CARISMA

Innovation for Climate Change Mitigation

Discussion Paper No. 1

February 2017

Contextual factors affecting EU climate policies and their outcomes

Summary

Institutional, economic and social contexts influence the formulation as well as the implementation of climate policy instruments. To design more robust and adaptive instruments, it is necessary to understand different categories and types of contextual factors that are central to EU climate change mitigation. This paper identifies three types of contextual factors: institutions and governance; innovation and investment; attitudes, behaviour and lifestyle. By categorising the contextual factors and mapping examples of how each factor shapes and influences mitigation policies and their outcome, this paper seeks to contribute to more systematic understanding and structured discussions for EU and member state policy-makers.

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CARISMA
Innovation for Climate Change Mitigation

Contents

1. Introduction

Institutional, economic and social contexts influence the formulation as well as the implementation of climate policy instruments. Although they are highly complex, better awareness and understanding of these contexts could enable policy-makers to design policy instruments to be more robust and adaptive to changes in contextual frameworks.

This CARISMA Discussion Paper seeks to contribute to the understanding of the factors that constitute a context for the formulation and implementation of a policy instrument. While knowledge about contextual factors remains fragmented, the paper maps, categorises and discusses key contextual factors and gives examples of how they could affect decision-making. The mapping and categorising exercise is based on a review of the literature on, among others, climate change mitigation and support measures for both renewable energy (including innovation or investment) and energy efficiency (including behavioural change and household consumption). By organising and presenting existing information related to the contexts for climate change mitigation options and policy instruments, this paper aims at supporting EU and national policy-makers. For this purpose, the paper focuses on the key contextual factors that are particularly relevant for EU climate change mitigation actions.

The Discussion Paper first explains why contextual factors are important in influencing the performance of mitigation policies and policy instruments. Then, it uses insights from the Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report to categorise contextual factors. Based on the IPCC report and other literature, the paper presents an overview of context categories and contextual factors, including the basic characteristics of each contextual factor, and examples of how a contextual factor could influence the mitigation outcome. Specific contextual factors are grouped by context categories. Finally, the paper closes with a discussion based on mapping and categorising contextual factors of mitigation options.

2. Approach to arriving at contextual factors

Policy-makers have to make complex decisions in order to design, adopt and implement a policy instrument that really works in terms of effectiveness and efficiency. There is a strong need for robust and adaptive policy instruments that remain effective and efficient even if external contexts and frameworks change. For climate change mitigation, this is particularly important because of the systemic nature of the required transition, the long time frame over which this transition needs to be made and the profound impacts of the mitigation policies on all parts of society, including households and citizens. Institutions and infrastructure have long-lasting effects. In many cases, today's decisions determine the shape of our energy and industrial systems for the next 20-30 years, or even longer.

To achieve climate and energy policy objectives, policy-makers select a specific mitigation option that has the potential to reduce greenhouse gas (GHG) emissions to desired levels. Subsequently, they need to decide how to implement the mitigation option, by choosing from a range of policy instruments in the categories of economic instruments (e.g. taxes, emissions trading, certificate trading and subsidies), regulatory instruments (standards, regulation and directives), voluntary instruments (self-regulation

and soft technology standards) or information instruments (communication and awareness-raising).

Examples from literature (see the following sections) show how a particular contextual factor could play out in a certain national or local context, affecting the adoption, implementation and/or effectiveness of a specific mitigation option and its associated policy instrument. These insights need to be considered when selecting and designing specific policy instruments.

This Discussion Paper presents three categories of contextual factors that are especially relevant to climate change mitigation in EU policy-making. The three categories are i) institutions and governance, ii) innovation and investment, and iii) attitudes, behaviour and lifestyle. They are derived from "common enabling factors" to underpin adaptation and mitigation responses in the IPCC's Fifth Assessment Report (AR5) (IPCC, 2014a[1] and 2014b). The IPCC also indicates a list of common factors that constrain the implementation of adaptation and mitigation options, i.e. "constraining factors" (IPCC, 2014a[2]). This Discussion Paper excludes the fourth category mentioned by the IPCC (2014a), "sustainable livelihoods", as the narrower scope of the other three categories sufficiently captures the contextual factors relevant to climate change mitigation in Europe.

In this paper, the list of contextual factors under the overarching categories derived from the IPCC AR5 is further modified in light of our focus on mitigation options in Europe. For this purpose, information has been collected from a variety of sources, such as scientific papers, policy briefs, project reports and conference papers. Use has also been made of literature on, for example, barriers to public engagement in climate change mitigation that have been impediments to a sustainable lifestyle, and require enabling institutions and infrastructure (Lorenzoni et al., 2007). In addition, the paper has drawn from literature on categories of systemic problems that hamper diffusion and deployment of renewable energy technologies and include those associated with institutions, market structure and infrastructure (Negro et al., 2012).

3. Overview of contextual factors

Institutions and governance

Institutions and governance are the means for deciding, managing and implementing climate change mitigation policies and measures. This paper focuses on the following factors associated with the context of institutions and governance in European countries:

- institutional coordination,
- regulatory alignment with non-climate policies,
- administrative feasibility, and
- constellation of stakeholders.

Institutional coordination is distinguished by two different challenges: those between ministries at a national level and those between the national and sub-national levels (Deroubaix and Lévèque, 2006; Negro et al., 2012). Regulatory alignment is required between climate and non-climate policies. The latter include safety and spatial planning regulations (Ragwitz et al., 2015).

[1] See section 4.1, "Common enabling factors and constraints for adaptation and mitigation responses".

[2] See Table 4.1, "Common factors that constrain the implementation of adaptation and mitigation options".

Administrative feasibility is particularly concerned with authorisation or permitting procedures.[3] Lastly, stakeholders and their constellation influence the adoption of legislative proposals as well as support for the implementation of the legislation passed.[4]

Innovation and investment

Innovation and investment take place in environmentally sound technologies and infrastructure. Such actions are influenced by contextual factors originating from the form and condition of the broader economy, as well as the actors within the economy. This work identifies five factors that relate to the structure and health of the economy, and the degree of collaboration and general attitudes of actors within it. They can be categorised in the following ways:

- presence of a technological innovation system,
- market framework,
- policy continuity,
- macroeconomic environment, and
- corporate and investment culture.

Technological innovation systems (TIS) are networks of agents in a specific technology area that generate and diffuse technologies; such systems can help shift the focus from individual organisations to interactions between multiple groups, or shift the focus of policies from research and development towards the processes involved in introducing new products or methods to a particular system (Dantas, 2005). TISs have been closely associated with Germany's policy to support solar and wind power (IRENA, 2015). Market frameworks can help or hinder investment in low-carbon policies, as seen in EU accession countries with government-specified electricity prices, which can result in false price signals being sent to investors (Vlahinic, 2011). Policy continuity bolsters investor confidence that market conditions or limitations will not unexpectedly change, encouraging investment (Lipp, 2007; De Jager and Rathmann, 2008). The conditions of the broader macroeconomic environment are relevant as well: after the global financial crisis, investment in green energy suffered because of banks' wariness about taking on additional debt due to the impacts of changes in the housing market. Finally, the culture and attitudes of private companies and their CEOs can have an effect on investment, as reflected both globally by the varied reactions of multinational oil companies to efforts to limit emissions (Kolk and Levy, 2001) and on a smaller scale, by investors in renewables in Sweden (Bergek et al., 2013).

Attitudes, behaviour and lifestyle

Social attitudes, behaviour and lifestyle may pose implicit constraints or drive behavioural change, as motivated by policy measures that influence individual adopters' decisions, and are usually the hardest to change. This paper looks into seven factors, which relate to the influence of social structures over individual behaviour, as well as behavioural characteristics and resource challenges. These are categorised as follows:

- collective environmental beliefs & norms,
- social attitudes & parameters,
- public perception,

[3] See in general United Nations (2010), IEA-RETD, (2013) and Noothout et al. (2015). For specific examples, see Toke (2003) and Ragwitz et al. (2015).

[4] For specific examples, see Deroubaix and Lévèque (2006), Thalmann (2004), Fearnley et al. (2015), Figenbaum and Kolbenstvedt (2015) and Assum et al. (2014).

- behavioural predisposition at the individual level,
- knowledge and experience,
- financial resources, and
- social capital.

Social attitudes as well as collective belief systems may strongly influence (public) perception of and thus compliance with/participation in climate change mitigation policies. This can be explained by the fact that individuals tend to follow the norms of a group (e.g. society, community, neighbours and networks). Indicatively, one of the most difficult but potentially effective ways to reduce GHG emissions would be by changing energy consumption patterns in the household sector.

Behavioural predisposition at the individual level concerns the behaviour of potential adopters (of policies), which is dictated by individual motives, norms, values, characteristics and strategies. Nevertheless, individual households or SMEs face different types of resource constraints: knowledge and experience (Gadenne et al., 2011); financial resources (Mignon and Bergek, 2016; Bergek et al., 2013); and social capital (Mignon and Bergek, 2016). These challenges need to be considered separately from the needs for general resources, the state of a country or a market.

Table 1 presents a preliminary list of contextual factors by overarching category. In this table, each factor is described with specific examples of how it can influence the adoption, implementation and/or effectiveness of a specific mitigation option and its associated policy instrument in European countries. Even if we provide specific examples in specific EU countries, most of them are relevant for several EU countries.

Table 1. Categorisation of contextual factors

Contextual factors	Explanation	Example(s) of how the contextual factor may affect climate policy
Institutions and governance		
Institutional coordination	Climate change mitigation policies can fall under the competences of more than one governmental authority (e.g. the ministries of environment, energy or finance) at a national level, and between national and sub-national governments. Coordination across ministries and between different levels of government affects coherence in policy formulation and effectiveness, as well as efficiency in policy implementation.	• *Between ministries*: The Ecological/Environmental Tax Reform failed in France in 2000 partly because disagreements between the Ministry of Environment and the Ministry of Finance added to the lack of transparency in the negotiations between the government and the business representative, which led to the final decision of the Constitutional Court to terminate it (Deroubaix and Lévèque, 2006). • *National and sub-national*: Both biofuel and photovoltaic policies in the Netherlands show misalignment between the national and provincial governments – with the former discontinuing subsidies while the latter provided tax exemptions for biofuel applications and subsidies for solar production firms (Negro et al., 2012, pp. 3840-41). We see the same in other EU countries such as Austria, where federal and provincial subsidies for energy and climate measures overlap (Galarraga et al., 2011).
Regulatory alignment with non-climate policies	A regulatory framework, such as regulations and standards, developed for non-climate objectives could support or prevent the uptake of mitigation options.	• The framework for cycle lanes vis-à-vis automobile lanes in the Netherlands affects the motorised transport movement and emissions (Zuidgeest et al., 2011). • Non-harmonised regulations for spatial planning among the federal states (e.g. the 2015 distance regulation for wind parks in Bavaria) constitute a major barrier for wind energy development in Germany (Ragwitz et al., 2015).
Administrative	Administrative feasibility depends on the procedures and	In the UK, wind-power developers apply to local authorities for planning

feasibility	structures. Administrative procedures include authorisation procedures for legal permission or permits, public tendering processes and operational instructions, tools and procedures. Administrative structures are concerned with the authorities involved in terms of the number of administrative bodies and their capacities (United Nations, 2010; IEA-RETD, 2013). These authorities can help or prevent the uptake of mitigation options by affecting the amount of time required for private entities, such as power plant developers, to obtain permission or permits to construct and operate their installations ("administrative lead time") (Noothout et al., 2015).	permission. The decision is made by the councillors on the planning committee (Toke, 2003). The permitting procedures ('planning permit') for medium- and large-scale installations are lengthy, especially due to appeal processes (Ragwitz et al., 2015).
Constellation of stakeholders	Stakeholders may emerge as supporters or sceptics of a mitigation option. A constellation of stakeholders may limit or streamline the uptake of mitigation options.	• The Ecological/Environmental Tax Reform failed in France in 2000 partly because business could mobilise and easily form a counter-coalition (Deroubaix and Lévèque, 2006; see also "institutional coordination" above). • In the example of a referendum in Switzerland in 2000 (the green tax reform, the solar initiative and the energy conservation package), big business strongly opposed the taxes and managed to block them (Thalmann, 2004). • In the example of electric vehicles (EV) deployment in Norway, politicians and media are supportive while stakeholders are active in dissemination and communication of information and in sharing experiences, particularly among friends and acquaintances (a strong 'neighbour effect') (Fearnley et al., 2015; Figenbaum and Kolbenstvedt, 2015; Assum et al., 2014).

Innovation and investment		
Contextual factors	**Explanation**	**Example (s)**
Presence of a technological innovation system	A technological innovation system is a network of agents that operates under institutions in a specific technology area. Market formation is one of the functions in a technological innovation system, which generates and diffuses technologies. Others include entrepreneurial experimentation, knowledge development and development of external economies (Hekkert et al., 2011). The concept of the innovation system stresses that the flow of technology and information among people, enterprises and institutions is key to an innovative process (Hekkert et al., 2011).	• Clusters and regional collaborative networks involving firms, universities and research institutes are a signature of Germany's policy to support solar and wind energy industries (IRENA, 2015). • Weak market formation processes through the respective support schemes in Denmark and in the Netherlands are considered to be important barriers to the diffusion of offshore wind in these countries (Wieczorek et al., 2013).
Market and regulatory framework	Market frameworks can enable or limit investment in low-carbon policies, namely through the commercialisation barriers or a lack thereof that new technologies face compared with mature ones, regulatory frameworks that may be prohibitive and other factors (e.g. access to information, capital and transaction costs).	• In EU accession countries in south-eastern Europe the market has not been liberalised yet and electricity prices are set by the governments. Thus the right price signals have not been provided for investment in some of the technology options (Vlahinic, 2011). • The low-carbon transformation will not take off by itself. Renewable energy technologies are currently more expensive than fossil fuel-based power production, and all carbon and capture storage technologies imply a substantial increase in costs. Therefore, a regulatory framework must be created that gives the right incentives so that market participants are ready to step in. The basic design choice of this regulatory framework is which instruments are to be used. The current regulatory framework uses a mix of subsidies, carbon prices and technological prescriptions to advance the low-carbon transformation (de Bruyn et al., 2016).
Policy continuity	It is important for investors that a policy or support framework is not	Retroactive changes to support policies for renewable energy sources

	unexpectedly changed.	(RES) in Spain, for example, have hindered the development of renewable energy.
Macroeconomic environment	In EU and particularly in EU accession countries, the macroeconomic framework environment supports or limits the public or private sector's capacity to invest. The broader condition of the macroeconomic environment, outside the specific sectors relevant to climate change mitigation, can promote or limit the public or private sector's capacity to invest in low-carbon technologies. Changes in other sectors, e.g. in availability of capital, expected returns on investment, expectations of future economic conditions and investor confidence, can lead to indirect effects on the ability to invest in low-carbon technologies.	Economic activity raises the demand for energy and investment in the energy sector and the available means of finance. After sustained yearly growth in the renewable energy sector beginning in 2004, the 2008 financial crisis led to less favourable financial conditions and uncertainty over future demand for green energy, with new financial investment in renewable technologies in 2009 falling to pre-2006 levels (Fritz-Morgenthal et al., 2009). The crisis has led to credit restrictions, which have affected all types of productive investments and particularly renewable electricity investment. The cost of capital has risen in several member states (EC, 2013), making it more difficult to access loans in order to finance such investment and/or substantially increasing total capital costs. In some countries, and notably in southern Europe (e.g. Portugal and Spain), capital is relatively more expensive.
Corporate & investment culture	Economic and market position, e.g. a company's financial situation and competitive market positioning, as well as such organisational factors as degree of (de)centralisation, the type of decision-making process and existence of a closed or open corporate culture, all influence corporate opinion towards climate policy. These traits differ across types of companies and countries, and these differences may lead to support, or a lack thereof, for mitigation policy.	Differing corporate cultures in multinational oil companies have been cited as contributing to their degree and timing of acknowledging climate change, and support of efforts to mitigate emissions. Shell and BP were earlier to do so, and their decentralised management structure and reliance on outside experts for scientific knowledge are seen as contributing factors, as opposed to others (e.g. ExxonMobil), whose centralised approach and top-down management style limited acceptance of climate science (Kolk and Levy, 2001). In Sweden, the level of investment in renewables was found to differ based on numerous institutional characteristics, including previous energy market experience (corresponding to less investment in renewables), size and financial strength, and internal/external investment contexts (Bergek et al., 2013).
Attitudes, behaviour and lifestyle		

Contextual factors	Explanation	Examples
Collective environmental beliefs and norms	Beliefs and norms influence effective policy design and implementation as individual choices shape and are shaped by broader social structures (Nye et al., 2010). This can be explained by the fact that individuals tend to follow the norms of a group (e.g. society, community, neighbours and networks) to which they intend to belong because they tend to regard their positive image within the group as very important. Such groups and social structures comprise norms, customs, traditions and community influences. These types of factors may pose implicit constraints or drive behavioural change.	• A study on European market transformation conducted in 2009 notes that countries where the general sensitivity to environmental issues is judged high-to-average present higher market shares of energy efficient appliances, to some extent. However, the study also notes that general sensitivity to climate change issues alone is not enough to increase market shares of efficient models (Attali et al., 2009). • Until recently, countries with historical, domestic fossil-fuel production and less expensive retail electricity prices (such as the case of the UK with coal production and Greece with lignite) did not have to consider energy efficiency. Owing to this lack of tradition in energy efficiency, among other reasons, the observed change in energy-efficient consumer behaviour and purchase decisions for people living in such countries is often less than anticipated.
Demographic attitudes and other parameters	Demographic attitude parameters comprise the collective characteristics of specific target groups (e.g. private households, immigrant settlements, high-income households and farmers). Societal and community demographic parameters, like the physical environment where the householders are living, may affect intended policy outcomes, such as energy consumption patterns or technology adoption (Pothitou et al., 2014; see also van den Bergh, 2008).	An econometric study of behaviour towards household energy use across 10 EU countries confirms that patterns in family age composition are significantly associated with such behaviour. Households with higher levels of education were also found to be more prone to adopt energy-efficient technology and energy conservation practices (Mills and Sleich, 2012).
Public perceptions	The public may react to a climate change policy or project differently, as influenced by perceptions of personal (dis)advantages, perceptions of inequity in distributing costs and benefits or conflicting beliefs, and oppose a climate change policy usually by causing delays or even	• Several wind farm projects in the Netherlands met with local opposition related to noise and health effects, visibility, and scenic and aesthetic impacts on the landscape (De Boer and Zuidema, 2013 in Hofman and van der Gaast, 2014).

	halting policy and project implementation (Lilliestam et al., 2016). Policy-makers also tend to consider public perceptions when making decisions over energy tax, carbon tax or subsidies at a national level.	• A case study near Sheffield, UK shows that the anticipated visibility of the development and concerns over impacts on the landscape heavily influence the levels of support for project sites (Jones and Eiser, 2010). Even in a wealthy society like Norway, the financial burden on the national budget led to a concern about the adequacy of costly incentives for electric vehicles (Figenbaum et al., 2014).
Behavioural predisposition at the individual level	Behavioural predisposition at the individual level concerns the behaviour of potential adopters (of policies), which is dictated by individual motives, norms, values, characteristics and strategies. This may include individual interests and motives, the motivation or prioritisation of a company or small and medium-sized enterprise (SME) that guides decision-making (driven by profit-related criteria or social responsibility values) or the values and belief system of a single household. Adopters' different interests and motives or habits (e.g. household daily routines, occupants' heating patterns and lifestyle) may affect the possibility of a potential adopter taking up a climate-friendly behaviour.	Individual standards on environmental performance are not often transmitted in an SME business operation strategy unless a measure has a cost–benefit aspect for the company. Evidence from the literature suggests that the main drivers for SMEs in adopting environmental management practices are the economic benefits, practices for compliance and personal awareness (Gadenne et al., 2009).
Knowledge and experience	Knowledge and information: Adopters' knowledge regarding environmental issues and access to information on policies is considered to be linked to positive environmental behaviour and further potential for environmentally-oriented purchasing behaviour (Gadenne et al., 2011).	Resource challenges at the individual level are different from the general resources state of a country or a market (e.g. characteristic cases include low-income households and SMEs with no access to capital). • Evidence from several European appliance markets demonstrates that lack of awareness of energy issues is identified as a barrier to the adoption of efficient appliances, while informed consumers are more likely to change their behaviour (Attali et al., 2009). • Studies have also shown that households with lower incomes have the highest discount rates and are more in favour of purchasing cheaper inefficient appliances (Pothitou et al., 2014). For RES project adopters, in Sweden and France, the financial
Financial resources	An adopter's (lack of) financial resources (e.g. own capital recourses, access to finance, equipment costs and energy prices) can affect adoption decisions in terms of choices of plant types and ownership models in the case of more capital-intensive investment such as RES projects (Mignon and Bergek, 2016; Bergek et al., 2013) as well as that of private low-energy equipment.	

Social capital	Social capital refers to "legitimacy and access to social networks" (Mignon and Bergek, 2016). Legitimacy refers to the stance and attitudes of an adopter's social network that may drive or inhibit the adopter's motives to adopt a mitigation technology. Access to social networks also tends to influence the adopter's information and experience. Opinions expressed in an adopters' network can affect its motive to adopt a certain policy while adopters' (investment) decisions are often influenced by other stakeholder actions in their networks (Mignon and Bergek, 2016).	challenges primarily related to difficulties in access to capital from banks and to low return on their investment (Gadenne et al., 2011). • Bollinger and Gillingham find strong evidence of causal peer effects when studying the diffusion of solar photovoltaic panels in California. Their findings indicate that an extra installation in a street zip code increases the probability of adoption in the zip code by 0.78 percentage points (Bollinger and Gillingham, 2012).

Source: Authors' compilation.

4. Discussion

This Discussion Paper has provided an overview of contextual factors for climate change mitigation policies in three categories, and discussed how each contextual factor could influence the implementation of climate change mitigation options. This overview does not show the relative importance of contextual factors for specific policy instruments; neither does it claim to be fully complete. It nonetheless shows the diversity of contextual factors that may be of particular interest to policy-makers.

Different factors or conditions may facilitate or hinder effective policy implementation (i.e. in terms of attaining policy outcomes) as so much depends on the institutional, economic and social contexts. In addition, not only international pressures but also local barriers (e.g. the state and infrastructure of a sector) may affect the effective implementation of and associated response to a policy tool adopted at a national level.

The overview of contextual factors suggests some preliminary solutions to the challenges associated with the contextual factors. In the category of institutions and governance, the need for regulatory alignment is recognised. While EU impact assessments of mitigation options[5] have largely limited the focus to regulatory alignment of climate and energy policies, future assessments could also look at the need for alignment between climate and non-climate regulations. As our examples show, in some EU countries it is also important to ensure coherence and closer coordination between the relevant authorities and between different levels of government.

For innovation and investment, one way forward is to strategically support clusters and regional collaborative networks as hubs of knowledge creation and dissemination, with a view to establishing a technology innovation system. The examples also show the need for an enabling regulatory framework and for policy continuity.

For attitudes, behaviour and lifestyle, early education (e.g. school curriculum) could make difference. Well-educated and informed children may influence the attitudes and behaviour of their parents and other members of their local community. Another effective action in the research community would be categorisation and more thorough examination of demographic features of target groups in order to better inform policy-makers at both the national and sub-national levels.

Based on this observation, the next step would be the collection of more empirical evidence to show how contextual factors can actually shape and influence policy-makers in different ways across European countries (selected EU member states and accession countries). This evidence will be presented to policy-makers in the form of country cases and fact sheets, including more comprehensive information on the role of the context for replicating policy practices.

[5] The EU has established a standard practice of carrying out impact assessments of existing regulations before proposing a new legislative initiative. These assessments are in principle presented to make a case for introducing the new initiative, while minimising the possible detrimental effects, such as costs and risks.

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