel usage mandates. Our interview data from policy-makers in the US reveals very little evidence of a direct transmission belt from the ideas, strategies and activities of transnational political actors to domestic politics. In contrast EU policy, with its need for imports, has had to face a series of significant transnational issues. Given GHG emissions reductions is a central part of EU policy, there is a need to ensure the production of all biofuels feedstocks contributing to biofuels consumed in the EU avoids conflict with this goal. As a result, a system of policy measures is having to be developed regarding the

production conditions of feedstocks, whilst remaining consistent with WTO rules on trade barriers.

There is strong evidence that EU sustainability criteria have been developed with WTO rules expressly in mind. Moreover, transnational political engagement is expressly part of the guidance offered to countries in the WTO Technical Barriers to Trade Agreement (TBTA) when developing such criteria (Ackrill and Kay, 2011). Prior to drawing up legislative proposals for the sustainability criteria, a consultation process was held to which anybody, including third country governments, could contribute. Consultation also involved engagement over the certification process for producers that could ensure approved sources delivered feedstocks – and thus, ultimately, fuel suppliers could deliver transport fuel – that conformed with those sustainability criteria.

There are various national and international Roundtables, in which a variety of economic and civil society actors work together in defining what sustainable biofuels are or should be, what could/should private actors do to move in that direction, and how this can be certified and verified (Verdonk et al. 2007, Mol 2010, van den Hombergh 2008). Direct engagement between governments and Roundtables is key where the practical requirement of aligning certification schemes of the latter with importer government standards sets the biofuels trade policy agenda.

For example Bonsucro (formerly the Better Sugarcane Initiative) developed a general sugarcane production-standard, to which was added a small number of additional elements when developing an EU-compliant standard. Moreover, the Roundtables'

certification function helps promote sustainability production independent of biofuels concerns. Products such as palm oil certified by the Roundtable on Sustainable Palm Oil (RSPO) are gaining market credibility in the eyes of industrial buyers and, ultimately, final consumers. This is helping spread the use of RSPO certification procedures globally.

The differences between EU and US engagement with such transnational actors reflect the different trade implications of biofuels mandates. In Brazil, meanwhile, the government's position has been to engage with the EU during the process establishing legislation on sustainability criteria. It has avowedly not, however, supported or promoted domestic producers' involvement with certification schemes. It has remained neutral, a position from which (interview data reveal) it can best monitor policy implementation to ensure WTO-compliance in the policy-enactment phase.

Overall, therefore, we have found evidence of transnational political networking activity by policy-makers, but in political terms the influence of this work is attenuated, certainly relative to domestic networks and their impact on domestic policies. Identifying a lack of operating capacity at the transnational scale, particularly in political terms in the form of inter-governmental influence, is an important finding.

One interpretation is that at the present stage of the development of biofuels policy, the construction of domestic operating capacity is of paramount importance. Moreover we may assume that, *a priori*, this is less challenging politically than constructing operational capacity on a transnational scale. As noted earlier Value

Agreement was undertaken by means of emphasising aspects of biofuels policy to which domestic constituencies would be most receptive.

Another important aspect of governments' operational capacity is the ability to respond to changes in market conditions. Expansion of trade, changes in the direction of trade flows, and concerns over sustainability, all raise the possibility that domestic policies could be affected in increasing ways by transnational politics. The question then becomes how those transnational factors might influence domestic policy change and, thus, domestic policy-makers' capacity to accommodate and deliver such change (this also embraces Reflection Capacity, considered below). For example, were a certification scheme to gain a global foothold that was inconsistent with an importer's sustainable production standard, network effects around the adoption of such a standard in different markets may potentially be sufficiently powerful that importers may just have to submit to the private sector standard: public governance may, in some cases, have to adapt to developments in private governance.

In considering the co-ordinating mechanisms to implement the policy in each jurisdiction and how this has left both policy areas susceptible to fragmentation through sustainability concerns (which, in turn, have different meanings and scope in the EU and US), the initial policy design is brought into analytical focus. This included various policy objectives – implicitly and explicitly – such as rural development, energy security, and GHG emissions reduction that were managed intertemporally. This strategy required the bridge between the two stages, of 1G and advanced biofuels, to be credible for co-ordinated implementation. Without this, spillovers between the different temporal dimensions of the policy may arise and

values conflict as their incidence is distributed among different policy legacies that might have an interest in biofuels policy.

It may be self-evident to assert that the lack of co-ordination in policy design is positively related to lack of co-ordination in policy implementation. Yet this truism sits at the heart of the implementation dilemma for both the US and the EU: the need to remain credible about long term goals alongside ambiguity about the reasons for those goals and necessary uncertainty about the steps to their achievement.

One policy issue that has been used by opponents of biofuels to challenge the policy goals, that raises questions about the internal consistency of domestic biofuels policies, and has exposed significant differences of opinion in different countries, is Indirect Land Use Change (ILUC). The increased global demand for biofuels results in an expansion of croplands used to produce the feedstocks for ethanol or biodiesel production. As farmers worldwide respond to this, pristine lands are cleared and converted to new cropland to replace the crops for feed and food that were elsewhere diverted to biofuels production. Because natural lands, such as rainforests and grasslands, store and sequester carbon in their soil and biomass as plants grow each year, clearance of wilderness for new farmland (locally or globally) translates as a net increase in greenhouse gas emissions. ILUC is thus the unintended consequence of biofuels demand on the GHG balance of a biofuel.

As several interviewees noted, in its causal complexity ILUC is difficult to imagine, never mind measure. This complexity renders observation and direct measurement *de facto* impossible. Modelling is the only feasible approach, although determining the

accuracy of such estimates is constrained by limited understanding of ILUCs causal complexity, whilst the absence of directly-observed ILUC effects means inevitably the real-world accuracy of ILUC cannot be determined. This shows how policy-making within the discourse of sustainability is never a settled process because of its expansive quality; different and novel dimensions constantly emerge, compared to something more limited (but nonetheless grand) like GHG reduction, whilst understanding and modelling capacity of these aspects continues to develop.

Foresight Capacity

To adapt a distinction in March (1978), policy-making always takes place in an environment of uncertainty about the consequences of action, but importantly also in an environment in which there is uncertainty about future preferences. What the study of policy, over many decades, has contributed clearly is that the assumption that policy preferences are stable over time, consistent, and exogenous to policy actions and their effects is not helpful in modelling the policy process. Instead preferences are often vague, unstable and inconsistent.

With both the EISA and RED, there are explicit biofuels mandates (plus other targets, such as the US CAFÉ target for increasing average car fleet fuel efficiency). The EISA also contains explicit targets for the improved energy efficiency of Federal car fleets, as well as support for research into new technologies such as electric cars, advanced biofuels etc. In the EU, these measures are not contained in the RED, but support is provided via a range of thematic research programmes. In addition, there are other policy measures that are less explicit, yet continue to move energy usage and climate-change mitigation measures in a particular direction. This latter feature is not

only a direct legislative effort, but also represents a contribution to a wider political discourse on energy and climate issues that continues to be contested.

Although the present paper is focused primarily on transport biofuels, it is important to note that both US and EU biofuels policies exists in a wider energy and climate context. That said, one difference is the nature of targets in those other policy areas. In the EU, the 20-20-20 targets represent targets for GHG emissions reductions, renewable energy in the EU energy mix, and a reduction in overall EU energy usage; of which heat and power are important contributors. In the US, however, the Senate removed a House plan to require that, by 2020, electricity utilities delivered a minimum 15% of electricity derived from renewable sources, with up to 4 percentage points able to come from efficiency savings (Sissine, 2007: 2).

In the EU, the institutional structure allows the European Commission, not subject to electoral cycles, to engage in more challenging 'blue-sky' policy thinking. It is already, for example, undertaking discussions about possible goals for energy policy by 2050.[2] However even if, in policy terms, the EU is working towards more challenging targets, and even if the discussions of policy in 2050 are not fully delivered, in both jurisdictions the legislation and the surrounding discussion are seeking to take policy in a certain direction. Even if it is two steps forwards, one step back, as the House/Senate disagreement over renewable electricity illustrated, that is still a net step forwards.

[2] http://ec.europa.eu/energy/strategies/2011/roadmap_2050_en.htm (accessed 5 July 2011).

A further aspect of Foresight, as evidenced in EU policy, is manifest in an iterative approach to policy-making. The RED established EU biofuels policy with a usage mandate, but it was only in 2010 that the detailed sustainability criteria, referenced in the RED, were first published. Over a year later and discussions over ILUC continue. Interviews revealed sustainability criteria and ILUC were known about prior to agreement over the RED in 2009. This iterative approach to legislation may reflect Foresight in that the European Commission, in drawing up the proposed legislation, were aware of where the policy needed to get to, but also may have been aware of the political barriers they faced. Thus, rather than present risk averse policy-makers with a proposal that reached the end-point in one go, they chose instead to present the legislation a bit at a time, using 'salami tactics' (Zahariadis 2003:15).

Reflection Capacity

Given the problems facing policy-makers, outlined at the start of the previous sub-section, there is then the question of the ability of policy-makers to reflect on policies as implemented. Can inconsistencies between policy-as-designed and policy-as-implemented be identified and corrected? Can lessons be learned from past experiences and/or from experiences in other countries? In terms of the biofuels cases, it is the credibility of government's commitment to longer term targets for biofuels use which lies at the heart of implementation politics; changes may be needed in order to maintain forward movement in the general direction of broad goals, even if they are implicit and unquantified. This requires a capacity for forward-looking Reflection.

Our data reveal that the feedback processes from policy design to subsequent policy changes are not straightforward; they are an uncertain and volatile mixture of positive

and negative. There is evidence of policy layering [***add refs***] in design; for example, biofuels policy clearly overlaps with, though it is much broader in scope than, the agricultural policy domain as it increases biomass demand i.e. for certain commodities as feedstocks, also ethanol production/refining generally in rural areas (most biofuel feedstocks are bulk-losing commodities).

But policy layering in design needs to be complemented by analysis of its consequences in implementation. In particular, the interaction between different legacies and new interests can be observed in the lack of institutionalisation and co-ordination between the two parts of the design in the implementation phase. The biofuels cases are suggestive of the particular difficulties of joining up government in the new governance of sustainability. The two part policy designs that were enacted in the US and the EU immediately introduced a number of bureaucratic players in implementation. In the EU several Commission Directorates-General were involved: ENER, MOVE, ENV, CLIM and AGRI; in the US there was DoE, USDA, EPA and State – let alone the other stakeholders and interested actors involved in implementing policy. Furthermore, as noted, the emergence of new international organisations, such as GBEP, provide a forum for discussion between the major players in a more constructive and progressive manner than the traditional international intergovernmental organisation. Internally, however, the biofuels cases have revealed old interests have still been influential. With the RED, ENER held the pen; whilst in the US, RFS2 was driven through by the Senate.

In both the EU and US, despite the use of policy mandates, we observe a biofuel policy bifurcation between an increasingly path-dependent 1G component and a still

incoherent, uncertain and contested advanced component. In terms of technological uncertainty and policy implementation, the biofuels policy case is affected by uncertainty about parameters within existing technologies (e.g. blend walls, and viability of existing liquid transportation fuel infrastructure) as well as uncertainty about technological paradigm shifts to advanced biofuels. The potential consequences of this latter shift – something anticipated in existing policy design – for biofuels policy-making is so profound as to make its prospect something that adversely affects the institutionalisation of advanced biofuels policy; whilst the technological certainty of existing 1G biofuels production means that this element of US policy is relatively more joined up.

The US corn-ethanol target for 2015 is likely to be met, without imports or adverse effects on domestic food prices, and with perhaps insignificant disruption to existing fuel distribution infrastructure (BUT only if the widely anticipated permission for E15 by the EPA is forthcoming –which seemed to be expected around DC). But the growth in the biofuels market up to 2022 is designed to be in advanced biofuels. In the US, the different mandates in a sense represent different biofuels policies. So for the technological change hypothesis: 1G biofuels policy, less technological uncertainty and you get more co-ordinated policy. But even here, the E10/E12/E15 blend wall debate is uncertain. Without an increase in the blend percentage, it seems unlikely even the ring-fenced 15 billion gallons of 1G ethanol can enter the market, as vehicle miles travelled has been falling and are projected to fall further, whilst CAFÉ ensures average fuel efficiency continues to rise.

If the authorities are this uncertain about existing technologies when they make policy related to 1G, what does that say about policies related to advanced biofuels? It is in the space for these and the huge mandates for a domestic industry not yet working (because technology is uncertain) that the co-ordination problems are greater. Of course, the co-ordination problems may well be fundamentally technical in nature rather than policy/political; but the concern of this paper is how technological uncertainty is related to policy coordination in implementation.

One manifestation of inbuilt Reflection Capacity in US policy is the power, granted to the EPA, to amend the annual usage target for advanced biofuels should supply fall short in any year. The EPAs recourse to this facility and the extent of the shortfall so far demonstrates the extent of the bifurcation in US policy. It also, paradoxically, serves to highlight the incoherence and uncertainty in a policy that, unlike in the EU, sought to split explicitly the mandate into (known) 1G and (uncertain) advanced biofuel components. There is less evidence of the bifurcated policy design inhibiting co-ordinated implementation in EU policy because the RED is part of a climate change package that includes, for example, the FQD and, across a range of pieces of legislation, provides mandates, targets, etc. Moreover, there is no distinction in the EU biofuels mandate between 1G and advanced biofuels (although the latter counts double towards the mandates). This is consistent with the hypothesis that coherence of design and co-ordination of implementation are positively related.

In the EU, the whole context of domestic production of biofuels means imports are more inevitable than in the US, whilst locating biofuels firmly in the climate change agenda has decoupled biofuels policy from agricultural policy. This meant there was

less policy layering and the problems which that might pose for co-ordination in implementation, as the tense relationship between different layers prevents the emergence or design of institutions. In the US, however, we suggest that the greater production of (surplus) corn, etc, has led to a policy that, whilst not an 'agricultural' policy, has deep roots in the traditional agriculture silo (as noted earlier, for example with the RFS being motivated partly by pressure to preserve biofuels as a market outlet for corn). Furthermore, if the primary goal is diversifying energy supply away from imported fossil fuels and unfriendly regimes, that is something that can be delivered by agriculture, via biofuels. It is interesting how, in order to get Republican congressional support for pro-biofuels measures, more assistance was provided for offshore oil drilling.

Conclusion

In the implementation phase of BF policy, ILUC sustainability concerns and food security issues (exogenous to policy designs in both jurisdictions) have pushed both US and EU policy in a convergent direction. We are cautious of this analysis, as the paper simultaneously argues that both jurisdictions are wrestling with the difficulty of co-ordination and struggling for clear direction in implementation; thus making the detection of any policy trajectory hazardous. Nevertheless, the intriguing point remains that the EU debates have always been located in a wider climate change (c.f. US) strategy; right back in the policy design phase. This is an important starting difference between the two cases. Indeed, we can go further and see separate policy frames at the design phase in US and EU in terms of deeper cultural values: EU desire to be 'green' diplomatic leader in the world during the time of the Bush administration and the assertion of deep and distinctive 'European' values; as does the

energy security concern in the US tapping into older notions of isolationism and self-reliance. Yet, the continued contestation of biofuel policy in the implementation phase in both US and EU especially during 2008 can be observed in increasingly common problems of policy co-ordination, particularly in managing the 'bridge' between the two types of biofuel policy, with attendant consequences for politics of implementation. The policy agendas in implementation look more similar in 2010 than they did in policy design phase 2006/7. For example, the tripod exists now in policy narratives in the US as well as the EU. There is convergence and coherence around those elements as regards 1G biofuel policy. Moreover, as our interview data from Brussels reveals – if someone challenges biofuels with reference to one leg of the tripod, the defence can be made that biofuels deliver the other two.

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