
This is an electronic reprint of the original article.
This reprint may differ from the original in pagination and typographic detail.

Peixoto, Inês; Temmes, Armi

Market organizing in the European Union's biofuels market

Published in:
Journal of Cleaner Production

DOI:
[10.1016/j.jclepro.2019.06.307](https://doi.org/10.1016/j.jclepro.2019.06.307)

Published: 01/11/2019

Document Version
Peer reviewed version

Published under the following license:
CC BY-NC-ND

Please cite the original version:
Peixoto, I., & Temmes, A. (2019). Market organizing in the European Union's biofuels market: Organizing for favouring, acceptability, and future preferences. *Journal of Cleaner Production*, 236, [117476].
<https://doi.org/10.1016/j.jclepro.2019.06.307>

This material is protected by copyright and other intellectual property rights, and duplication or sale of all or part of any of the repository collections is not permitted, except that material may be duplicated by you for your research use or educational purposes in electronic or print form. You must obtain permission for any other use. Electronic or print copies may not be offered, whether for sale or otherwise to anyone who is not an authorised user.

Market organizing in the European Union's biofuels market: Organizing for favouring, acceptability, and future preferences

Inês Peixoto^a and Armi Temmes^b

^a Aalto University School of Business, Department of Management Studies, P.O.Box 21210 – FI-00076 Aalto, Finland; E-mail address: ines.peixoto@aalto.fi (*corresponding author*)

^b Aalto University School of Business, Department of Management Studies, P.O.Box 21210 – FI-00076 Aalto, Finland; E-mail address: armi.temmes@aalto.fi

Manuscript accepted for publication in the Journal of Cleaner Production, 236 (Nov.2019)

Abstract

Market creation as such is a relevant policy instrument in sustainability transformations that merits further examination. The regulatory creation of the European Union (EU) biofuels market has been a highly contested policy instrument, largely because of its atypical nature, as biofuels became one of the most controversial renewable energies. This paper combines the literatures of market organization and meta-organizations as conceptual lenses to analyse the dynamics and challenges of market creation through policy-making with sustainability goals. A longitudinal qualitative analysis of the EU biofuels market in 2003-2015 is conducted to examine contested policy-making and heterogeneous implementation as two key elements shaping the dynamics and outcomes of market organization. The analysis shows that market organization developed as three organizing schemes—favouring a product group, specifying acceptability for the product group, and establishing preferences within the product group—that redefined market boundaries and signalled innovation incentives but potentially undermined the policy goals of market growth. The findings show that this reorganization produced intertemporal discrepancies and tensions between conflicting policy aims, which partly explain the previously observed inconsistencies within transnational market-creation policies. Accordingly, the market organization and meta-organization literatures are proposed as useful conceptual tools to analyse sustainability-driven market creation policies.

Keywords: biofuel; market creation; market organization; meta-organization; transnational market; sustainability

1. Introduction

Market-creation policy instruments aim at transforming economic and social systems towards sustainability through the promotion of better alternatives to less sustainable products (Bergek et al., 2014; Kemp et al., 1998; Rogge and Reichardt, 2016). The European Union (EU) uses market creation policy as part of its climate policy strategies (Afionis and Stringer, 2012), which includes specific support to market niches (Kemp et al., 1998) and the fostering of innovation (Mazzucato, 2016). In turn, member states shape the outcomes of these policies by adapting their implementation to the national contexts (Bergquist and Söderholm, 2015; Kivimaa and Mickwitz, 2011; Söderholm et al., 2017). In the case of biofuels, this transnational interaction is illustrated by the view of an EU Commissioner that these policies “*[are] not about trying to create a market artificially. [They are] about taking a long-term view: supporting research within the EU, and already encouraging a certain level of biofuel and biomass use, so that when technology creates new opportunities, we can respond quickly*” (EU Commission, 2006). Such a flexible and adaptive approach, for example the development of market solutions that are adapted to local contexts, is beneficial for policy implementers, including member-states and firms (White et al., 2013), and also for policy-makers in heterogeneous contexts, for instance from a perspective of experimental governance (Sabel and Zeitlin, 2012).

Nevertheless, such a flexible approach may hinder the achievement of multifaceted transnational market creation goals. This is illustrated by the unique development of the EU biofuels market, which has attracted much scholarly interest (German et al., 2017; Oliveira et al., 2017). Member states have implemented EU policies divergently (Sandoval and Popartan, 2014) and companies’ responses to policies have produced unexpected and controversial environmental impacts (Mol, 2010; Oliveira et al., 2017). Especially the latter outcome contradicted the original intentions of policy-makers. In turn, the various EU attempts to tackle these unwanted outcomes, by repeatedly changing the policies it had established (German et al., 2017), proved insufficient to generate the sought-after market growth. Moreover, although various changes to regulation aligned the market with criteria to tackle the controversial impacts, frequent regulation and policy changes undermine the investment necessary for a striving market (White et al., 2013). As a result, the market share of biofuels lagged behind the EU targets. Hence, these outcomes represent important challenges to transnational market-creation policies.

Taken together, these challenges deserve further attention because transnational transformations towards sustainability are desirable albeit complex and uncertain (Etzion et al., 2017; Weinstein et al., 2013). More specifically, transnational policies to create and foster markets engage multiple actors and involve complex market mechanisms—such as competition, customer acceptance, and demand—that reflect local contexts interwoven with global processes (e.g., Harnesk et al., 2017). By distilling some of these interlinked processes, the market-creation policy literature has generated important insights about the effects of policy on market outcomes. Regarding implementation, it suggests that policy outcomes are shaped by the interaction of prior local technology paths, local resource and industry contexts, and national regulatory and policy cultures (e.g., Söderholm et al., 2017). In addition, it suggests that frequent policy changes, for instance in response to controversies, create a policy inconsistency that hinders investment in the nascent market (e.g., White et al., 2013). However, the literature has hitherto overlooked the dynamics generated by intended and unintended market outcomes that result in changes to the policy itself. Accordingly, in the biofuels case, contested policy-making and heterogeneous implementation are identified as two key elements shaping policy-driven market creation for sustainability transformations that need further scrutiny and problematization. To the best of our knowledge, the interaction of both elements in transnational market creation remains overlooked in the policy literature.

For the examination of these two elements, this paper draws on the literatures on market organization (Ahrne et al., 2015) and on meta-organizations (Ahrne and Brunsson, 2005) which offer additional possibilities. While the market organization literature assumes that contestation and varying implementation are integral to market creation and market change, the meta-organizations literature offers an analytical lens to examine the relationships between market organizers. In this regard, the EU functions as a meta-organization composed of member states, all of which contribute to organizing transnational markets. However, in shaping the markets that they organize (Kerwer, 2016), member states also affirm their difference, resist harmonization, and compete for actorhood (Ahrne et al., 2016a; Ahrne and Brunsson, 2005), which leads to heterogeneous implementation. Moreover, transnational market organization is open to being contested by various actors, such as industry organizations, consumer associations, and other civil society organizations (Engels, 2006), which thereby influence market organization, directly or indirectly (Alexius et al., 2014; Vifell and Thedvall, 2012). Furthermore, the literatures of market organization and meta-organization allow the researchers to problematize the harmonization of EU and member

states' actions. Nevertheless, little is known about the effects of the tensions between harmonization, contestation, and implementation on concrete market organizing outcomes in the context of market creation towards sustainability. Furthermore, the empirical studies in these literatures have hitherto overlooked the dynamics of market organization in the replacement of an existing product with a more sustainable alternative product.

Accordingly, the research question asked in this paper is: how does organizing address the challenges of contestation and varying implementation of market organization over time? In order to answer this question, the paper presents a longitudinal qualitative analysis of the development of the EU biofuels market over a period of twelve years (2003-2015) with a focus on the EU-level and three member states (Denmark, Finland, and France). More specifically, the analysis of the process of market organizing and its outcomes was carried out using qualitative and process analysis methods (Langley, 1999; Miles et al., 2014) to examine multiple sources of archival data.

2. Market organization in transnational markets

The market organization literature is based on the premise that markets are not fashioned “out of a vacuum” (Ahrne et al., 2015, p. 9). Most markets result from intended organizing efforts (Ahrne et al., 2002, p. 51) in which different actors negotiate the construction of the market (Aspers, 2011, p. 158). Organization refers to the use of organizational elements, i.e., rules, monitoring, sanctioning, hierarchy, and membership, in markets (Ahrne et al., 2015; Ahrne and Brunsson, 2011). Hence, organized markets are shaped by various decisions (Luhmann, 2005) that prescribe patterns for the behaviour and interaction of market actors. Examples of organized markets include markets governed by technical standards (Brunsson and Jacobsson, 2000), such as telecommunications and fuels, and by sustainability standards (Boons and Mendoza, 2010), and also markets for emissions trading (Engels, 2006). This framework has also been used to examine sustainability-related market reforms (Alexius et al., 2014).

In organizing, the decisions about those constitutive elements are made by market organizers, which include policy-makers, legislators, and regulators as well as sellers, buyers, industry representatives (e.g., in technical standards), and non-governmental organizations (e.g., in sustainability standards). Other actors, exogenous to decision-making, may instead attempt to influence these organizers, for instance, by voicing opinions and proposing alternatives (Ahrne et al., 2015; Djelic and Sahlin-Andersson, 2008) like non-governmental organizations

(NGO) do. Given the variety of organizers in a transnational market, such as in EU single markets, those with conflicting views often compete for opportunities to organize (Ahrne et al., 2016b). The resulting variety of organizing alternatives creates the need to accommodate heterogeneous views and interests (Engels, 2006; Reinecke et al., 2012).

Two complementary literatures—organization of markets (e.g., Ahrne et al., 2015) and meta-organizations (e.g., Ahrne and Brunsson, 2005)—are combined in this paper to identify the features and challenges of the organization of transnational markets. The framework includes, first, the emergence of implementation and contestation problems in rule-based transnational markets and, second, the role of autonomy among market organizers in the creation, implementation, and modification of market rules. Thus, it provides conceptual tools to analyse transnational market creation by policy-makers.

2.1. Rules and other organizing elements in transnational market organization

In any market, rules define the conditions of trading, the features of products traded, and the market actors (Ahrne et al., 2015; Aspers, 2011). Rules may be instrumental, value-laden (Alexius and Tamm Hallström, 2014), and also symbolic (March et al., 2000). Some rules standardize products (Brunsson, 2002) and others incentivize, constrain, or ban the use of products (Howarth and Rosenow, 2014; Maxwell and Briscoe, 1997). In transnational markets, the “rules that many use” (Kerwer, 2005, p. 611) create a level playing field that adds some predictability to competition (Edelman and Suchman, 1997).

Nonetheless, the power of rules to prescribe behaviour and solve problems (March et al., 2000) is fallible because of the potential discrepancy between rules and action (Ahrne et al., 2015; Luhmann, 2005). For example, rules may be avoided or defied (Oliver, 1991), resisted by voicing disagreement or exiting the domain of influence (Hirschman, 1970), or sidestepped through the creation of alternative rules (Okhmatovskiy and David, 2011). Implementers, however, may not be able to avoid or escape all rules. For instance, the dismissal of rules determining the design, production, and trading of products (Brunsson and Jacobsson, 2000) forces companies to comply or exit a market (King and Pearce, 2010). Furthermore, the presence of authority, the autonomy that implementers have to make decisions, and tensions between both (Ahrne et al., 2015; Ahrne and Brunsson, 2011) influence the discrepancy between rule and implementation. For instance, EU directives feature binding and non-binding rules coupled with other elements that motivate compliance, such as monitoring and

sanctions (Jordan and Adelle, 2013; Kerwer, 2005). Monitoring tracks implementation of rules and sanctioning establishes either incentives to encourage implementation or penalties to prevent implementation avoidance.

Furthermore, rules are mutable and prone to being changed through decision making (Ahrne et al., 2015). First, the drivers of potential changes include the learning produced in monitoring (March et al., 2000; Sabel and Zeitlin, 2008) and the contestation of rules (Luhmann, 2005). For instance, monitoring and rule reviews constitute policy-making in the EU (Jordan and Adelle, 2013; Sabel and Zeitlin, 2012), thereby producing new rules to supervise, harmonize, or replace existing rules (March et al., 2000). Second, conflicts among organizers in decision making also prompt changes. In the case of the EU, decisions typically take place in a triad among Commission, Council, and Parliament (Fligstein and Mara-Drita, 1996). As an “inclusive hierarchy” (Kerwer, 2016, p. 49), the EU receives opinions from member states and other stakeholders (Jordan and Adelle, 2013), in which it is confronted by divergent views (Sabel and Zeitlin, 2008). In order to avert conflicts, market organizers also formulate rules as non-binding (Jacobsson and Sahlin-Andersson, 2008) or ambiguously (Baier et al., 1986). Although ambiguous rules have the virtue of gathering support and avoiding contention (Baier et al., 1986), the resulting conflicts of interpretation may lead to rule redefinition and stricter sanctioning (Le Galès, 2001). Therefore, the configuration and dynamics of organizing elements shape the outcomes of market organization (Ahrne et al., 2015).

2.2. The role of meta-organizations in rule-making as market organizers

The literature on meta-organizations studies the dynamics of organizations that have other autonomous organizations as their members (Ahrne and Brunsson, 2005, p. 431). Meta-organizations and its members play a key role as market organizers (Ahrne and Brunsson, 2005; Berkowitz, 2018). In the case of the EU, a meta-organization, the members are the states (Kerwer, 2016), all of which play the role of market organizers in the EU single market. Meta-organizations impel and coordinate global collective action (Berkowitz and Dumez, 2016) by facilitating outcomes that cannot be produced by members alone (Ahrne and Brunsson, 2005). For instance, major societal problems may be too complex for single organizations to tackle (Chaudhury et al., 2016; Valente and Oliver, 2018). Accordingly, the concept has been used to study sustainable innovation (Berkowitz, 2018), governance in climate change mitigation (Chaudhury et al., 2016), and sustainability in institutional voids

(Valente and Oliver, 2018). Hence, meta-organizations potentially facilitate harmonization and coordination in transnational markets.

Whereas the meta-organization has power to prescribe organizing elements for its members to implement, which creates homogeneity, members have autonomy to make decisions about the use of these organizing elements. Accordingly, in the case of EU single markets, the autonomy of members in relation to the meta-organization poses many challenges (Sabel and Zeitlin, 2012). First, the juxtaposition of the rule-making functions of the Commission and the member states undergirds the competition for actorhood (Ahrne et al., 2016a; Ahrne and Brunsson, 2005). Second, the EU faces a “pluralistic and heterarchical” assemblage of “powers, preferences and logics” (Brès et al., 2017, p. 4) when it strives to harmonize markets across member states. Consequently, the implementation of organizing elements varies according to the autonomy of members, the disagreements on interests and values, the conflicts over decisions, and the competition for attempts to organize (Ahrne and Brunsson, 2005; Le Galès, 2001). For instance, member states are likely to resist implementation of unfavourable organizing elements, such as those with effects on competition (Fligstein and Mara-Drita, 1996; Le Galès, 2001). More generally, this double role of organizer and implementer potentially hinders the harmonization of the transnational market.

Nevertheless, the EU seeks harmonization in its single market and strives to tackle the issues that impede collective action (Fligstein and Mara-Drita, 1996). In this way, it may alter organizing elements to prevent variation and divergence, in order to counter the effects of implementation and contestation. These modifications include the use of fewer elements to prevent poor implementation (Ahrne et al., 2015), the avoidance of rules combined with sanctions (Kerwer, 2005), and the use of persuasion, incentives, or commitment (Ahrne and Brunsson, 2005). However, the local and national contexts also create variation in the outcomes of organizing processes (Chaudhury et al., 2016; Manning et al., 2012). In the long run, however, the harmonization of members may increase within the scope of influence of the meta-organization (Ahrne et al., 2016a; Ahrne and Brunsson, 2005).

2.3. Contestation and varying implementation in transnational market organization

Transnational market organizing processes aim at the harmonization of market practices and the coordination among market actors to achieve the market creation policy goals. However, the framework outlined here suggests that market organizing processes may impede the

harmonization and coordination needed in the early phases of policy-driven market creation. First, contestation—by organizers, buyers, sellers, and other organizations operating outside the boundaries of market exchange—impels the addition, withdrawal, and reconfiguration of organizing elements. Moreover, these actors also have power to influence implementation. Second, heterogeneous implementation hinders harmonization and coordination. In particular, the ability of member states to decide upon the use of organizing elements may provide insufficient support to transnational market development or instead create a fragmented market. By contrast, the enforcement of organizing elements prompts conflicts and resistance to implementation, which equally hinders market development. Thus, contestation and varying implementation play a pivotal role on transnational market organizing processes through their effects on harmonization over time. More specifically, these effects may challenge or undermine the goals of transnational market creation policy towards sustainability transformations.

3. Material and methods

This paper presents a longitudinal analysis of market organization in the EU biofuels market response to contestation and varying implementation was conducted according to established qualitative research methods. More specifically, it included a qualitative thematic coding analysis (Miles et al., 2014) and a process analysis Langley (1999). The details of data collection and analysis are presented below in separate sub-sections. Moreover, the analyses were conducted upon an extensive body of archival data that was collected for the purpose of examining the patterns of market organization and its outcomes in the EU and in three member states (i.e., Denmark, France, and Finland). These national contexts were selected because of their expected variation, due to national differences (Lovio and Kivimaa, 2012; Söderholm et al., 2017), which fits the analytical focus on the identification and qualification of longitudinal patterns in a market organization process (Langley, 1999).

3.1. Context: the EU road transport biofuels market

In the 1990s, attempts to organize an EU biofuel market failed to gather support across member states (Healy, 1994). Notwithstanding the lack of agreement, some member states, such as France, subsidized biocomponents and developed supporting plans (Bernard and Prieur, 2007). As a result, the market share of these agri-biofuels, i.e., “fuels from agricultural sources”, remained small in spite of the energy and agricultural policies that promoted market

growth (Afionis and Stringer, 2012; Healy, 1994; Londo and Deurwaarder, 2007). In 2003, however, the EU resumed its attempts by establishing a minimum market share for biofuels through a blending obligation (Directive 2003/30/EC). Its purposes comprised the reduction of transport CO₂ emissions and fossil fuel use and the development of rural economies. However, stakeholders alerted policy makers to the poor acknowledgement of important environmental impacts that undermined the CO₂ reduction goal. This criticism of agri-biofuels grew and challenged the prior stakeholder support (Charles et al., 2007; Levidow, 2013; Mol, 2010) and claims about biofuel impacts on land use and food prices triggered calls for policy reviews. The resulting debate and negotiation within the EU (Di Lucia et al., 2012; Peck et al., 2009) led to regulatory changes in 2009 and 2015 that preserved the regulatory support to biofuels but increased the complexity of regulation (Markevičius et al., 2010). In spite of incentives for market growth, the share of biofuels increased gradually from 1% (2005) to 2.6% (2007) and 5.4% (2013) but remained well below the targets for 2010 (5.75%) and 2020 (10%)¹. This biofuel share also grew unevenly across member states. In turn, the advanced biofuels that avoided these controversial impacts gathered more public attention (Janssen et al., 2013; Panoutsou et al., 2013).

3.2. Data collection

First, the analysed data included legislation, policy documents, and policy reports, which were collected from online repositories (EU digital databases and websites, EurObserv'ER, European Biofuels Technology Platform, International Energy Agency) and from the websites of official governmental authorities in the three member states. The use of archival data was chosen because documents hold “historical traces” of organization (March et al., 2000, p. 1). Second, in parallel, media material and press releases about road transport biofuels in Denmark, Finland and France—added to the prior data—were collected by searching the database Lexis Nexis using specific keywords (e.g., biof*AND name of member state). Third, the companies and consortia involved in the biofuel product market in each member state (DK:12, FI:6, FR:9) were identified. For each company and consortium, additional data collection included annual reports, press releases, and website content, from which relevant excerpts describing biofuel technologies and production were selected for the purpose of tracing their temporal development through temporal bracketing (Langley, 1999). This

¹ Data from the EU Biofuels Progress Reports of 2009 and 2015.

analysis was limited to the period of 2003-2015, based on a preliminary overview of relevant events identified in the data and the biofuels literature.

3.3. Data analysis

The analysis of the archival data was conducted in five main steps. First, the thematic coding analysis (Miles et al., 2014) identified market organizing elements, their descriptive characteristics, and ancillary elements presented in the market. In addition, the justifications given for each instance of market organization, change and implementation (whenever available) were identified. Second, a process analysis was conducted, which included the temporal bracketing, narrative, and visual template methods (Langley, 1999). First, temporal bracketing defined three time periods delimited by the regulatory changes (before 2003, 2003-2009, and 2010-2015). In each temporal bracket, various characteristics were identified for analysis: the organization elements and their status (proposed, added, modified, or rejected), their implementation by member states, and changes across temporal brackets. Table 1 summarizes the organizing elements identified in each member state.

Table 1 about here

Fourth, within each temporal bracket, the analysis proceeded with the production of narratives of the development of biofuels in the EU and in each member state. The member state narratives included the development of biofuel products and technologies in companies and consortia as well as the use of EU and national-level supporting programs. Finally, the visual template method supported the analysis of patterns in the data, which enabled the identification and description of three overlapping market organizing schemes.

4. Findings: Organization and reorganization in the EU biofuels market

The analysis identified three market organizing schemes that defined configurations of rules, monitoring, and sanctions in the production and trading of biofuels (i.e., the product group) in different periods of time. Based on the outcomes of these schemes, they were labelled as: a) favouring a product group, b) specifying acceptability in the product group, and c) establishing future preferences within the product group. More specifically, within the process

of organizing, each scheme modified existing elements and added new elements to the biofuels organized market. Table 2 describes each scheme configuration.

Table 2 about here

4.1. Market organizing schemes

Each scheme is a configuration of market organizing elements with specific purposes, which evolves over time. Scheme 1—*favouring*—is a configuration that aims to promote growth in the trade of a product group, for instance with the goal of climate change mitigation. Scheme 2—*specifying acceptability*—is a configuration that determines conditions of acceptability for what is traded in the market within the product group. Scheme 3—*establishing future preferences*—is a configuration that favours preferred products and limits non-preferred products. These two latter schemes emerged from responses to the contestation (ecological and climate impacts) and to the varying implementation (compliance, variation, or avoidance) of the first scheme. Each new scheme resulted from policy changes and reorganized the market by defining market boundaries and either limiting or favouring product types. Figure 1 depicts this process of market reorganization.

Figure 1 about here

4.1.1. Scheme 1: Favouring biofuels

Market organizing carved space for biofuels in the EU road transport fuels market, but the uneven implementation of the blending obligation rule across member states impaired the harmonized favouring of biofuels. The Commission first introduced the minimum biofuel market share believing that member states were not able to galvanize biofuel demand or improve biofuel competitiveness on their own. In turn, member states implemented EU rules according to national interests, available resources, and industry competences. Some member states replaced the blending obligation with tax incentives, whereas others utilized subsidies to production (e.g., through Common Agricultural Policy (CAP) programmes). As a result of the member states’ use of autonomy, the implementation of rules to fulfil the minimum share produced varying results.

The straightforward implementation of Directive rules sustained France's prior commitment to the promotion of agri-biofuel businesses. The CAP subsidies to the supply of raw materials for agri-biofuels bolstered the development of industrial infrastructure and production capacity. As the French fossil fuel producers preferred paying sanctioning fines rather than complying, the government added onerous tax penalties that reversed the producers' resistance. By contrast, Denmark and Finland delayed implementation, which was justified with the absence of industrial competences, unfavourable climatic conditions, and the need to analyse feasibility, cost-efficiency, and policy alternatives. Prompted by EU warnings, though, these member states implemented non-binding blending targets and claimed that obligations ignored implementation costs and past efforts to promote renewable energy. However, both countries also funded R&D programmes on novel technologies and new biofuel products. This funding supported the deployment of industrial competences (e.g., Danish biotechnology, Finnish wood processing and hydrated vegetable oil) that were not yet developed in the agri-biofuels industry. Many of the potential new biofuels, though, were far from commercialization.

The market reorganization of 2009 tackled this varying implementation, but member states responded unevenly. The Commission modified the blending rule to a more demanding—enforceable but flexible—obligation. That is, the market share target was open to all renewable energies (e.g., electricity) and member states set their own compliance schedules to which justified deviations were allowed. In addition, member states set tax exemption rules due to the absence of a harmonized biofuel taxation regime. Denmark justified its weak implementation with a plan for fossil fuel independence by 2050 but continued to channel state funding to the private development of new biofuels. In contrast, Finland prompted a policy turnaround; it set ambitious binding targets that relied on new biofuels with business potential for Finnish companies. France, on the contrary, paused the incentives given to biofuels due to the food-fuel controversies. As a result of this varying implementation, the biofuel market share grew slowly and below the expected, but the EU maintained its commitment to the market growth.

4.1.2. Scheme 2: Specifying the acceptable biofuels

The second organizing scheme established a standard of acceptability for biofuels. In 2009, the backlash against biofuels, triggered by environmental impacts, prompted the bundling of organizing elements that *specified* the kinds of biofuels accepted in the regulated market.

These acceptability criteria (Table 2) addressed the higher-than-expected GHG emissions, biodiversity loss, and other impacts of biofuels. It restricted the choices available for producers and sellers and hindered the regulatory support to certain biofuels. Likewise other member states, Denmark, Finland, and France implemented the acceptability criteria within the short compliance timeframe.

However, by 2009, some of the criteria failed to gather agreement from member states and therefore were excluded from the scheme but remained under negotiation. An example was the addition of GHG factors that expressed the land use impacts, which limited the range of acceptability. Instead, the EU legislated a monitoring obligation to survey those impacts with the purpose of informing the ensuing policy discussions. The subsequent negotiations culminated in 2015 with a compromise solution that combined this monitoring with the mandatory reporting of indirect emissions. Although the change did not modify the core of the scheme, it shows the persistence of an unresolved conflict among market organizers.

4.1.3. Scheme 3: Establishing preferences within acceptable biofuels

The third organizing scheme addressed the impact of controversies and incentivized the production of new biofuels. This bundle of elements set preferences for the market: it favoured preferred biofuels and limited non-preferred biofuels, a distinction made according to their GHG emissions and their use of land. The non-preferred biofuels included the agri-biofuels produced from food crops (known as “conventional”). The preferred biofuels included those produced from non-food energy crops, waste raw materials, bacteria, and algae (known as “advanced”), some of which depended on technology under development. The new organizing elements first added a positive sanction for preferred biofuels that made them worth the double for the purpose of fulfilling blending rules (e.g., 1% of biodiesel from waste animal fat was worth 2%). A more incentivizing quadruple counting system, proposed by the Commission, was rejected by the Council and the Parliament. Further, subsequent changes set a non-binding minimum market share for the preferred biofuels and a maximum market share for the non-preferred ones, which favoured the waste-based biofuels in the short- and long-run. However, in spite of the support to the advanced biofuels that sidestepped contestation, their market supply was insufficient to fulfil the blending targets.

The member states implemented these positive sanctions and the market share targets in different fashions. Finland implemented the double counting, thereby expecting to reach its

blending target with biofuels produced from wastes. In France, the biodiesel industry, which relied on food crops and lagged behind the developments of advanced biofuels, attempted to obstruct the rule adoption and the tax exemptions to double-counted biofuels. Denmark demanded a persuasive binding EU target for advanced biofuels, instead of double counting and non-binding targets, but avoided enforcing one itself to the dismay of the Danish advanced biofuel producers. In parallel, proposals to curb the agri-biofuels market share divided the member states. Denmark proposed an emissions penalty and a market share limit below 5%, and claimed that a higher threshold undermined the promotion of advanced biofuels. In turn, the Council contested the penalty and resisted the adoption of a blending cap. Eventually, the EU triilogue agreed on the 7% cap, which conventional biofuel producers unsuccessfully attempted to reverse, as well as scheduled reviews of the inclusion of future emissions penalties. Similarly, although the French oilseeds industry claimed negative repercussions for the national economy, the government maintained the market share cap, insisting that the vocation of agriculture was food rather than fuel. The rule constrained the growth of agri-biofuels, as the EU-average biofuel market share (5.4%) remained below the 7% cap in 2015.

4.2. Effects of market organizing by meta-organization in policy-driven market creation

The reorganization of the market through the three organizing schemes substantially modified the market-creation policy instrument. These modifications emerged from the combined effects of contestation and varying implementation and rendered the market organization increasingly complex. For instance, each scheme added new, often conflicting purposes, which undermined the original policy goals (e.g., market growth) and reflected new goals (e.g., defining acceptability). Furthermore, this reorganization produced intertemporal discrepancies. The establishment of boundaries of acceptability and preferences tackled the problems of emissions reduction in the long-term (schemes 2 and 3) but hampered the achievement of the desired market growth (scheme 1).

A myriad of actors (market organizers, market actors that implement market rules, and other influencers of market organization) rendered the market-creation policy problematic. First, the mixed responses of member states to the market creation, as well as the influence of disagreeing actors, contributed to market reorganization. For instance, member states' decisions to reorganize modified the policy instrument at the local level, which was reflected in further EU-level changes. Second, as market organizer and meta-organization, the EU

enabled these mixed responses by allowing autonomy and enacting hierarchy. By promoting the adoption of some organizing elements but only enforcing the adoption of others, the EU facilitated the heterogeneous implementation of the organizing schemes. Third, the producers that developed and launched innovative products stimulated reorganization. For instance, the policy-makers introduced the advanced biofuels in the legislation as preferential future technologies. In addition, some of the producers innovated in response to the EU market rules, rather than to their member states' rules, which had the effect of minimizing the absence of member states commitment to biofuels. Nevertheless, such regulatory commitment was pivotal in the economic sustainability of these products in the national markets. In this way, member states, producers, and other actors either modified or undermined the policy instrument and its goals, through market organization, even if unintendedly and indirectly.

5. Discussion

This paper offers an alternative approach—based on the combination of market organization and meta-organization literatures—for a fine-grained examination of the organizational elements underpinning the dynamics of policy mixes (Rogge and Reichardt, 2016; Scordato et al., 2018). This approach enables researchers to unpack the complexity and dynamics observed in the biofuels market (German et al., 2017; Harnesk et al., 2017; Swaney, 1992). By combining the literatures of market organization and meta-organization (Ahrne et al., 2015; Ahrne and Brunsson, 2005), the analysis identified key features of dynamics of market outcomes that influence transnational market-creation policy.

First, the effect of varying implementation in market reorganization illuminates some of the identified drawbacks, such as uncoordinated bundled goals (Oliveira et al., 2017), unfulfilled supra-national sustainability norms (Afionis and Stringer, 2012), and weak mobilization (Sandoval and Popartan, 2014). Member states, as market organizers, deployed variations of organizing schemes, which often reflected conflicting interests (Oliver, 1991). For instance, they resisted the implementation of EU market rules and instead funded the development of new industry competences to fulfil the same policy goal. Thus, the policy implementation is influenced by multiple factors, in addition to the national interests and resource contexts (Lovio and Kivimaa, 2012), which drive resistance (Oliver, 1991), and to the actions of buyers and sellers in the value chain (Harnesk et al., 2017). Implementation is also found to be influenced by the effects of market organization on industry competitiveness and by the competitive actions of producers (incumbents and new entrants).

Relatedly, the varying implementation suggests a pivotal role for the relation between hierarchy and membership within meta-organizations acting as market organizers. The analysis suggests that the blending of autonomy (given by membership) and authority (given by hierarchy) in the relationship between the EU and member states, as market organizers, bolsters the varying implementation. Also crucial is the role played by other actors that are unable to organize but do influence the decisions of market organizers (Ahrne et al., 2015). The prominent influence of these actors, given the porosity of the EU's policy-making process, is expected to be higher in controversial policies. Thus, organizing schemes can be viewed as broad repertoires of responses to policy—ranging between implementation and non-implementation—enabled by the market organizers' autonomy in relation to the meta-organization and by the influence of other actors.

Second, regarding the role of contestation in reorganization, the reformulation of policy goals in response to actors' feedback is a feature of transitional policy-making that is well described in the literatures of reflexive governance (e.g., Meadowcroft, 2009) and experimental governance (e.g., Laakso et al., 2017). These literatures, however, appear to have overlooked key implications of this reformulation for the coordination among market organizers, producers, and sellers and market creation outcomes. Part of these implications consists of the combination of increasing regulation and frequent regulatory changes. This may result in the lack of coherence, consistency, and credibility in transitional policy (Rogge and Reichardt, 2016), the failure to achieve policy goals (Oliveira et al., 2017), and the loss of confidence among investors who are crucial for sustainability transformations (White et al., 2013). In addition, the analysis suggests that intertemporal discrepancies—an effect of reorganization—hinders coordination across present actions and future orientations. On that account, the role of temporality appears to play a critical role. However, temporality is still understudied as a feature of policy changes (Afionis and Stringer, 2012) and policy mixes (e.g., Rogge and Reichardt, 2016), although it is gaining traction in the corporate sustainability literature (e.g., Slawinski and Bansal, 2015).

Furthermore, the analysis contributes to the market organization literature by specifying the effect of conflicts through the role of conflicting purposes and intertemporal discrepancies. Conflicting purposes are integral to the tackling of global challenges in transnational markets (Djelic and Sahlin-Andersson, 2008). In addition, intertemporal discrepancies are manifested in the relations between compliance, competition, and innovation. In particular, the outcomes

of organizing schemes that establish future preferences for the short-term, through regulation in the present, appear to be negatively influenced by the long-term nature of innovation processes and by their uncertainty. As a result, future-oriented market organization may not provide incentives for producers and sellers to invest resources in promoting sustainability in the long-run (Harnesk et al., 2017). A potential implication is the role of these schemes in creating more or less predictability in market organization. Thus, further research is needed to build an in-depth understanding of the influence of particular configurations of organizing schemes on intertemporal discrepancies and on conflicting purposes.

The findings also contribute to the meta-organizations literature by suggesting that the blending of membership and hierarchy in meta-organizations acting as market organizers challenges the coordination among members towards a common purpose. For instance, given this hybrid role, the EU set legally-binding rules but relied on commitment and negotiation. Hence, the effect of combining the use of hierarchical authority as a market organizer (Ahrne et al., 2015) with autonomous membership as a meta-organization (Ahrne and Brunsson, 2005) suggests the pivotal role of hybridity in the failure to effectively achieve policy goals. For instance, hybridity may influence the neutralization or polarization of conflicts in meta-organizations (Berkowitz and Dumez, 2016). Nevertheless, the boundaries of the possibilities to manage this hybrid role and resolve the outcomes of conflicting purposes and intertemporal discrepancies are unclear. As a result, these implications are also relevant for transitional policy. Therefore, it is necessary to understand better the interaction and coordination among market organizers (Ahrne et al., 2007) in forms of market governance that promote innovation towards sustainability transformations (Berkowitz, 2018; Berkowitz and Bor, 2018).

Finally, as market-creation policy instruments are increasingly used in the EU, this study also has policy implications. Urgent action is needed to tackle increasingly complex challenges, but its effectiveness may be hindered by the contestation and implementation issues that are integral to transnational market transformations. More specifically, the public backlash triggered by the controversial outcomes of policies highlights the need to not only anticipate but also integrate the roles of multiple actors in the process. In addition, it is difficult, albeit necessary, to manage short-term and long-term action for climate change mitigation as well as to manage the tensions between these temporalities, such as in sustainable innovation and robust action. The case of the EU biofuels market shows that policy changes may lose effectiveness in the creation of a transnational market and the fulfilment of policy goals.

6. Conclusions

This paper shows the value of the literatures on market organization and meta-organizations in the understanding of the outcomes, dynamics, and complexity of the use of market-creation policy instruments. Through the analytical concepts of contestation and varying implementation, the market organization literature enables researchers to scrutinize and explain the complexities of transnational market changes that are caused by the interaction and influence of multiple actors, including competitors, regulators, customers, and various other stakeholders. For instance, it explains market fragmentation, which is detrimental to the transnational trade of commodities, such as fuels, and to coordinated action. In addition, the literature on meta-organizations is able to explain the implications of the hybrid role of the EU as a market-organizing meta-organization, which is defined by the blend of authority and autonomy. More generally, the paper proposes that this hybridity offers a relevant research angle for the literature on meta-organizations, which, to the best of our knowledge, is understudied. Taken together, these are outcomes of interest to the literature on market organization with a particular focus on the dynamics of market organizing.

The main finding of this paper is that market reorganization over time may cause intertemporal discrepancies and conflicting objectives within market-creation policies. In the case of the policy-driven EU biofuels market, the combination of conflicting objectives, intertemporal discrepancies, and hybridity in the role of market organizer—though necessary or inevitable—compromised the fulfilment of the market growth goals. Thus, a better understanding of the challenges that are rooted in the market organizing dynamics is of paramount importance to inform potential corrections of unexpected inconsistencies in these complex systems. Thus, this paper takes a step further in the understanding of the policy reformulation dynamics in transnational markets with implications for the coordination among multiple actors and the predictability of market outcomes.

Acknowledgements

This work was financially supported by the Finnish Foundation for Economic Education, the Helsinki School of Economics Foundation, and the Strategic Research Council at the Academy of Finland [314325]. We appreciate the support of Matthew Billington in providing language assistance.

References

- Afionis, S., Stringer, L.C., 2012. European Union leadership in biofuels regulation: Europe as a normative power? *J. Clean. Prod.* 32, 114–123.
- Ahrne, G., Aspers, P., Brunsson, N., 2015. The Organization of Markets. *Organ. Stud.* 36, 7–27.
- Ahrne, G., Brunsson, N., 2011. Organization outside organizations: the significance of partial. *Organization* 18, 83–104.
- Ahrne, G., Brunsson, N., 2005. Organizations and meta-organizations. *Scand. J. Manag.* 21, 429–449.
- Ahrne, G., Brunsson, N., Garsten, C., 2002. Standardizing through Organization, in: Brunsson, N., Jacobsson, B. (Eds.), *A World of Standards*. Oxford University Press, Oxford, pp. 50–69.
- Ahrne, G., Brunsson, N., Kerwer, D., 2016a. The Paradox of Organizing States: A Meta-Organization Perspective on International Organizations. *J. Int. Organ. Stud.* 7, 5–24.
- Ahrne, G., Brunsson, N., Seidl, D., 2016b. Resurrecting organization by going beyond organizations. *Eur. Manag. J.* 34, 93–101.
- Ahrne, G., Brunsson, N., Tamm Hallström, K., 2007. Organizing Organizations. *Organization* 14, 619–624.
- Alexius, S., Castillo, D., Rosenström, M., 2014. Contestation in transition: value configurations and market reform in the markets for gambling, coal and alcohol, in: Alexius, S., Tamm Hallström, K. (Eds.), *Configuring Value Conflicts in Markets*. Edward Elgar Publishing, Cheltenham, pp. 178–203.
- Alexius, S., Tamm Hallström, K. (Eds.), 2014. *Configuring Value Conflicts in Markets*. Edward Elgar Publishing, Cheltenham.
- Aspers, P., 2011. *Markets*. Polity, Cambridge.
- Baier, V.E., March, J.G., Saetren, H., 1986. Implementation and ambiguity. *Scand. J. Manag. Stud.* 2, 197–212.
- Bergek, A., Berggren, C., KITE Research Group, 2014. The impact of environmental policy instruments on innovation: A review of energy and automotive industry studies. *Ecol. Econ.* 106, 112–123.

- Bergquist, A.-K., Söderholm, K., 2015. Transition to greener pulp: regulation, industry responses and path dependency. *Bus. Hist.* 57, 862–884.
- Berkowitz, H., 2018. Meta-organizing firms' capabilities for sustainable innovation: A conceptual framework. *J. Clean. Prod.* 175, 420–430.
- Berkowitz, H., Bor, S., 2018. Why Meta-Organizations Matter: A Response to Lawton et al. and Spillman. *J. Manag. Inq.* 27, 204–211.
- Berkowitz, H., Dumez, H., 2016. The Concept of Meta-Organization: Issues for Management Studies. *Eur. Manag. Rev.* 13, 149–156.
- Bernard, F., Prieur, A., 2007. Biofuel market and carbon modeling to analyse French biofuel policy. *Energy Policy* 35, 5991–6002.
- Boons, F., Mendoza, A., 2010. Constructing sustainable palm oil: how actors define sustainability. *J. Clean. Prod.* 18, 1686–1695.
- Brès, L., Raufflet, E., Boghossian, J., 2017. Pluralism in Organizations: Learning from Unconventional Forms of Organizations. *Int. J. Manag. Rev.* 1–23.
- Brunsson, N., 2002. Organizations, Markets, and Standardization, in: Brunsson, N., Jacobsson, B. (Eds.), *A World of Standards*. Oxford University Press.
- Brunsson, N., Jacobsson, B., 2000. *A World of Standards*. Oxford University Press, Oxford.
- Charles, M.B., Ryan, R., Ryan, N., Oloruntoba, R., 2007. Public policy and biofuels: The way forward? *Energy Policy* 35, 5737–5746.
- Chaudhury, A.S., Ventresca, M.J., Thornton, T.F., Helfgott, A., Sova, C., Baral, P., Rasheed, T., Ligthart, J., 2016. Emerging meta-organisations and adaptation to global climate change: Evidence from implementing adaptation in Nepal, Pakistan and Ghana. *Glob. Environ. Change* 38, 243–257.
- Di Lucia, L., Ahlgren, S., Ericsson, K., 2012. The dilemma of indirect land-use changes in EU biofuel policy – An empirical study of policy-making in the context of scientific uncertainty. *Environ. Sci. Policy* 16, 9–19.
- Djelic, M.-L., Sahlin-Andersson, K. (Eds.), 2008. *Transnational governance: institutional dynamics of regulation*. Cambridge University Press, Cambridge.
- Edelman, L.B., Suchman, M.C., 1997. The Legal Environments of Organizations. *Annu. Rev. Sociol.* 23, 479–515.
- Engels, A., 2006. Market creation and transnational rule making: The case of CO2 emissions trading, in: Djelic, M.-L., Sahlin-Andersson, K. (Eds.), *Transnational Governance:*

- Institutional Dynamics of Regulation. Cambridge University Press, Cambridge, pp. 329–48.
- Etzion, D., Gehman, J., Ferraro, F., Avidan, M., 2017. Unleashing sustainability transformations through robust action. *J. Clean. Prod.* 140, 167–178.
- EU Commission, 2006. *Priorities in agricultural and trade policy*. Mariann Fischer Boel, Member of the European Commission responsible for Agriculture and Rural Development (SPEECH/06/290). http://europa.eu/rapid/press-release_SPEECH-06-290_en.htm (accessed 3 December 2018)
- Fligstein, N., Mara-Drita, I., 1996. How to Make a Market: Reflections on the Attempt to Create a Single Market in the European Union. *Am. J. Sociol.* 102, 1–33.
- German, L., Goetz, A., Searchinger, T., Oliveira, G. de L.T., Tomei, J., Hunsberger, C., Weigelt, J., 2017. Sine Qua Nons of sustainable biofuels: Distilling implications of under-performance for national biofuel programs. *Energy Policy* 108, 806–817.
- Harnesk, D., Brogaard, S., Peck, P., 2017. Regulating a global value chain with the European Union’s sustainability criteria – experiences from the Swedish liquid transport biofuel sector. *J. Clean. Prod.* 153, 580–591.
- Healy, S.A., 1994. The recent European biofuel debate as a case study in the politics of renewable energy. *Renew. Energy* 5, 875–877.
- Hirschman, A.O., 1970. *Exit, Voice, and Loyalty: Responses to Decline in Firms, Organizations, and States*. Harvard University Press, Cambridge, MA.
- Howarth, N.A.A., Rosenow, J., 2014. Banning the bulb: Institutional evolution and the phased ban of incandescent lighting in Germany. *Energy Policy* 67, 737–746.
- Jacobsson, B., Sahlin-Andersson, K., 2008. Dynamics of soft regulations, in: Djelic, M.-L., Sahlin-Andersson, K. (Eds.), *Transnational Governance: Institutional Dynamics of Regulation*. Cambridge University Press, Cambridge, pp. 247–265.
- Janssen, R., Turhollow, A.F., Rutz, D., Mergner, R., 2013. Production facilities for second-generation biofuels in the USA and the EU – current status and future perspectives. *Biofuels Bioprod. Biorefining* 7, 647–665.
- Jordan, A., Adelle, C. (Eds.), 2013. *Environmental policy in the EU: actors, institutions and processes*, 3rd ed. ed. Routledge, Oxon.
- Kemp, R., Schot, J., Hoogma, R., 1998. Regime shifts to sustainability through processes of niche formation: The approach of strategic niche management. *Technol. Anal. Strateg. Manag.* 10, 175–195.
- Kerwer, D., 2016. International Organizations as Meta- Organizations: The Case of the European Union. *J. Int. Organ. Stud.* 7, 40–53.

- Kerwer, D., 2005. Rules that Many Use: Standards and Global Regulation. *Governance* 18, 611–632.
- King, B.G., Pearce, N.A., 2010. The Contentiousness of Markets: Politics, Social Movements, and Institutional Change in Markets. *Annu. Rev. Sociol.* 36, 249–267.
- Kivimaa, P., Mickwitz, P., 2011. Public policy as a part of transforming energy systems: framing bioenergy in Finnish energy policy. *J. Clean. Prod.* 19, 1812–1821.
- Laakso, S., Berg, A., Annala, M., 2017. Dynamics of experimental governance: A meta-study of functions and uses of climate governance experiments. *J. Clean. Prod.* 169, 8–16.
- Langley, A., 1999. Strategies for theorizing from process data. *Acad. Manage. Rev.* 24, 691–710.
- Le Galès, P., 2001. Est Maître Des Lieux Celui Qui Les Organise: How Rules Change When National and European Policy Domains Collide, in: Stone Sweet, A., Sandholtz, W., Fligstein, N. (Eds.), *The Institutionalization of Europe*. Oxford University Press, Oxford, pp. 137–154.
- Levidow, L., 2013. EU criteria for sustainable biofuels: Accounting for carbon, depoliticising plunder. *Geoforum* 44, 211–223.
- Londo, M., Deurwaarder, E., 2007. Developments in EU biofuels policy related to sustainability issues: overview and outlook. *Biofuels Bioprod. Biorefining* 1, 292–302.
- Lovio, R., Kivimaa, P., 2012. Comparing Alternative Path Creation Frameworks in the Context of Emerging Biofuel Fields in the Netherlands, Sweden and Finland. *Eur. Plan. Stud.* 20, 773–790.
- Luhmann, N., 2005. The Paradox of Decision Making, in: Seidl, D., Becker, K.H. (Eds.), *Niklas Luhmann and Organization Studies, Advances in Organization Studies*. Liber & Copenhagen Business School Press, Kristianstad, pp. 85–106.
- Manning, S., Boons, F., von Hagen, O., Reinecke, J., 2012. National contexts matter: The co-evolution of sustainability standards in global value chains. *Ecol. Econ.* 83, 197–209.
- March, J.G., Schulz, M., Zhou, X., 2000. *The dynamics of rules: Change in written organizational codes*. Stanford University Press, Stanford, CA.
- Markevičius, A., Katinas, V., Perednis, E., Tamašauskienė, M., 2010. Trends and sustainability criteria of the production and use of liquid biofuels. *Renew. Sustain. Energy Rev.* 14, 3226–3231.

- Maxwell, J., Briscoe, F., 1997. There's money in the air: The CFC ban and DuPont's regulatory strategy. *Bus. Strategy Environ.* 6, 276–286.
- Mazzucato, M., 2016. From market fixing to market-creating: a new framework for innovation policy. *Ind Innov.* 23, 140–156.
- Meadowcroft, J., 2009. What about the politics? Sustainable development, transition management, and long term energy transitions. *Policy Sci.* 42, 323–340.
- Miles, M.B., Huberman, A.M., Saldaña, J., 2014. *Qualitative Data Analysis: A Methods Sourcebook*, 3rd ed. Sage Publications, Thousand Oaks, CA.
- Mol, A.P.J., 2010. Environmental authorities and biofuel controversies. *Environ. Polit.* 19, 61–79.
- Okhmatovskiy, I., David, R.J., 2011. Setting Your Own Standards: Internal Corporate Governance Codes as a Response to Institutional Pressure. *Organ. Sci.* 23, 155–176.
- Oliveira, G. de L.T., McKay, B., Plank, C., 2017. How biofuel policies backfire: Misguided goals, inefficient mechanisms, and political-ecological blind spots. *Energy Policy* 108, 765–775.
- Oliver, C., 1991. Strategic Responses to Institutional Processes. *Acad. Manage. Rev.* 16, 145–179.
- Panoutsou, C., Bauen, A., Duffield, J., 2013. Policy regimes and funding schemes to support investment for next-generation biofuels in the USA and the EU-27. *Biofuels Bioprod. Biorefining* 7, 685–701.
- Peck, P., Bennett, S.J., Bissett-Amess, R., Lenhart, J., Mozaffarian, H., 2009. Examining understanding, acceptance, and support for the biorefinery concept among EU policy-makers. *Biofuels Bioprod. Biorefining* 3, 361–383.
- Reinecke, J., Manning, S., Hagen, O. von, 2012. The Emergence of a Standards Market: Multiplicity of Sustainability Standards in the Global Coffee Industry. *Organ. Stud.* 33, 791–814.
- Rogge, K.S., Reichardt, K., 2016. Policy mixes for sustainability transitions: An extended concept and framework for analysis. *Res. Policy* 45, 1620–1635.
- Sabel, C.F., Zeitlin, J., 2012. Experimentalism in the EU: Common ground and persistent differences. *Regul. Gov.* 6, 410–426.
- Sabel, C.F., Zeitlin, J., 2008. Learning from Difference: The New Architecture of Experimentalist Governance in the EU. *Eur. Law J.* 14, 271–327.

- Sandoval, I.S., Popartan, L., 2014. The implementation of the EU biofuels policy in Spain and the UK: a case of contested Europeanization. *Biofuels* 5, 129–140.
- Scordato, L., Klitkou, A., Tartiu, V.E., Coenen, L., 2018. Policy mixes for the sustainability transition of the pulp and paper industry in Sweden. *J. Clean. Prod.* 183, 1216–1227.
- Slawinski, N., Bansal, P., 2015. Short on Time: Intertemporal Tensions in Business Sustainability. *Organ. Sci.* 26, 531–549.
- Söderholm, K., Bergquist, A.-K., Söderholm, P., 2017. The transition to chlorine free pulp revisited: Nordic heterogeneity in environmental regulation and R&D collaboration. *J. Clean. Prod.* 165, 1328–1339.
- Swaney, J.A., 1992. Market versus Command and Control Environmental Policies. *J. Econ. Issues* 26, 623–633.
- Valente, M., Oliver, C., 2018. Meta-Organization Formation and Sustainability in Sub-Saharan Africa. *Organ. Sci.* 29, 678–701.
- Vifell, Å.C., Thedvall, R., 2012. Organizing for social sustainability: governance through bureaucratization in meta-organizations. *Sustain. Sci. Pract. Policy* 8, 50–58.
- Weinstein, M.P., Turner, R.E., Ibáñez, C., 2013. The global sustainability transition: it is more than changing light bulbs. *Sustain. Sci. Pract. Policy* 9, 4–15.
- White, W., Lunnan, A., Nybakk, E., Kulisic, B., 2013. The role of governments in renewable energy: The importance of policy consistency. *Biomass Bioenergy* 57, 97–105.

Table 1. Variation in implementation, further national support, and biofuel technologies, products and market share

	Denmark	Finland	France
Implementation of EU Directives	No early implementation Non-binding blending rule of 0.1% (2005) Phase-in of incremental sub-targets up to 5.75% by 2012 Decision on binding rule to 2015 postponed Implemented sustainability criteria (2009)	No early implementation Non-binding blending rule 0.1% (2005), later a binding 6% by 2014 that increased to 20% by 2020 and 40% by 2030 Negative sanction: fines for non-compliance with binding blending rule Implemented double counting and sustainability criteria (2009)	Binding rule progressed to 5.75% by 2008, 7% by 2010, and 10% by 2015, but halted at 7% Negative sanction: fines for difference between target and actual blending Implemented modified double counting (with tax exemption) and sustainability criteria (2009)
Further national support	State funds to R&D on advanced biofuels and on industry-academia collaboration projects, e.g. bioethanol from straw Venture funding of spin-offs of academic research institutes	Early temporary tax exemption Public and private funding of R&D and fuel trial programmes (e.g., technology potential) Public subsidies supported private initiatives on use of residues and new technologies Research on higher biofuel blends (companies and public institutes) Sale of E10 and E85 petrol	Exemption of excise taxes Research programmes on agriculture sector (1994-2005) and technology development State-funded multi-sector programmes for advanced biofuels Subsidies to increases in production capacity (public tenders) Sale of E10 petrol and E85 petrol, B30 diesel for captive fleets
Biofuel competences, products and technologies	2000s: biotechnology for cost-efficient production 2005: biodiesel from animal fat and rapeseed oil 2006: technology for bioethanol from agricultural waste (firm partnerships) Production capacity in 2014: 0 kt	2008: biodiesel from vegetable oils, animal fats and other residues; bioethanol from organic waste 2014: technology capability for biodiesel from microbial oil and bioethanol and biodiesel from pulp processing residues Production capacity in 2014: 445 kt	1990s: biofuels from agriculture crops (farming sector) and biocomponents for petrol (oil sector) 2010: start-ups on biopetrol 2014: advanced technology research pooled multi-sector resources (e.g., industry consortia) to produce from straw Production capacity in 2014: 3852 kt
Market share development	0% in 2005; 0.5% in 2010; 4.7% in 2014	0.1% in 2003; 2.9% in 2010; 10.6% in 2014	0.6% in 2003; 5.0% in 2010; 6.1% in 2014

Table 2. Constitutive dimensions of each organizing scheme

Organizing scheme	Favouring a product group	Specifying acceptability for product group	Establishing preferences within product group
Elements of market organization	<p>Non-binding rule (minimum blending 2% by 2005 and 5.75% by 2010) modified to binding rule of ambiguous scope (minimum 10% for all renewable energy sources by 2020).</p> <p>Discretionary exceptions to taxation rules</p> <p>Monitoring of member state (MS) compliance</p> <p>Sanction: non-compliance warning to MS</p>	<p>Binding rules: 35% GHG emission reduction (vs. fossil fuels) (50% by 2017, 60% by 2018), no raw materials grown in land with high carbon and high biodiversity</p> <p>Monitoring of environmental and social impacts of biofuels produced and sold in MS</p> <p>Monitoring of producers: third-party verification of sustainability criteria</p> <p>Sanctions: non-eligibility to fulfil targets and receive subsidies or funding</p>	<p>Binding rule: maximum agri-biofuels' share 7%</p> <p>Positive sanction: double-counting bonus for advanced biofuels (selected types)</p> <p>Non-binding rule: minimum advanced biofuels' share 0.5% (all double-counted except used cooking oils and animal fats)</p> <p>Monitoring of producers: reporting of indirect land use change emissions</p>
Other elements reinforcing market organization	<p>State aid allowed case by case (investment subsidies)</p> <p>Energy crop support scheme and permission to grow crops on set-aside land</p> <p>Funding for technology research and demonstration programmes</p>	<p>Research on biofuel's social and environmental impacts (including emissions, use of land, food prices volatility)</p> <p>Research on definitional criteria for sustainable biofuels</p>	<p>Definitional activities to identify eligibility for double counting</p> <p>Funding for technology research and demonstration programmes</p>
Outcomes	<p>Market growth below targets and slower than expected (share of 4.1% in 2014 excluding double counting vs. 5.75% goal for 2010)</p> <p>Weak enforcement (ambiguous target open to other renewable energies)</p> <p>Fragmented implementation</p>	<p>Biofuels certified according to sustainability criteria (89% of total consumption in 2014)</p> <p>Potential change in market organizing due to scheduled reviews</p> <p>Quasi-harmonized implementation</p>	<p>Favourable market conditions for advanced biofuels (in some MS)</p> <p>Potential change in market organizing due to scheduled reviews</p> <p>Fragmented implementation</p> <p>Advanced biofuels grew from 1.4% (unofficially 9%) of total share in 2010 to about 20% in 2014</p> <p>Share of double counted biofuels: not reported</p>

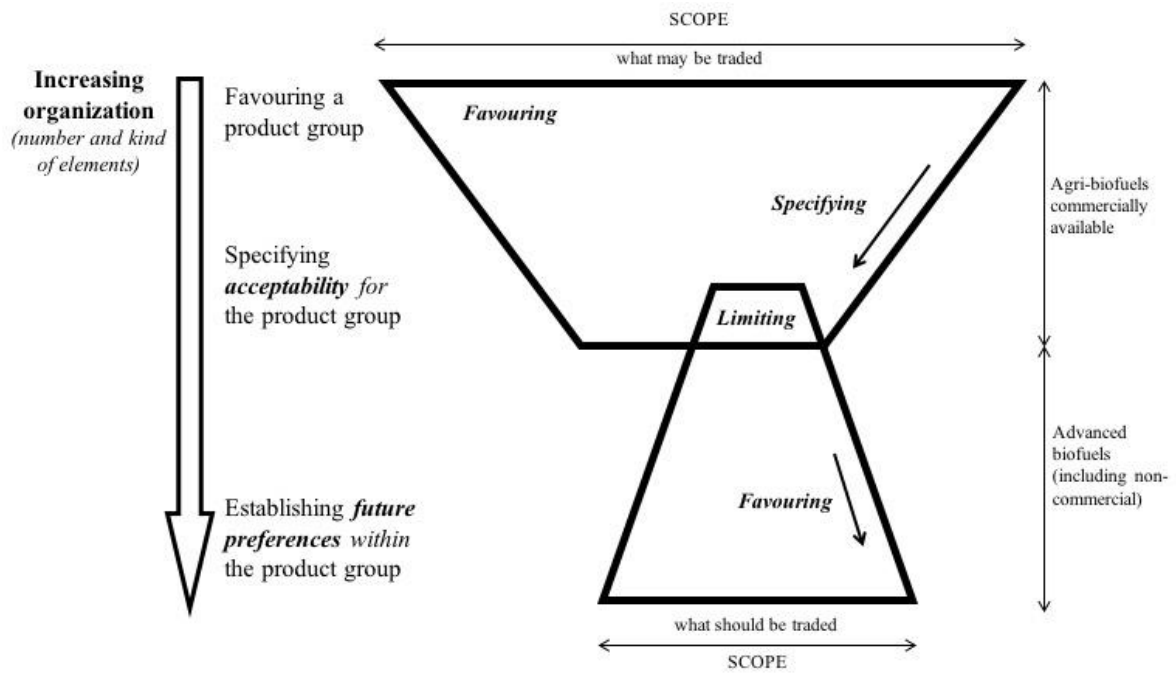


Figure 1. Organizing schemes: Organizing for favouring, for acceptability and for future preferences