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EU biofuels targets: Evidence-based policy as iterative learning

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In recent years, certain attempts to promote sustainable transport have fallen victim to the impact of ‘unintended consequences’ on decision-making and policy outcomes. The pressure that EU biofuel targets place on global food production, and the role they play in facilitating deforestation, are well-known examples. This article highlights how policymakers’ failure to consider evidence relating to the potential impacts of biofuel mandates in the early 2000s led to a host of complex problems developing over subsequent years. Drawing on the concept of problem ‘framing’, the article then examines the extent of policy learning that has taken place since the Biofuels Directive was implemented in 2003. While acknowledging that not all eventualities can be prepared for, the article highlights the importance of enhanced communication and collaboration across different levels and departments of government in policymaking processes as a means of promoting learning, especially when dealing with complex cross-cutting and international social, environmental and economic problems.

Keywords: biofuels, environmental policy, framing, indirect land-use change, policy learning, sustainability

The rise (and fall) of biofuels in Europe

The need to decarbonise the road transport system has become clearer over the past 20 years, and policy responses have emerged at different levels to try and mitigate the climate impacts of what is an almost exclusively oil-dependent sector. Crop-derived or ‘bio’ fuels gained much attention from the mid-1990s as one of the forerunning solutions to this problem, not least because their use does not require the road transport system to undergo significant or radical transformations. While significant policy measures designed to stimulate the increased use of biofuels as substitutes for petrol and diesel have therefore been introduced on both sides of the Atlantic, concerns about the potential environmental and social impacts of large-scale biofuel production also have a long history.

At the European level, formal plans to expand transport biofuel consumption can be traced to the European Commission’s (2001) White Paper. Acknowledging the need to redouble efforts to reduce greenhouse gas (GHG) emissions and enhance energy security in Europe,

the Commission used this document to make an ambitious long-term plea to replace 20% of conventional road fuels with substitute fuels by 2020. Biofuels were highlighted as the ‘most promising forms... in the short and medium term’ (European Commission, 2001, p. 86), and the White Paper therefore put forward proposals for a new directive obligating minimum levels of biofuel blending into conventional petrol and diesel across all Member States, to reach a rate of almost 6%, as measured by energy content, by 2010.

Importantly, when it emerged, the 2003 Biofuels Directive (European Commission, 2003) was justified not only on the basis of biofuels’ purported ability to reduce Europe’s energy dependency and mitigate greenhouse gas (GHG) emissions from the road transport sector, but also because of the view of biofuels as a tool for diversifying production and creating jobs in the agricultural sector. This three-pronged rationale was initially extremely compelling to a wide range of actors and stakeholders. In the UK context, for instance, support for biofuels in the years immediately following the passing of the Biofuels Directive was manifest in a Biofuels Declaration, whose signatories included British Sugar, Saab, Ford, the National Farmers’ Union, and Friends of the Earth (Low Carbon Vehicle Partnership, 2005). Similarly, a year earlier, no fewer than five environmental non-governmental organisations (NGOs) – the Green Alliance, Transport 2000 (now the Campaign for Better Transport), Friends of the Earth, World Wildlife Fund (WWF) UK and the Royal Society for the Protection of Birds (RSPB) – had also called for the Government to ‘encourage the use of biofuels’ (*The Guardian*, 2004).

Despite their initially widespread appeal however, by the time the UK Government had outlined proposals for a Renewable Transport Fuels Obligation (RTFO) in 2007, the image of biofuels as a ‘silver bullet’ for the road transport sector had been tarnished significantly. Several sets of issues were highlighted, including the potential impact of biofuel production on food prices and food security, on deforestation and biodiversity loss, and even on labour standards and land rights in certain parts of the world (for example Costa, 2009; EAC, 2008; Koh & Ghazoul, 2008; Royal Society, 2008; RSPB, 2008). The chief scientific adviser to the UK Government’s Department for Environment, Food and Rural Affairs went as far as to claim that the RTFO would be an ‘insane’ policy if decision-makers couldn’t be certain of its positive environmental effects (BBC News, 2008). Most damaging of all, perhaps, was the emergent problem of indirect land-use change (ILUC), a phenomenon identified in two scientific research articles published in *Science* in early 2008 (Fargione, Hill, Tilman,

Polasky & Hawthorne, 2008; Searchinger *et al.*, 2008) as having the potential to render biofuels' overall carbon footprint significantly more damaging for the global climate than the petrol and diesel which they were replacing.

Controversially, in the face of all of these concerns, the European Union ultimately reinforced its commitment to biofuels with the passing of the Renewable Energy Directive (RED) in 2009 (European Commission, 2009). In superseding the Biofuels Directive, the RED put in place obligatory targets for all Member States to replace 10% of their road transport fuel by 2020 with fuels derived from renewable resources. Biofuels are expected to contribute the majority of that 10%. On the surface it therefore appears that the diverse negative consequences potentially associated with biofuel production have made little difference to the support being granted to this practice by policies implemented at the European level.

Drawing on this rich case study, the relationship between problem framing, evidence gathering processes, and policy learning at the EU level is examined from an interpretive perspective. Focussing on two sets of questions, in particular those pertaining to the geographical origin of biofuels, and those pertaining to their propensity to stimulate ILUC, it is argued that policy learning – and indeed evidence-based policymaking itself – are necessarily iterative, messy processes. The case study arguably has significant implications for a number of theoretical literatures exploring the complexities of evidence-based policy and policy learning, particularly where decision makers face complex problems imbricating energy systems and the environmental agenda. It also offers a number of insights for practitioners seeking to make contemporary governance institutions and arrangements more discerning and perceptive of the full potential impacts of decisions taken on similar issues in the future.

Problem framing and policy learning: an overview

Within political science, it is widely accepted that the contentiousness of policymaking becomes especially pronounced in situations where decision makers 'face "wicked" problems, complex influences, shifting commitments, and moral complexity in their daily efforts to act on policy goals' (Hajer & Laws, 2006, p. 251). Indeed, given the inherently contested nature of much apparently objective knowledge regarding complex policy problems, 'it is often the case that [actors] will not even be able to agree on what the problem *really* is, and turning to the facts may amplify rather than resolve differences in the face of

contradictory certainties' (Hajer & Laws, 2006, p.252, emphasis in original; see also Weinberg, 1972). Environmental and climate change policymaking arguably presents particularly challenging complexities and ambiguities for policymakers to overcome in these respects (Hoppe, 2010). For instance, Schneider (2001) posits that in environmental policy: 'Policymakers struggle to make decisions using vague and ambiguous concepts (such as sustainability), with sparse and imprecise information, in decisions that have far-reaching, and often irreversible, impacts on both environment and society' (p. 4673).

In light of these difficulties, many political scientists have turned to interpretive conceptual tools, which aim to elucidate how actors 'allocate particular significance to specific social or physical events' over others in order to make sense of the world around them (Hajer & Laws, 2006, p. 252). Following Foucault (2002), interpretive policy analysts argue that particular 'discursive formations' operate to 'determine what can and cannot be thought' in particular fields of debate and discussion, thereby constraining the range of legitimate options available for dealing with policy problems (Hajer & Versteeg, 2005, p. 178).

In seeking to illustrate how 'discursive formations' might manifest themselves in real-world policy debates, many scholars (for example, Hoppe, 2010) have highlighted the influence of so-called policy 'frames', which allegedly operate as 'special types of story that...provide stability and structure by narrating a problem-centred discourse...over time' (Laws & Rein, 2003, p. 174). Crucially for interpretive academics, while 'frames' can often operate to constrain policy, by reifying particular accounts of a problem, their innate simplicity also leaves them vulnerable to attack, particularly where actors are able to find empirical evidence that undermines them. The ability to create or modify a persuasive storyline about biofuels, or indeed to 'reframe' the issue altogether (Rein & Schön, 1991), would therefore be regarded by interpretive policy analysts as a crucial source of political power, and moreover as a potentially critical driver of policy learning.

Indeed, given the right conditions, discursive framing might impact upon policy learning both instrumentally and conceptually (Radaelli, 1995). In the former case where a frame is mobilised in order to reinforce pre-existing value allocations or institutional arrangements, and in the latter where it is imbricated in a more reflexive process of 'double loop' learning (Argyris & Schön, 1978), it calls into question the very purpose of policy itself. Where a dominant framing of a problem is well embedded throughout the policymaking community for instance, opportunities for conceptual learning, where the boundaries around problems are

redrawn, may be missed, and any learning that does occur will be only instrumental in nature; focussed on improving the efficacy and efficiency of existing policy tools and frameworks. As Hoppe (2010) puts it, policymakers are often unprepared to undertake ‘boundary work’, instead continuing to frame problems as structured, and fitting them into existing models or breaking them down into smaller sub-problems. Such circumstances may even lead evidence to be deliberately disregarded:

An expert’s opinion may be embraced or rejected solely on the basis of its compatibility with the needs of influential political figures at that moment in time. Similarly, uncertainty in that knowledge and opinion may be discarded or inflated because of political bias. (Streets & Glantz, 2000, p. 104)

In a similar vein, in reflecting on his long-term analysis of UK economic policy, Hall (1993, p. 290) argues that ideas and institutions will often ‘reinforce each other’, producing ‘long periods of continuity’ characterised by only minor policy changes. At the same time however, he also argues that ideas possess a ‘status somewhat independent of institutions that can be used’ to initiate paradigm shifts in the philosophical ideas underpinning policy, where the very aims and objectives of government intervention are called into question (Hall, 1993, p. 290). The theoretical question to be resolved, therefore, concerns how, when and under what circumstances ideas come to initiate a paradigm shift or ‘reframing’.

Biofuels in Europe: best-laid plans or tunnel vision?

The challenge taken up by this article is to use the case of EU biofuels policy to examine in more detail the interactions of ideas and institutions, as well as of framings and policy learning. The analysis that follows therefore aims to tease out some distinct aspects of EU policymaking processes that have served to constrain the ability of policymakers to learn conceptually, and not just instrumentally, about the impacts of biofuel mandates since the initial passing of the Biofuels Directive in 2003. Specifically, these aspects concern firstly the scope of biofuel supply chains, and secondly the contribution of biofuel production to potentially damaging land-use changes.

Sourcing biofuels: the question of supply chain geography

Amongst the most immediately obvious consequences of the implementation of the EU’s Biofuels Directive in 2003 was the establishment of a novel, global set of supply chains and market interactions relating to the production of biofuel feedstocks. Typically, these comprise staple agricultural commodities (such as wheat, maize, sugar cane, oil palm and soy) that are

already grown in vast quantities across the world for food, animal feed, cosmetic production and other end uses. The EU's stipulation of a new 5.75% target for biofuel blending in the road transport sector can, therefore, effectively be viewed as placing a new set of demands upon existing supply chains relating to these feedstocks: a demand that eventually came to be cast by many groups as the principle cause of significant food price increases in late 2007.

The complex, global extent of these supply chains is ultimately permitted by a combination of biophysical, logistical and legal factors. Biophysically, the feasibility of producing biofuel feedstocks for consumption in the EU in locations far from European soil arguably owes much to the superior yields, and thus the greater economic revenues can be obtained from agricultural cultivation in sub-tropical climates: for instance through growing oil palm in countries like Indonesia and Malaysia. Logistically, pre-existing supply chains linking agricultural activity in one part of the world with purchasers and end-users in another exerted their own, path-dependent influence over the shape and scope of embryonic biofuel production networks. Meanwhile, the insurmountable nature of barriers to free trade erected under the auspices of the World Trade Organisation's General Agreement on Tariffs and Trade also legally prevented European policymakers from implementing clauses in the Biofuels Directive that would have privileged biofuels produced solely within Europe, over those produced fully or partly outside of the continent, for instance through large tax breaks or burdensome import customs duties (Ponte & Daugbjerg, 2015).

While the inevitability of the global scope of biofuel supply chains is clear with hindsight, prior to the passing of the Biofuels Directive policymakers arguably placed greater emphasis in their accounts of this policy on its potential to provide stimulus to domestic (i.e. intra-EU) agricultural production systems. In official documentation such as its 2001 Transport White Paper for instance, the European Commission implied that large-scale domestic production of biofuels was not only feasible, but also – in light of impending reforms to the EU's Common Agricultural Policy – eminently desirable. According to the European Commission (2001, p. 83): 'The production of raw materials for biofuels may be of particular interest under the Common Agricultural Policy for creating new economic resources and preserving employment.'

Rather than presenting a formal, ex-ante assessment of the potential for the Biofuels Directive to interact with pre-existing international agricultural supply chains, policymakers instead directed attention towards the question of how such a policy would benefit the EU's

agricultural community. Moreover, and as the following quote from a European Commission official serves to indicate, in some cases at least, policymakers were apparently content to discount the potential for non-domestic biofuel production altogether:

We had a very specific situation in the EU, because the idea was that all this biofuel was going to be grown on set-aside land...In a nutshell I would say [it] was put in place to rescue the Common Agricultural Policy. (European Commission Official, Interview, 2010)

Such comments reveal a lack of distinction and clarity over the primary objective in the promotion of biofuels: publicly an environmental initiative to reduce GHG emissions, yet privately, at least in some sections of the European Commission, ‘a new form of agricultural support policy’ (Ackrill & Kay, 2014, p. 13). Drawing on Hoppe’s (2010) concept of problem framing, we argue here that in their haste to position biofuels as a flagship climate change policy in the transport sector, EU policymakers overlooked the inevitably multi-scalar dimensions of biofuel production systems, as well as their important linkages to other agricultural sectors. Consequently, ex-ante assessments of the possible impacts of an EU biofuels target were relatively unconcerned with international ramifications (whether positive or negative), focussing instead on ostensibly positive domestic implications for Europe’s GHG emissions profile, energy security and rural economy. This framing of biofuels as a silver bullet for Europe importantly enabled proposals for a Biofuels Directive to satisfy the interests of the agricultural lobby while simultaneously being seen to be addressing an important environmental issue. The ultimate result, however, represents a clear demonstration of the ability of persuasive framings to impact significantly on the scope of evidence that is considered relevant to policymaking, particularly where an entirely new policy is being developed, as in this case.

ILUC: questions of expansion and intensification

The issue of ILUC, whereby biofuel production displaces existing agricultural activity into new geographical territory, represents a second significant unforeseen consequence of EU biofuels policy to have emerged since 2003. Public awareness of this issue can arguably be traced to a now famous article published in *Science* in early 2008, in which estimates were presented of the quantity of GHG emissions that could arise from land-use change – essentially involving the conversion of non-agricultural landscapes to agricultural ones – driven by US corn ethanol production (Searchinger *et al.*, 2008). The article’s analysis

suggested that such emissions might be so significant as to take up to 167 years to reclaim through the subsequent use of biofuels as substitutes for fossil fuel in the road transport sector. While certain underpinning assumptions in Searchinger *et al.*'s (2008) paper have been called into question, a substantial quantity of additional modelling and analysis has reinforced the overarching conclusions that, firstly, biofuels do generate ILUC, and, secondly, this can have potentially significant consequences for the GHG emissions footprint of biofuels (Edwards, Mulligan & Marelli, 2010; Ahlgren & Di Lucia, 2014).

Almost exactly two weeks before Searchinger *et al.*'s (2008) analysis was published in *Science*, the European Commission published its official Impact Assessment for what would eventually become the Renewable Energy Directive (European Commission, 2008).

Intriguingly, this document directly acknowledges concern over the issue of ILUC stating:

Some commentators imply that each hectare of land devoted to the cultivation of crops for the biofuel market will have to be offset by finding a hectare of land, somewhere else, to produce the food that would (it is suggested) otherwise have been produced on the biofuel-producing land. (European Commission, 2008, p. 144)

It is not possible to verify whether policymakers were aware of the precise substance of the analysis by Searchinger *et al.* (2008). The admission in the draft Impact Assessment document (jointly prepared by officials working in the Directorates-General for Transport and Energy, DG TREN, and for Environment, DG ENV), that certain commentators had drawn attention to the issue precludes the possibility that ILUC was unknown within the European Commission at that time. However, no attempt to assess the possible risks associated with ILUC appears in the Commission's official Impact Assessment. Instead, this document contends that the issue does not deserve further attention from policymakers.

Specifically, the Impact Assessment dismisses claims that biofuel production could stimulate ILUC by quoting historical data supplied by the UN's Food and Agricultural Organisation, which shows that around 70% of global increases in oil crop production between 1980 and 2006 were attributable not to land expansion, but to increases in agricultural productivity. Having thus identified what they term 'a clear link between demand for agricultural commodities, their prices, investment in agriculture and agricultural productivity', the Assessment's authors then simply extrapolate this supposedly robust link into the future, by stating that 'the main impact of increased biofuel demand will be a further increase in

productivity, not an increase in the quantity of land used for agriculture’ (European Commission, 2008, p. 144).

In short, in the proposals accompanying the official Impact Assessment (which were to become the Renewable Energy Directive), the European Commission suggests that ILUC would in all likelihood not occur as a result of the policy. Assumptions about the potential for significant yield increases therefore operated in this instance in much the same way as assumptions about the domestic origin of biofuels had done some years earlier, effectively exonerating policymakers from any duty to consider the wider, international impacts of their legislation, this time on patterns of land-use change outside of Europe.

Improving the policy process

The extensive literatures on policy framing and policy learning highlight a number of challenges; yet it is also possible to identify four ways in which the integration of relevant evidence into policymaking could be substantially improved, and the scope and pace of policy learning could be expanded in the face of complex environmental problems.

Frame issues carefully and collectively

Hisschemöller & Hoppe (1996) suggest that more explicit contemplation of the socio-political structure into which policy measures are introduced, and of the definitions of prevailing problems when they arise, would be worthwhile endeavours. Indeed, more open and inclusive debate around the nature of the policy objectives being pursued by a biofuels mandate, as well as the geographical scope of the consequences, would arguably have been useful before the passing of the 2003 Biofuels Directive. The framing of biofuels as a climate-based transport policy neglected to acknowledge the multi-scalar dimensions of their production systems or the fundamental links to the wider agricultural implications, clearly highlighting that, without considered collective framing of issues, adequate policy responses cannot be delivered. In thinking about the future of biofuels in Europe and further afield, a much more holistic perspective of the complex relationships between agriculture, trade, energy, climate and transport may yield more effective policy responses. Standing in the way of such progress, however, is the institutional structure of the EU (and other political regimes), as it is currently inadequate to enable such cross-cutting, multidisciplinary work to take place. The institutional architecture of the current system is too rigid and siloed to enable such ‘boundary work’ across conventional policy domains. Moreover, such approaches ultimately require more consideration of how policymakers themselves are influenced by

dominant framings and the impact that this might have on how they use available knowledge and gather and interpret evidence in pursuit of policy objectives. More detailed attention to these issues is required and could form the basis of future research.

Normalise iterative approaches

As highlighted above, iterative approaches are required to monitor the success of particular measures. Lindblom (1959) suggested that ‘successive comparisons’ are preferable to traditional rational comprehensive methods of assessing policy measures. This is because it enables the consideration of alternatives. Lindblom’s work with Woodhouse emphasised that trial and error learning was more favourable to permanent learning (Lindblom & Woodhouse, 1993). Indeed, setting indiscriminate biofuel targets, and concomitantly committing to the development of an entirely new industry, offered little opportunity to monitor success or failure in this case, and certainly not to modify the prevailing policy approach. Experimenting with small-scale biofuel production and selectively ramping up investment into particular types of biofuel technology, based on the careful assessment of achievable crop yields, emissions reduction capabilities, and environmental impacts, may well have been a more suitable initial approach, to enable the derived learning to be incorporated into the broader policy landscape. For instance, while it was not proposed in debates leading to the development of the Biofuels Directive, the adoption of insights from small-scale pilots in different contexts would perhaps have allowed for a more successfully staged full-scale roll out of production, and ultimately the development of a more sustainable European biofuel market.

Emphasise positive learning over negative mistakes

Hisschemöller & Hoppe (1996) advocate a learning strategy to cope with intractable controversies. Although as Schneider (2001) points out, a surprise cannot by definition be anticipated, Streets & Glantz (2000) suggest that once a surprise has occurred, a window exists for positive change or remedial action, from which lessons can be learned. Much is continually being learned from the complexities of the biofuels case, yet policymakers have for the most part adopted a defensive stance in the face of new evidence and ideas, seeking to entrench and re-rationalise their initial decisions, rather than embracing the opportunity to make beneficial adjustments. Uncertainties can of course only be reduced through more data collection and research, and even then only ever to a partial extent. Learning to integrate

uncertainty into decision-making and policy processes would arguably enable a better management of unforeseen situations when they do arise.

Routinise transparency and collaboration

Collingridge (1992) suggests that government has an important role to play in independently defining the normative goals of policy, and that greater transparency is needed in policymaking, ensuring that any given government exerts genuine control and does not merely reflect business interest and views. In a related manner, greater transparency is also required in policymakers' use of expert knowledge, as was not evident in the case of knowledge relating to ILUC. While Richter (2010) asserts that timely technical advice is an important element in the decision-making process, identifying the best available advice in a complex debate is arguably not possible without first subscribing to a particular framing of the issues at hand. Under these conditions, utilising knowledge, evidence or opinion more transparently would also force policymakers to be more open and explicit about the assumptions underpinning their decisions. This recommendation is in turn linked to the need for better collaboration, and supports Hisschemöller & Hoppe's (1996) suggestion that actors with different views should be engaged more substantively throughout the policymaking process. As noted above, ensuring that the multi-scalar dimensions of any given problem is understood and that 'boundary work' is done effectively are both important in collaboration.

Conclusions

Importantly, when it did emerge in 2009, the Renewable Energy Directive was notable for its stipulation of a number of sustainability criteria that biofuels should meet in order to be eligible for financial support, and indeed order to count towards the Commission's 10% target for renewable energy in the transport sector (Di Lucia, Ahlgren, & Ericsson, 2012). From an interpretive perspective, these criteria can be viewed as the outputs of a good deal of policy learning on the part of EU officials in the six years since the Biofuels Directive had been passed. No longer did policymakers assume that biofuels would be sourced entirely domestically, and in requiring producers to demonstrate that they had not cultivated biofuels on land with high biodiversity value or high carbon stock, the criteria point to a more nuanced understanding of the complexities involved in ensuring that their potential environmental benefits are yielded in practice. Yet the absence of any protections against ILUC (the RED simply included a clause requiring the Commission to produce a report on

the issue by December 2010) also makes clear that such learning did not extend to a reappraisal of the overall wisdom of an indiscriminate target for biofuel blending.

When the Commission published its 2010 report on ILUC, it acknowledged that ILUC could have an impact on greenhouse gas emissions savings associated with biofuels, and that without intervention, this could under certain circumstances reduce their contribution to the goals of the RED (European Commission, 2010). However, the Commission delayed publishing a full Impact Assessment of different options for intervening to reduce ILUC's impacts until October 2012, nearly two years later. Eventually, this Impact Assessment proposed to tackle ILUC only by 'capping' the contribution that could be made to targets under the Renewable Energy Directive by 'food-based biofuels' (specifically to 5% of the 10% required) (European Commission, 2012). More recently still, even this initial proposal has been watered down, with the European Parliament only finally approving a 7% cap on food-based biofuels in April 2015 (EurActiv, 2015). Estimates of the scale of ILUC associated with specific consignments of biofuel must also now be reported by producers, although no provision has yet been made to preclude biofuels – whether derived from food crops or not – with high ILUC estimates from contributing to the overall 10% target embodied in the RED. Moreover, the European Commission explicitly justified its decision not to discriminate between biofuels on this basis by stating that to do so would result in 'the exclusion of all vegetable oil biodiesel, which today represents the vast majority of the market' (European Commission, 2012, pp. 5-6). Arguably, this justification suggests that the imperative of reaching the 10% target as efficiently as possible, regardless of the potential environmental impacts, remains the key concern of EU policymakers today.

Overall therefore, the case presented in this article indicates that policy learning relating to biofuels at the EU level has been instrumental only; limited in scope to honing and finessing existing tools (mandated blending targets) while overlooking the potential for more fundamental reconsideration of the goals and objectives embodied by those tools. However, it is acknowledged in the literature that such transformative change takes time; according to Weiss (1977), new evidence or ideas can sometimes take decades to embed themselves into the system, and the process requires persistence on the part of those advocating change and providing knowledge. To achieve more conceptual learning also requires changes to be made to the institutional fabric of the system. Even with such endogenous and exogenous forces,

there are no quick wins or guarantees that lessons can be learned and embedded into the system.

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