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Power through Collaboration: Stakeholder Influence in EU Climate and Energy Negotiations

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Supplementary Materials

APPENDIX 1 Outline of Causal Mechanisms in Liberal Intergovernmentalism, the Advocacy Coalition Framework and Historical Institutionalism

Theoretical perspective	**Liberal Intergovernmentalism (LI)**	**Advocacy Coalition Framework (ACF)**	**Historical Institutionalism (HI)**
Most relevant actors	The member state governments	Advocacy coalitions consisting of a variety of individuals, such as interest group leaders, legislators, agency officials, scientists and journalists, or their organizations	In this study: the EU's supranational bodies. In general applications of HI: organizations like the member state governments and national agencies
How these actors' beliefs and preferences are formed	The member state governments aggregate national interests. Key national industries that either are particularly vulnerable to legislation, or will gain exceptionally, will have a larger say. Economic reasoning is central for governments' preference formation, but ideas and geopolitical interest may also play a role	Individuals/organizations seek to create coalitions with other stakeholders that share policy core beliefs on normative issues such as the importance of economic development vs. climate action. The principal "glue" of these coalitions is common ideas, but material factors may also play a role	HI is not explicit here, but one might infer that the EU's supranational institutions have responsibility for creating outcomes that move in the direction of the EU's long-term targets and objectives and enhance EU integration, but that are also agreeable to the member state governments
Model of the individual	Rational actor[1]	Bounded rationality[2]	Bounded rationality

[1] Moravcsik is claimed to argue that the individual possess full rationality, but Liberal Intergovernmentalism generally makes few claims about the individual. LI argues that the member state governments in EU negotiations "possess information about the preferences and opportunities facing their foreign counterparts, as well as the technical implications of policies that are for the greatest interest to them" (Moravcsik 1993: 498).

[2] Bounded rationality means that an actor's understanding of the world is always constrained by his or her limited knowledge about the decision to be made, the time he or she has within which to make the decision, and the nature of the decision. Therefore, decisions are always made with imperfect information.

How the actors choose their action	Moravcsik mentions Putnam's model (1988) of two-level games: e.g. national governments bargain in the fashion of two-level games where they will choose negotiating positions that will be acceptable at the domestic level and provide them maximum bargaining leverage	The members of advocacy coalitions seek to influence the content of public policies over decades or more. This is a field where ACF is not very explicit. Advocacy coalitions lobby where they regard impact to be the largest in terms of likelihood of succeeding at the national and EU levels, e.g. conduct "venue shopping." Repeated interaction helps the coalition members to develop shared understandings, common strategies and execute these together	EU institutions work to expand their own competence through employing the legal competence they have been assigned to new areas and areas that are affected by those where they already have competence. The Commission can use the advantage of its insight into other stakeholders' political positions strategically. The institutions' actions are normally conditioned by previous actions, existing institutions and existing legislation, e.g. path dependency. They may choose different actions if there is learning, an internal shock or an external shock that opens a "window of opportunity"
How the individual actions of multiple actors are aggregated to produce the collective outcome	National governments only accept the outcome of intergovernmental bargaining if it leads to the solution of common good problems and enhances their domestic role. Issue-linkages, side payments, veto threats and threats of exclusion are common features of attaining international agreement. Bargaining outcomes will particularly reflect the interests of the largest member states (asymmetrical interdependence)	Major policy change is produced by four mechanisms: because of an internal shock, due to an external shock, as a negotiated agreement between different advocacy coalitions and by coalition learning. Governmental policies reflect the policy core beliefs of one or more coalition	EU integration over time is explained by autonomous actions by EU-level bodies (like institutional entrepreneurship), as a result of unintended consequences, that national decision makers have limited time-horizons, and that member state preferences shift. Decision making rules, rising price of exit from an agreement and "sunk costs" make it hard for member state governments to regain legislative authority

Sources: Capoccia & Kelemen (2007); Fioretos (2011); Hooghe & Marks (2001); Jenkins-Smith et al. (2014); Moravcsik (1993, 1998); Pierson (1996); Putnam (1988); Sabatier (1988, 1998); Schimmelfennig (2015); Steinmo et al. (1992); Thelen (1999).

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APPENDIX 2 List of Interviews

Agder Energi (Agder Energy): interview 3 December 2014
Alliance of the Liberals and Democrats (ALDE): interview 4 June 2014
Climate Action Network Europe (CAN): interview 26 May 2014
Coalition for Energy Savings (CoE): interview 2 June 2014
Brusselkontoret: interview 2 December 2014
Bundesverband Erneuerbare Energie (BEE, German Renewable Energy Federation): interviews 6 May and 2 December 2014
Confederation of European Business (BusinessEurope): interview 2 June 2014
Directorate-General for Energy (DG Energy): interviews with interviewee a) 23 May 2014 and with interviewee b) 8 December 2014
Energy Norway (EnergiNorge, the Norwegian utilities association): interview 12 March 2014
European Renewable Energy Federation (EREF): interviews a) 8 April 2014 and b) 1 December 2014
European Climate Foundation (ECF): interview 9 May 2014
European People's Party (EPP): interview 21 May 2014
European Wind Energy Association (EWEA, from April 2016: WindEurope): interviews 2 May 2014, and 23 October 2015
Friends of the Earth Europe (FoE): interview 7 May 2014
FuelsEurope (until June 2014: Europia): interview 23 May 2014
Greenpeace Europe (Greenpeace): interview 11 April 2014
Independent consultant for the buildings sector: interview 1 December 2014.
Mission of Norway to the European Union: interviews 11 March 2014, 27 November 2014 and 17 October 2015
Permanent Representation of Estonia to the European Union: interview 4 November 2015
Permanent Representation of Portugal to the European Union: interview 12 November 2015
Statnett: interviews with interviewee a) 11 March, and interviewee b) 12 March 2014, 3 December 2014 and 14 December 2015
Statkraft: interview 12 March 2014 and 14 December 2015
The European Union of the Natural Gas Industry (Eurogas): interview 23 April 2014
Third Generation Environmentalism (E3G): interview 1 December 2014
Union of the Electricity Industry (Eurelectric): interviews with interviewee a) 16 April 2014, interviewee b) 29 May 2014 and interviewee c) 28 November 2014
Union Française de l'Électricité (UFE, the French utilities association): interview 29 October 2015

APPENDIX 3 Methodological Considerations

Selection of Interviewees

Interviewees were contacted by a formal letter attached to an email. In case of no response, they were contacted via telephone. The 37 research interviews were conducted in spring 2014, autumn/winter 2014 and autumn 2015 in Brussels and Oslo, most in person, but some by telephone. Thus, the first round of interviews was conducted while the EU negotiations for the 2030 Climate and Energy Policy Framework were still ongoing; the second round soon after the negotiations had concluded and the third round approximately one year later. This timing allowed the researcher to get an accurate impression of the political debates as they were unfolding, which proved beneficial: there were a great many issues discussed, a large group of stakeholders, and several of the discussion matters were complex. Given the proximity in time to the events, it is reasonable to believe that the interviewees had an accurate memory and could answer accurately. A potential drawback with this approach is that interviewees may well have provided incomplete information due to the political sensitivity and high stakes involved, particularly in the first round of interviews. For example, some interviewees did not want to answer in depth about their organizations' lobbying strategies. Conducting a round of interviews soon after the negotiations were finished made it possible to obtain new data while the interviewees still had the political processes fresh in mind. In addition, this strategy may have provided data on issues that had been too politically sensitive to mention while the negotiations were still ongoing. Finally, the last round of interviews in 2015 provided crucial additional data.

Interviewees were selected on the basis of organizational affiliation and proximity to the political process. Thus, the interviewees are key informants and/or elite informants. They can be categorized in eleven groups:

1) Members of the committees in charge of the 2030 Climate and Energy Policy Framework in the European Parliament: the committees on Industry, Research and Energy (ITRE) and Environment, Public Health and Food Safety (ENVI), from the European People's Party (EPP) and Alliance of the Liberals and Democrats for Europe (ALDE).
2) Commission officials working on related legislation in DG Energy.
3) Environmental nongovernmental organizations: Greenpeace EU (EU level), Climate Action Network Europe (CAN, EU level), Friends of the Earth Europe (FoE, EU level).
4) The renewable energy industry at the national and at the EU level: Bundesverband Erneuerbare Energie (BEE, the German Renewable Energy Federation, national level), European Renewable Energy Federation (EREF, EU level), European Wind Energy Association (EWEA,[1] EU level).
5) The buildings industry and other stakeholders concerned with energy saving: Coalition for Energy Savings (CoE, EU level).
6) The utilities industry at the national and at the EU level: Eurelectric (EU level), Statkraft (Norway, national level), Energy Norway (Norway, the Norwegian utilities association, national level), Agder Energi (Norway, national level), Union Française de l'Électricité (UFE, the French utilities association, national level).
7) Transmission system operators: Statnett (Norway, national level).
8) European business associations: BusinessEurope (EU level).
9) The gas and petroleum industries, Eurogas (EU level) and FuelsEurope[2] (EU level).
10) Permanent representations and missions to the EU: the Permanent representation of Portugal to the European Union, the Permanent representation of Estonia to the European Union, and Mission of Norway to the European Union.

[1] Now called WindEurope.
[2] Formerly called Europia.

11) Other well-informed groups: Brusselkontoret, European Climate Foundation (ECF), independent consultant for the buildings sector, Third Generation Environmentalism (E3G).

All interviewees were guaranteed anonymity due to the political sensitivity and high stakes of the issues involved, with the expectation that this could make them more open to sharing their views. Some interviewees declared that the interview would be given *only* on the explicit promise of anonymity because of the political sensitivity of the topics discussed. Mostly representatives of interest groups rather than, for instance, companies, were chosen because many companies use their trade associations as their main tool for representation in EU climate and energy policy (for discussion of whether companies' views really are well represented, see Fagan-Watson et al. 2015). EU policy-makers, both in the Commission and the Parliament, also generally prefer meeting with European trade associations and NGOs, rather than individual companies or citizens to hear the aggregated views of various groups (e.g. Greenwood 2007: 343; interview Eurelectric 2014b).

Semi-structured Interviews

The interviews were semi-structured so as to facilitate follow-up questions; the order of questions was adjustable, and the key/elite interviewees could answer freely and elaborate upon their views – emphasized as typical advantages of this format by e.g. Aberbach and Rockman (2002) and Andersen (2006). The interviews were like in-depth conversations. Interview questions concerned matters like a) the organizations' political positions on various issues, b) political strategies, c) the impact of the third Russia-Ukraine crisis that took place in 2014, and d) which actors were thought to have been most influential in the end. The interviewees gave additional interesting information when they were free to elaborate on the questions. A drawback of the semi-structured approach is its limited replicability (Berry 2002; Mikecz 2012). In addition, depending on the context, the exact phrasing of the interviews and their order, interview questions might be understood differently by different interviewees, as noted by Beyers et al. (2014: 179–180). For example, the interviewees came from the whole of Europe and the USA, with a wide range of cultural, educational and language backgrounds that might have influenced their answers. Despite the recent nature of the events, the interviewees may have presented themselves as more rational than was the case with the objective of, for example, making a good impression or because issues had been forgotten.

Method and Source Triangulation

The events the researcher participated in included public conferences and debates arranged by the interest organizations, Eurelectric and EWEA, at the think tank Centre for European Policy Studies (CEPS), the research institute Institute for European Policy Studies (IES), and by the news agency Interfax. The researcher also attended a closed event at the European Parliament. These events were chosen because they concentrated on main topics related to the political negotiations and featured several main stakeholders in the energy industry, energy-intensive industry, non-governmental organizations, high-level representatives of the Commission and the Parliament, prominent analysts and researchers, and others with key insights. Such event participation facilitated interaction with the stakeholders, highlighting the arguments they presented to support their causes, identify topics that were the most controversial, show how debates in the field of climate and energy were framed and linked, and identify which stakeholders agreed and disagreed. Moreover, it provided updates on the rapid development of the issues related to climate and energy in Europe. Furthermore, such participation enabled the researcher to obtain an impression of the various participants. During the events, the researcher took the position of being a moderate observer in order to remain objective, but able to obtain views from different participants about the development in the European climate and energy field. There was a strong fight to define reality, and very different "world views" among the participants

(see Appendix 4 for examples of the various discourses). Participation at events thus helped the researcher to understand more about the political views of the various groups and persons and interact with representatives of those organizations described by the researcher, emphasized as important strengths of the ethnographic method by Gains (2011) and Wedeen (2010). Another important source of data was the press. EU media channels like *EurActiv* (www.euractiv.com), *EUobserver* (www.euobserver.com) and *European Voice*, now *Politico* (former address: www.europeanvoice.eu, from 2015 onwards, www.politico.eu) were followed regularly to gain insights into the processes and the public debate.

These strategies for data selection provided an accurate picture of the unfolding of events, which stakeholder held which position at what time, also including the stakeholders' media strategies. Through scrupulous evaluation of the sources, data and method triangulation, as well as commenting by the interviewees, all data were checked against other data to achieve an accurate and complete overview as recommended by methodologists such as Beach and Brun Pedersen (2013: 129, 135) and Bennett and Checkel (2015: 27). During and after the interviews, the researcher took notes on key points mentioned. Most interviewees allowed the interviews to be taped, and these interviews were transcribed afterwards for optimal accuracy. In the middle round of interviews, however, some material was lost due to technical problems. For enhanced data accuracy and in order to engender trust, interviewees were given the opportunity to check all quotes and comment on all information related to their organization. Most of them provided feedback. The research interviews were conducted in English, Norwegian and German. Prior notification of the project was given to the Norwegian Centre for Research Data (NSD).

Causality with Regards to Attained and Attributed Influence

Due to the large number of stakeholders involved and the many matters up for consideration in the negotiations, there is no easy or obvious way to establish causality as to which stakeholders achieved what in the final text. Moreover, several issues were negotiated simultaneously, including matters other than the climate and energy targets – such as the formulation of new EU Energy and Environment State Aid Guidelines (EEAG) (see Commission 2014). An interviewee commented:

> When you put very few people in the room, with a very complicated set of decisions, and they are not just talking about climate and energy, they are talking about all the trade-offs with other issues (interview Eurelectric 2014b).

Among the issues that could be a part of this "horse trading" were the top political posts in the EU (interview Statnett 2014c). If these negotiations are understood as a part of a reiterated diplomatic negotiation game conducted over several years and involving a large number of issues, the picture is complicated further. Sebenius (1983), Putnam (1988) and Moravcsik (1993) use the term *issue linkage/synergistic linkage/linkage at the margin* in referring to bargaining where various issues are coupled with another. What is admitted/given to other negotiating parties to "sweeten the pill," Putnam (1988) labels *side payments*, in his famous model of two-level games. This game model is built into Moravcsik's (1993) Liberal Intergovernmentalism. In such a complicated issue-environment, and with such controversy and high stakes involved, it is impossible for a researcher to obtain all the data that might reveal influence. Given the secrecy of the high-level diplomacy involved, many relevant documents and other information will remain closed to the public for several decades following negotiations. Some of the most interesting documents in this regard, for example, the minutes of the European Council meetings, will be available to the public only 30 years later (Council 2017). Other pertinent data sources are documents such as preparatory drafts that include information about the debate among the member states, with their objections and suggestions for change (Thomson 2011: 33). Moreover, what counts as "successful" preference attainment is far from straightforward: in some cases success might mean achieving an outcome that is closer to one's own preference than the original proposal (Bernhagen et al. 2014). Bennett and Checkel (2015: 32) call the matter of identifying stakeholders' real

preferences *the revealed preference problem;* stakeholders may publicly display more extreme political positions than their original preferences as a "counterweight" to the political positions of others.

Thomson (2011: 32–33) argues that interviewing experts is the sole viable option to obtain information on policy positions on controversial legislative processes in the Council. Experts may be persons such as representatives of the Commission, the Parliament, the permanent representations of the member states, the Council Secretariat and interest groups. This study also includes expert assessments of the stakeholders' policy positions, but does not limit itself to assessing the member states' positions, like in Thomson's study (2011), but also focuses on the positions of the interest group community and the EU's supranational institutions. Assessment of political positions here is also based on other types of data, like position papers, consultation documents, media reports and the EU institutions' official documents. One way a researcher can map political positions is by creating spatial scales, ranging from, for example, 1 to 100, where countries with the most extreme positions take the values 1 and 100, and the rest are placed in-between (Thomson 2011: Chapter 2). The positions of the stakeholders in this study are not placed on relative scales like Thomson (2011), but rather on *exactly which position* the stakeholder formulated *during the 2030 negotiations*, e.g. "at least 40% reduction of the EU's GHG emissions by 2030." These types of data are not subject to potential post-hoc rationalization.

The formula applied here to measure *attained influence* is similar to the formula used by Cross (2012: 81). Attained influence is the same as what Cross calls "bargaining success." An actor's political position is called $X_{ia,}$ so, the smaller the distance, the larger the influence. In other words: 0 distance means an exactly equal position to the outcome, thus full goal attainment:

$$\text{Attained influence} = [X_{ia} - \text{outcome}]$$

Such measurement is called the *objective way* of measuring lobbying success (Bernhagen et al. 2014: 204). Thomson (2011) focuses on legislative processes in the Council of the European Union, while this study concentrates on bargaining related to a political framework that ultimately was decided in the European Council. Because of the high complexity of the negotiations, the researcher took care not to complete the analysis until the final 2030 Framework negotiations had been concluded, in order to further reduce the risk of confirmation bias based on premature analysis.

Non-trivial Degree of Coordination and Cooperation over Time

A central description in the application of the Advocacy Coalition Framework is that advocacy coalitions consist of groups or persons that have a non-trivial degree of coordination and cooperation over time. Sabatier (1988), Jenkins-Smith et al. (2014) and other contributors to the ACF distinguish between weak coordination and strong coordination. Weak coordination means that the stakeholders adjust their behavior towards each other, such as by sharing information and/or adjust their strategies mutually, while strong coordination implies that the stakeholders have a more formalized degree of cooperation, such as by writing joint press statements and arranging joint meetings (Jenkins-Smith et al. 2014: 197). The reason for choosing strong coordination patterns in this study is that if strong patterns of coordinated behavior prove to persist over time, advocacy coalitions must definitely exist in the policy subsystem of the EU's climate and energy policy. Although ACF originally focused on coalitions of likeminded individuals, recent ACF-inspired research also focuses on organizations, which is what this study does (Jenkins-Smith et al. 2014: 191).

Data from interviews, from the organization's web pages, event participation, consultation statements, interviews in the press and other data provided information about this non-trivial degree of coordination among stakeholder groups over time. Different types of non-trivial coordination were identified here: the energy intensive industries published common statements, press releases and shared information systematically. Moreover, they had a name: The Alliance of the Energy Intensive Industries. The Broad Green Community: several of the member organizations were members of each other. These stakeholders arranged

common events, lobbied politicians together, published joint press releases and arranged joint meetings regularly. The utilities industry: shared information systematically, published joint press releases and lobbied politicians together.

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Appendix 4 The Policy Core Beliefs of the three Advocacy Coalitions

Overarching coalition	The Broad Green Community	Eurelectric and its affiliates in the utilities industry[1]	The Alliance of the Energy Intensive Industries
Issue: Climate change			
Policy core beliefs	Climate change is fundamentally dangerous and should be dealt with urgently because of its serious and already manifest environmental, social, health and economic consequences. Early action reduces the economic, environmental, resource, social and health costs, including saving lives that otherwise would have been lost due to pollution (e.g. CAN Europe 2013a; EurActiv 2008; FoE 2013; Green Budget Europe 2013; Greenpeace 2007a).	Taking action on climate change is paramount. "Climate change is a serious global environmental, economic and social challenge" (Eurelectric 2007). "Climate change is a global challenge, and as such it requires a global answer" (Eurelectric 2012: 4).	Climate change needs to be taken seriously, but so must other problems such as unemployment and competitiveness in the EU, particularly in times of economic crisis. The EU needs an industrial renaissance (AEII 2014; CEPI 2013; EuroAllianges 2013; Eurometaux 2013; Fertilizers Europe 2013; IFIEC Europe 2014).
Examples of policy preferences[2]	EU and national leaders must show political leadership. There should be broad and concerted action to reduce emissions of greenhouse gases and other pollutants; reduce energy consumption; increase renewable energy production; reduce waste etc. Taking action on climate change will lead to higher levels of economic growth. "The EU must design an ambitious, coherent and comprehensive post-2020 package to cost-effectively deliver on its long-term objectives while maintaining its global leadership on climate action and	"A well-functioning single European energy market and an effective EU Emissions Trading Scheme (ETS) are the best way of ensuring that the objectives of the European energy policy are met. They will ensure a cost-effective transition to a low-carbon economy, while guaranteeing security of supply and system stability" (Eurelectric 2012: 4).	The EU needs a stable and predictable framework that prevents carbon and investment leakage in the period leading up to 2030. The best performers in an industrial sector should not be subject to additional GHG emission mitigation measures from climate policies (AEII 2014; Cembureau 2013: 8). The EU's climate and energy policy "must be linked with EU industrial policy and contribute to the "Industrial

[1] The utilities sector was divided: some companies wanted higher ambitions while others argued for lower (see Coalition of Progressive European Energy Companies (2012a, 2012b), Magritte Group (2014).
[2] *Policy preferences*: the preferred policy solutions to address the policy core beliefs, shorthand for *policy core policy preferences* (Jenkins-Smith et al. 2014: 191).

	technology development" (CAN 2013a: 3–4; WWF 2013).		Renaissance" initiative (EuroAllianges 2013: 2).
Issue: EU Emissions Trading System			
Policy core beliefs	The polluter pays principle should be paramount (Green Budget Europe 2013: 2; WWF 2014: 1). Therefore, the EU ETS must be reformed to work according to its intentions.	The core instrument to reduce GHG emissions, including supporting mature renewable energy and energy efficiency technologies should be a strengthened EU ETS (Eurelectric 2012: 4, 2014h).	The EU ETS is the right tool for reducing GHG emissions. "The carbon market is functioning" (AEII 2012; Eurometaux 2013).
Examples of policy preferences	The EU ETS allowances are far too cheap to stimulate investment in e.g. renewable energy. Unused allowances from the EU ETS in the period 2013–2020 should be cancelled before introduction of the post 2020-system. One way of reforming it would be to increase the *linear reduction factor*[3] to 2.6% and cancel 2.2 billion emission allowances (*back-loading*).[4] There is no evidence of so-called carbon leakage. Income from the ETS should go to e.g. investment in renewables and energy efficiency projects (CAN, Greenpeace, and WWF 2012; CAN 2013a: 3; EWEA 2013b; WWF 2014: 2–3).	The ETS quota prices should rise, for example by introducing a *market stability reserve* (MSR) by 2017 and transfer 900 million allowances to this reserve (Eurelectric 2014g: 3).[5] 2030 Framework: the annual linear reduction factor in the EU ETS should be 2,3% for 2030 (Eurelectric 2013a: 12).	Targets and instruments other than EU ETS should be cancelled. The *cross-sectorial correction factor*[6] in the EU ETS should be removed. Industries that might lose revenues because of this should be allowed to have free emissions allowances in the EU ETS as "carbon and investment leakage protection." All existing carbon leakage protection measures should be continued, also in the planned phasing-out period, from 2021–2030. Compensation mechanisms in the member states should be harmonized. The EU ETS should not be revised, such as by "back-loading" to a market stability reserve before a binding international climate agreement in Paris in 2015 (AEII 2012, 2013, 2014; Cefic &

[3] *Linear reduction factor*: the number of quotas that are cancelled in the EU ETS every year to increase the ETS quota price.

[4] *Back-loading*: taking an amount of EU ETS quotas temporarily out of the EU ETS market to increase the ETS quota price.

[5] *Market stability reserve*: a reserve of EU ETS quotas that have been taken out of the market to increase the ETS quota prices. If the quota prices exceed a certain level, quotas may be released to lower the quota price.

[6] *Cross-sectorial correction factor*: The cross-sectorial correction factor is a cap on how many allowances that can be allocated for free in the EU ETS. This factor applies when member states have granted more free allowances to their industries than what is available in the EU ETS (Commission 2014).

			EuroChlor 2013; Cembureau 2013; EuroAllianges 2013; Eurometaux 2013; IFIEC Europe 2014).
Issue: Overarching EU climate and energy targets			
Policy core beliefs	High targets for GHG emissions reduction, energy efficiency and renewable energy are imperative and will lead to enhanced economic growth, increased competitiveness and enhanced security of supply and, once achieved, will lead to remodeling of the energy systems. The EU's annual fuel bill will be reduced and thousands of new jobs will be created in e.g. the construction and in the renewable energy sectors (CAN 2013a; Coalition for Energy Savings 2013; EPIA 2013a; EWEA 2013b; FoE 2007; WWF 2013).	All policies should be guided by an overarching target for reducing GHG emissions. Having a single target will lead to the most cost-optimal solution for society. Action to mitigate GHG emissions should be taken in the most cost-efficient way while taking social factors such as effect on employment into consideration (Eurelectric et al. 2013).	High and binding targets for 2030 lead to the loss of both competitiveness and jobs, as competitors of European industries internationally do not face the same constraints. Current policies following the Climate and Energy Package put the survival of European industry at stake because e.g. energy prices are higher (Cembureau 2013; Eurometaux 2013).
Examples of policy preferences	We need *three* ambitious, *nationally binding* targets for the reduction of GHG emissions, improvement of energy efficiency and growth of renewable energy for 2020 and 2030 and ambitious legislative packages to implement them. These are mutually supportive (CAN 2013a; EPIA 2013a; EWEA 2013a, 2013b; FoE 2013; Greenpeace 2007d; Green Budget Europe 2013; WWF 2013; Ydersbond 2012). 2020 targets: at least 30% reduction of GHG emissions compared to 1990 levels, at least 20% renewable energy, with separate targets for electricity, heating and cooling, and transport (Greenpeace 2007b, 2007c, 2008). 2030 targets: GHG emissions reduction should be 55–60%	2020 targets: no national binding targets for renewable energy. The EU ETS should be the main instrument to secure investment in low-carbon energy technologies. There should be an EU-wide cap on GHG emissions (Eurelectric 2008a, 2008b, 2008c; Ydersbond 2012: 62–63). The three-target approach in the Climate and Energy Package has led to mutually contradictory policies by e.g. undermining the functioning of the EU ETS. Measures for renewable energy, energy efficiency and GHG emissions reduction should be harmonized, supporting a single internal European power market (Eurelectric 2013a). 2030 targets: the GHG emissions reduction target should be set at a minimum of	2020 targets: the targets of 20% GHG emissions reduction and 20% renewable energy in energy consumption were perceived as challenging (IFIEC Europe 2008). The targets for GHG emissions and energy efficiency in the Climate and Energy Package are inconsistent and lead to higher total costs for GHG mitigation and misallocation of resources (Cefic and EuroChlor 2013: 6). There should be a single overarching GHG target for 2030 (CEPI 2013; EuroAllianges 2013), and one for industrial growth (Cembureau 2013: 3; IFIEC Europe 2014). The manufacturing

	compared to 1990 levels, 45% renewable energy in domestic energy consumption and 40% improved energy efficiency (Birdlife International 2013; CAN 2013a; Coalition for Energy Savings, EREC, and CAN 2013a, 2013b, 2013c; EPIA 2013a; EWEA 2013a; FoE 2013; Green Budget Europe 2013; Greenpeace 2007d, 2014a, 2014c; WWF 2013).[7]	40% and be unilateral and domestic, and the targets for renewable energy and energy efficiency should follow from that, e.g. 27% renewable energy binding at the EU-level and an indicative target of 25–27% improved energy efficiency. 2050: power generation should be carbon-neutral (Eurelectric 2013a, 2013b and interviews Eurelectric 2014b and 2014c).	industry should have a 20% share of Europe's GDP by 2020. Predictable regulatory frameworks are key for the industries (Cembureau 2013; Eurometaux 2013; IFIEC Europe 2014). EU and member state leaders should only follow up overarching targets if there is a global level playing field, e.g. an agreement in Paris in 2015 (Cefic 2013; Cefic and EuroChlor 2013; Cembureau 2013; IFIEC Europe 2014).
Issue: Renewable energy			
Policy core beliefs	Expansion of renewable energy production is crucial for achievement of GHG emissions reduction, sustainable economic growth, to reduce energy poverty, improve energy security and attain sustainable energy system transformation. The energy system should become 100% renewable by 2050 (e.g. CAN 2013a; EUFORES 2009a; FoE 2013: 5; Zervos et al. 2010).	Renewable energy growth is beneficial for society and citizens because Europe must be decarbonized (Eurelectric 2014h: 2). Increased production of renewable energy is essential for the decarbonization of the power sector (Eurelectric 2014h: 5).	Renewable energy technology is no more important than other low-carbon technologies. The EU should have a technologically neutral approach (Eurometaux 2013: 6).
Examples of policy preferences	There should be nationally binding targets for renewable energy and national action plans developed according to a Commission template (Coalition of Progressive European Energy Companies 2012a; EUFORES 2009a, 2009b, 2011; EWEA 2013a; FoE 2014b). The Commission and the member states must ensure that the targets for renewable energy for 2020 and 2030 are met (EUFORES 2009a; EWEA 2013b). Member states	Key argument prior to the Climate and Energy Package: renewable energy is best stimulated by a market with green electricity certificates (Eurelectric, RECS, and EFET 2007; Ydersbond 2014). General argument: support schemes for renewable energy should be harmonized across member states and phased out in the future when existing support mechanisms expire and technologies mature. The existence of hundreds	Support schemes for renewable energy contribute to higher energy costs in the EU than in the USA. Renewable energy support schemes should be ended when technologies mature, as they increase the energy prices and are contradictory to the logic of an internal energy market (Cembureau 2013; EuroAllianges 2013; Eurometaux 2013; IFIEC Europe 2014).

[7] Some members of the Broad Green Community seem to have argued for lower figures than this, including the European Trade Union Confederation and Green Budget Europe.

	that do not meet their targets should be subject to penalties. The Commission should not try to halt successful renewable energy support schemes in the member states (EREF 2013). Support of research and innovation in renewable energy is essential and should be promoted (EPIA 2013a). Community energy should be stimulated (FoE Europe 2014a). Strong support regimes are also essential to assuring investors security that their investments will not stagnate. Retroactive/retrospective legal changes detrimental to renewable energy should be prohibited. Renewable energy needs to be given priority dispatch in the national power systems also in the future (EPIA 2013a, 2013b; EWEA 2013b).	of different national support schemes and regulatory measures create suboptimal outcomes at the EU level (Eurelectric 2008a, 2013a, 2014h). Priority dispatch (access) for renewable electricity to the electricity grid is unfair. Companies generating renewable electricity should participate in the electricity markets on par with other stakeholders. Producers of renewable electricity should face the same obligations for e.g. balancing of the electricity systems as other generators (Eurelectric 2013a, 2014f: 2, 2014h). Renewable energy technologies have unfairly received much support and should be subject to regulation at the EU level through the EU energy and environment state aid guidelines (Eurelectric 2014c, 2014d).	Support schemes should be harmonized. There should not be targets for the share of renewable energy, but rather for cost reduction of renewable energies (Cefic & EuroChlor 2013). Electricity and gas costs are much higher in the EU than in the United States, due to policies that support renewable energy and the electricity grid costs, to the detriment of the EU's energy intensive industry. Industrial consumers in globally competing industries should be protected against the extra costs caused by renewable energy and energy efficiency support schemes (EuroAllianges 2013).
Issue: Energy efficiency			
Policy core beliefs	Improved energy efficiency is paramount to reducing GHG emissions with 80–95% by 2050. Energy efficiency is the "first fuel" (Coalition for Energy Savings et al. 2013c; WWF EU 2013).	Energy efficiency is essential to "increase EU competitiveness, help electricity customers take charge of their consumption and costs, and contribute to the decarbonization of society at large" (Eurelectric 2014b).	Sustainable consumption is more important than sustainable production, and thus the burden should be shifted from production to consumption (Cefic 2013: 5; Cefic & EuroChlor 2013: 7).
Examples of policy preferences	There should be binding national targets and national action plans for energy efficiency following a Commission template (Coalition for Energy Savings 2013; Coalition for Energy Savings et al. 2013a; FoE 2013: 6). Varied EU funding should be used to improve energy efficiency, including Structural Funds and the	The EU should focus on primary energy savings and final energy prices (Eurelectric 2012: 10). The framework on the *primary energy factors*[8] should be revised. Energy efficiency objectives should be attained through taxation on GHG emissions, e.g. through the EU ETS, and through demand side management, supply side tools, storage and	There should be no absolute caps for total energy consumption in the EU (Cefic 2013: 4; Cefic & EuroChlor 2013: 2–3). Non-ETS sectors should be encouraged and incentivized to improve energy efficiency by measures helping to start new tools (Cefic & EuroChlor 2013:

[8] *Primary energy factor*: much energy is needed to produce the energy product required to satisfy final energy demand, the energy products being electricity, gas, gasoline or heat (Eurelectric 2015: 3).

	Cohesion Fund, particularly in Central and Eastern European member states. Funding should be earmarked, and there should be energy efficiency rules and requirements for public procurement. The EU Energy Efficiency Directive should be implemented in a timely and efficient manner (CAN et al. 2014; WWF 2013).	regulation (Eurelectric 2013a: 10; interview Eurelectric 2014c). EU ETS should be strengthened so that it delivers energy efficiency in the most cost-effective manner. Electrification of the heating, cooling and transport sectors will lead to more efficient energy use and mitigation of GHG emissions (Eurelectric 2014b).	9). "[…voluntary (bottom-up) initiatives bring realistic and innovative results as experts and policy makers striving for solutions together, e.g. energy efficiency initiatives of the chemical industry such as SPiCE3[2] or CARE+[3] (Cefic 2013: 5)."
Issue: the EU's international role			
Policy core beliefs	The EU needs to demonstrate its own ambition to inspire other international actors to be ambitious and maintain its role as an international climate leader (CAN 2013a; Greenpeace 2007a).	Ideally, EU leaders should have a position as soon as possible with a view to notifying the UN before the summit in September in New York (interview Eurelectric 2014b).	The EU does not need to be a global leader, as it stands for only 5–6% of global GHG emissions in the next decade (EuroAllianges 2013: 2)
Examples of policy preferences	2020: An early and ambitious agreement on the 2020 targets is important to inspire other parties in the Kyoto Protocol to fulfil their own commitments (Greenpeace 2007a). 2030: An early and ambitious EU agreement on the 2030 Framework is paramount in order to have a credible political stance in the run-up to the global climate negotiations in Paris in 2015 (E3G 2014).	2020: the proposed schedule for finishing the climate and energy package by December 2008 should be followed (Eurelectric 2008b). 2030: The EU should reach an agreement on the 2030 Framework early to give investors a clear signal, and show other parties such as the UNFCCC that the EU is willing to take on its own commitments (Eurelectric 2013a; and interview Eurelectric 2014b).	The EU and member state leaders should wait and see what other actors in international climate negotiations are willing to commit themselves to, so that there are equal commitments from countries with competing industries in an international climate agreement, leading to equivalent conditions for competing companies (Cefic & EuroChlor 2013; Cembureau 2013: 9; CEPI 2013; EuroAllianges 2013; Eurometaux 2013).
Issue: innovation			
Policy core beliefs	Support for renewable energy production is fair and will bring down the cost of production because there will be innovation when production is scaled up (EPIA 2013a).	First and foremost, new technologies need support for research, development and demonstration (Eurelectric 2007, 2014f).	Innovation will happen when there are cost-effective potentials for it. Demand for energy efficient products should be stimulated rather than stimulating

			supply from immature renewable energy technologies (Cefic & EuroChlor 2013: 2).
Examples of policy preferences	Public R&D is crucial to improving, e.g. the technology in wind turbines so that prices fall and larger investments are made. National and EU R&D and innovation policies are and will remain crucial (EWEA 2013b: 3).	Technological innovation in energy conversion and end-use should be supported. There should be a regulatory framework to stimulate innovation in smarter grids in the distribution networks (Eurelectric 2012: 10, 13). "Specific support beyond 2020 should focus on RD&D and be primarily directed at technologies which have not yet reached maturity." An EU approach to research and innovation provides added value (Eurelectric 2012: 12). RD&D support should be available throughout the innovation cycle up to market uptake (Eurelectric 2012).	Temporary measures to bring new technologies to the market are acceptable, such as support for R&D and innovation (Cefic & EuroChlor 2013). Long-term measures are not acceptable. The long-term costs of renewable energy are increasingly "unsustainable." Technology development should be market-driven rather than policy-driven. The CO_2-footprint of imported goods should be taken into consideration when developing new policies (Eurometaux 2013: 7). "The EU needs to promote breakthrough technology development in industrial processes, in projects, pilots, demos and implementation" (CEPI 2013: 2). Innovation policy should have a technologically neutral approach (Eurometaux 2013: 6).
Issue: energy systems			
Policy core beliefs	In the future, all energy in the world and in the EU should be renewable and large-scale energy efficiency measures should be implemented (Coalition for Energy Savings 2013). The Russia-Ukraine crises clearly demonstrate that it is essential to improve energy efficiency and boost renewable energy production, and that this is more important this than to e.g. expand gas transport infrastructure (AEBIOM et al. 2014; Greenpeace 2014b).	In 2015 electricity in the EU should be carbon neutral, and the European energy system should be electrified. Competition in the internal energy market is essential (Eurelectric 2012).	Climate and energy objectives should be attained in a cost-efficient way. Renewable energy expansion has led to unacceptable levels of quality of supply security in some parts of Europe (EuroAllianges 2013: 5).

Examples of policy preferences	Facilities producing energy from nuclear fuels, coal and oil should be phased out (Greenpeace & EREC 2008; FoE 2007; Greenpeace 2007b, 2014c: 31). Subsidies to these technologies and industries using them should be ended. CCS technology holds little promise, and shale gas should not be extracted (CAN 2013b; FoE 2013: 4, 2014c; Greenpeace 2008). The EU should increase electrification of the economy. To achieve renewable electricity growth, expansion of grid infrastructure is important, including smart grids – as is increased funding for research on renewable energy and energy efficiency in the EU and domestically, and strong domestic regimes for renewable energy and energy efficiency support (EPIA 2013a, 2013b; EWEA 2013b). If capacity remuneration mechanisms (CRMs)[9] are introduced, they should reward technologies that explicitly aid variable renewable energy generation, and be applicable across the member states (CAN 2014).	All technologies contributing to carbon neutral energy systems should be accepted and stimulated, including nuclear energy, electricity storage, gas, electricity grids and CCS (Eurelectric 2012). CCS is a key technology for the mitigation of climate change (Eurelectric 2008b). For several years, Eurelectric opposed capacity remuneration mechanisms (CRMs), but then changed its view to the following: if capacity remuneration mechanisms are introduced, they should be available for all technologies and not differentiate between existing and new facilities, i.e. providers of flexibility should be remunerated. CRMs should be coordinated at the regional level (Eurelectric 2014f: 3). At the same time, regulatory stability is crucial for investors. For a smoothly functioning internal energy market, full and quick implementation of the 3rd energy package is essential (Eurelectric 2014h). Electricity in transport should be an area of focus. With a transition to new types of technologies and with a large number of people retiring, public authorities should help the utilities to re-educate their workforce to acquire the new qualifications needed (EPSU et al. 2011: 47, 52).	Support measures should be technologically neutral. Unconventional energy sources such as shale gas should be explored and developed (Cefic 2013: 10; Cefic & EuroChlor 2013; Cembureau 2013; IFIEC Europe 2014). The energy market should be liberalized and the internal energy market should be completed, e.g. by full and fast implementation of the 3rd energy package (Cefic & EuroChlor 2013; CEPI 2013; EuroAllianges 2013; Fertilizers Europe 2013: 7; IFIEC Europe 2014). Long-term pricing enabling cheap electricity to energy-intensive industries should be allowed (Eurometaux 2013: 5–6). There should be voluntary demand response rather than capacity mechanisms in the national power markets (IFIEC Europe 2014).
Issue: electricity grid interconnection			
Policy core beliefs	Increased grid interconnection is important, particularly to integrate renewable power (Greenpeace 2014c: 31).	More attention should be paid to enhancing electricity grid interconnection to integrate new generating capacities and the various markets with each other (Eurelectric 2014e, f, h). "[…] the	The energy market should be better interconnected so that there is a single energy market (Eurometaux 2013: 5). Interconnection is good if it enables

[9] *Capacity remuneration mechanism*: providers of electricity generating capacity are paid to have this capacity stand by in case there will be shortage of electricity production in comparison to demand.

		development of transmission and distribution infrastructure is critically needed up to 2020 and beyond" (Eurelectric 2012: 6; EPSU et al. 2011).	increased energy supply security and lowers energy prices (Cefic & EuroChlor 2013: 10).
Examples of policy preferences	Electricity grid interconnection between and within the member states needs to be improved. New interconnections should be built, the distribution network should be improved and the existing interconnections should be modernized. This will cater for a larger expansion of distributed energy sources, particularly solar photovoltaic and wind power (CAN 2013a: 16; Greenpeace 2014c: 31). A "super grid" under the North Sea connecting the Northern European countries may be beneficial (Ford 2010). Renewable energy, such as photovoltaic energy, can be integrated in the grid system large-scale given that political will is present and systematic efforts are being dedicated (e.g. EPIA 2012). The 2030 climate and energy package should ensure that there is necessary investment in infrastructure and grids to include e.g. higher shares of renewable energy in the future. There should be a market for grid support services by 2020 (EWEA 2013b: 3).	Smart distribution networks are key and should be an area of increased focus[10] (Eurelectric 2013a: 10). Enhanced electricity grid interconnection is key, and those that have a positive macro-economic cost-benefit analysis should be constructed (Eurelectric 2014a: 17). When TSOs plan transmission grids, they should adopt a regional view to optimize the functioning of the power markets. Places with internal congestion, such as within Germany, should be subject to interconnection projects to mitigate the situation (Eurelectric 2014a: 18). Projects of common interest (PCIs) are strongly supported (Eurelectric 2014a).	Increased costs related to electricity grids lead energy-intensive industries to have higher electricity costs than global counterparts (IFIEC Europe 2014). A well-working internal energy market is key to bringing down costs. Fragmentation in the internal energy market caused by lack of interconnection, particularly in countries like Spain, reduces competition and leads to higher energy prices (Cefic 2013: 8; Cembureau 2013: 6). The transmission and distribution systems must be stable and reliable to promote decentralized power generation. The Commission should make funds available for investment in electricity grids so that more decentralized power production is enabled (Cembureau 2013: 9).

[10] Eurelectric represents not only electricity producers, but also distribution system operators (DSOs).

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Appendix 5: The EU Member States' Energy Mixes and Energy Policies
Part 1: Renewable Energy Policy, GHG Emissions Reduction Policy and Coal Policy

Country group/ country	Renewables in energy mix, share of gross final energy consump-tion (2014) Source: (Eurostat 2017c)	Renewables in electricity mix (2014) Source: (Eurostat 2017a)	Renewables policies	Long-term renewables target	Long-term GHG target	Average GHG emissions per capita in tonnes CO_2 equiva-lents (2014) (Eurostat	Coal production in 2014, in thousand tonnes (U.S. Energy Information Administra-tion 2014)	Coal policies
Ambitious Group of Member States								
Austria	33.1%	70.1%	Considerable expansion of bioenergy production, but also expansion of wind and solar power (Commission 2015a)	National energy strategy aims at 34% renewable energy by 2020. Green Electricity Act (2012) (Commission 2015a)	The Climate Change Act (2011). Develops low-carbon strategy for 2050. Provinces have long-term energy strategies (Commission 2015a)	9.21	0	Seemingly no official policy (IEA 2014t: 64). The existing coal power plants will be closed by 2025 down due to low profitability (Raus 2015; Renewables International 2015)
Belgium	8.0%	13.4%	The largest share of renewable energy from biofuels and waste	Does not seem to have established long-term renewable energy	Wallonia, Flanders and Brussels have vision of reducing	10.57	0	Strongly declining consumption from 1973 until

			(IEA 2016a: 117). Various federal green certificate systems to support renewable energy growth (IEA 2016a: 121–122)	targets (Commission 2015b: 12)	GHG emissions by 80–95% by 2050 (Commission 2015b: 11)			today. Several coal power plants have been closed (IEA 2016a: 75). No coal power plants as of 2017 (Carbon Brief 2017)
Denmark	29.2%	48.5%	Wind power has large share of Danish electricity mix (Vestergaard Andersen 2016). Global frontrunner in wind power (e.g. Kamp et al. 2004; Pettersson et al. 2010)	Combines ambitious policies on renewable energy with ambitious policies on energy efficiency. All electricity and heating to be renewable by 2035. 100% renewable energy by 2050, independence from fossil fuels (Danish Government 2013: 7)	40% reduction of GHG emissions by 2020 (Danish Government 2013: 8)	9.51	0	Has aimed at phase-out of coal in the energy system by 2030 (Danish Government 2013: 14)
Germany	13.8%	28.2%	*Energiewende* aims at large-scale energy system transformation in the next decades (Dickel 2014; German	More ambitious domestic targets than those set at EU level. 21% of gross final energy consumption by 2020, 60% of gross	40% reduction of GHG by 2020 compared to 1990 levels. The energy concept (2010, *Energiekonzept*)	11.5	205,597	Coal power plants are phased out due to e.g. regulations and low profitability

			Government 2010). Significant production of power from wind, solar and biomass (Burger 2015). Feed-in premium support mechanism decided in 2014, feed-in tariffs gradually phased out (BMWi 2017)	final energy consumption and 80% of electricity consumption by 2050 (Commission 2015j: 12; German Government 2010: 4)	outlines a reduction of 80–95% reduction of GHG emissions by 2050 (German Government 2010: 4)			(Jungjohann & Morris 2014: 4)
Ireland	8.6%	22.7%	Support policies have particularly stimulated large growth of bio power and onshore wind power (SEAI 2014)	Does not appear to have established long-term renewable energy targets yet (Commission 2015m)	2014: National Policy Position on Climate Action and Low-Carbon Development (Commission 2015m). Launched National Mitigation Plan July 2017 (Irish Department of Communications 2017). From 2015: vision of reducing CO_2 emissions by at least 80–95% compared to 1990 levels by 2050 (Irish Department of	13.03	0	A single coal-fired power plant (Irish Department of Communica-tions 2017)

					Communications 2015)			
Luxembourg	4.5%	5.9%	Support of biofuels and electromobility are the most important strategies to attain the target set in the Renewables Directive (IEA 2014u: 105)	Does not seem to have established long-term renewable energy targets. Government program (2013) prioritizes expansion of renewable energy and improvement of energy efficiency (Commission 2015q: 11)	The Climate Pact (2013) and Second National Action Plan. No overarching long-term target. Has the highest GHG reduction target of all EU member states in the Kyoto Protocol (Commission 2015q: 11)	21.85	0	The coal consumption dropped significantly from 1990 until 2000, and has been small since then (IEA 2014u: 19). Does not tax coal use (Crisp 2015). No coal power plants as of 2017 (Carbon Brief 2017)
Portugal	27%	52.1%	Aims at large-scale expansion of renewable energy to become a leader in renewables and major reduction of energy intensity. Large growth of particularly wind power. (IEA 2016b: 63). Have reduced support in the wake of the economic and financial crisis	40% of final energy consumption by 2030. 60–85% of all electricity from renewable sources by 2050 according to National Low Carbon Roadmap (Commission 2015t: 10)	Strategic Framework integrating both Climate and Energy, and Green Growth Strategy (2015). Aims at reducing primary energy consumption by 25% by 2020 and reducing GHG emissions by 30–40% by 2030 (Commission 2015t: 10)	6.46	0	Two coal power plants, one is planned to be decommis-sioned if market conditions are negative (IEA 2016b: 129)

			(KeepOnTrackEU 2014: 81)					
Sweden	52.6%	63.3%	Green certificate scheme, with Norway from 2012 to attain targets in the Renewables Directive (e.g. Gullberg & Bang 2014). Global frontrunner in bioenergy production (Ericsson et al. 2004)	2015: declared goal of 100% renewable across all sectors (Swedish Government 2015)	Sustainable Energy and Climate Policy for the Environment, Competitiveness and Long-term Stability (2009). Wants to achieve carbon neutrality by 2050 (Commission 2015y: 10)	5.82	0	Has implemented various policies to reduce coal consumption the last decades, consumption has declined substantially (Ericsson et al. 2004)
Member states with middle positions								
Croatia	27.9%	45.3%	Biomass largest source of heat, hydropower largest renewable energy source (Jurić 2015)	No specific targets (Commission 2015d: 10)	Does not seem to have a specific target. Low Carbon Development Strategy of the Republic of Croatia (2015) with particular focus on the buildings sector and renewable energy (Commission 2015d: 10)	4.84	0	Has no domestic coal reserves (CEE Bankwatch Network 2017). February 2016: temporary suspension of construction of new coal-fired power plans until new national energy plan is in place (Reuters 2016)

Cyprus	9.0%	7.40%	Solar water heating widespread (REN21 2015: 68). Growth of solar PV and wind power (Commission 2014a; EurObserv'ER 2015e: 7; EWEA 2015: 4)	Policies on renewable energy, energy efficiency and GHG emissions in the period from 2020–2030 were in preparation in 2015 (Commission 2015e: 11)	Policies on renewable energy, energy efficiency and GHG emissions in the period from 2020–2030 were in preparation in 2015 (Commission 2015e: 11)	10.73	0	No coal in the energy mix (Commission 2015e: 2)
Estonia	26.5%	14.6%	A large share of the heat comes from biomass, and biomass is the largest source of renewable energy (Estonian Government 2013)	A draft of National Development Plan for the Energy Sector (2015) outlines 45% renewable energy in energy consumption by 2030 (Commission 2015g: 10)	A draft of National Development Plan for the Energy Sector (2015) outlines reduction of GHG emissions in the energy sector by 70% compared to 1990 levels by 2030 (Commission 2015g: 10)	16.12	0	The majority of the electricity is produced from oil shale (IEA 2014c: 160). No coal power plants as of 2017 (Carbon Brief 2017)
Finland	38.7%	31.4%	Biofuels and waste are the largest sources of renewable energy. Growth in wind energy (EWEA 2015: 4; IEA 2013a: 99)	Aims at increasing the share of renewable energy to 60% by 2050 (Commission 2015h: 10)	National Climate Change Act sets a GHG reduction target of at least 80% by 2050 compared to 1990 levels (Commission 2015h: 10)	11.20	0	Consumption dependent on season, and in decline (IEA 2013a: 82–83). Aims to phase out coal in electricity production by 2025 (Finnish

								Ministry of the Environment and Finnish Ministry for Foreign Affairs 2014)
France	14.3%	18.3%	Government policies seem rather contradictory: outlining large growth of renewable energy and improvement of energy efficiency while support policies seem unstable (Ala-Kurikka 2015: EurActiv 2015)	Energy Transition Law (2015): expand renewable energy to 32% of final energy consumption by 2030. Reduce share of nuclear power to 50% by 2025 (Commission 2015i: 10; EurActiv 2015; French Government 2015)	Energy Transition Law (2015): Reduce GHG emissions with 40% by 2030 compared to 1990 levels, and by 75% by 2050 (Commission 2015i: 10; EurActiv 2015, French Government 2015)	7.13	0	Low share of coal in the energy and in the electricity mix (Commission 2015i: 2). Large decline in consumption since 1960. Several coal power plants have been closed in recent years (Schwartzkopff & Littlecott 2015)

Greece	15.3%	21.9%	Large growth of solar PV (EurObserv'ER 2015e: 10). Implemented retroactive cuts in renewables support (KeepOnTrackEU 2014: 50)	Greek Energy Roadmap to 2050 (2012): attain 20% renewables in energy consumption by 2020, envisages 60–70% by 2050. In electricity 85–100% should be renewable by 2050 (Energia 2012)	No long-term targets as of 2016. Scenario in the Greek Energy Roadmap to 2050 has a vision of a reduction of GHG emissions by 60–70% compared to 2005 (Energia 2012)	9.35	56,047	Coal consumption has increased significantly from 1973 onwards (IEA 2014g: 215)
Italy	17.1%	33.4%	Have had feed-in tariffs for solar photovoltaic and green certificates for other renewable energy sources (Grantham Research Institute on	National Energy Strategy (2013): over fulfil the target in the Renewables Directive. Aims to achieve 19–20% renewable energy in gross final energy consumption and 26–38% of the	National Energy Strategy (2013): reduce GHG emissions by 19% compared to 2005 by 2020. Does not seem to have specific targets post 2020 (Commission 2015n; Italian Ministry of Economic	7.12	95	Does not seem to have specific plans to phase out coal (2015). 3rd largest importer of coal in Europe, coal was the source of 17% of the electricity in

Latvia	38.7%	51.1%	Growth in wind, biomass and biogas (Vigants 2014: 12)	Latvian Energy Long-term Strategy 2030: indicative aim of a renewables share of around 50% by 2030 (Commission 20150)	45% reduction of GHG emissions by 2030 (Commission 20150: 10)	5.77	0	Seemingly no official policy. Generally low coal consumption (Commission 20150: 2). No coal power plants as of 2017 (Carbon Brief 2017)
Lithuania	23.9%	13.7%	Biomass largest source of renewable energy (IEA 2013b)	Has set indicative targets for 2050 with 40–100% renewables, 0–30% nuclear and 0–30% fossil fuel with CCS (Commission 2015p: 11)	Reducing GHG emissions by 40% by 2030, 60% by 2040 and 80% by 2050 as against 1990 levels (Commission 2015p: 11; Znutiene 2013)	6.83	0	No coal power plants as of 2017 (Carbon Brief 2017)
Malta	4.7%	3.3%	Has supported renewable energy with feed-in tariffs. Solar water heating widespread. Growth of solar PV, bioenergy (Riolo 2013)	No specific targets (Commission 2015r: 10–11)	National Strategy for Policy and Abatement Measures Relating to the Reduction of Greenhouse Gas Emissions for the period from 2009–2020. Climate Action Act (2015). No long-term targets	7.68	0	No coal in the energy mix (Commission 2015r: 2)

					as of 2016 (Commission 2015r: 10–11)			
Nether-lands	5.5%	10.0%	Biofuels and waste are the largest sources of renewable energy. Growth in wind energy (IEA 2014v: 105–106)	16% renewable energy by 2023 according to The Energy Agreement (2013) (Commission 2015z: 10)	Wants to achieve mitigation of GHG emissions of 80–95% by 2050 according to The Energy Agreement (2013) (Commission 2015z: 10)	11.79	0	The Dutch government has a long-term objective to reduce dependence on oil, gas and coal. 2014: new coal power plants were developed (IEA 2014v: 163–165)
Slovenia	21.9%	33.9%	Bioenergy largest source of renewable energy, hydropower largest source of electricity. Lack of political support for long term targets for renewable energy, unclear funding situation for renewable energy (Brunec 2015; KeepOnTrackEU 2014: 89–90)	No specific targets (Commission 2015w: 10)	The Energy Act (2012, amended 2014). Programme for Reducing GHG Emissions by 2020 with an outlook to 2030 (2014): indicative target for 2030 in the non ETS sectors of reducing GHG emissions (Commission 2015w: 10)	8.09	3,426	Has launched first commitment to phase out coal (Maggio 2017)
Spain	16.2%	37.8%	Had strong support policies in the past, but no longer. Spain	No particular targets	Does not seem to have a specific target. Spain has	7.27	4,298	Has provided subsidies to coal production. These

			has implemented several retroactive law changes in recent years (Couture and Bechberger 2013; KeepOnTrackEU 2014: 92). Has had strong growth in wind and solar energy (IEA 2015: 125)	(Commission 2015x: 10–11)	under the Kyoto protocol been allowed to increase GHG emissions compared to 1990 levels to 2020 (Commission 2015x: 10–11)			will be ended by 2018 (IEA 2015: 67)
United Kingdom	7%	17.8%	Expansion of particularly offshore wind (RenewableUK 2015). 2015: reduction in support for various types of renewable energy	No specific targets (Commission 2015aa: 11)	The fourth carbon budget: GHG emissions reduction of 50% below 1990 levels in the period 2023–2027. Climate Change Act (2008): reduce GHG emissions by 80% in 2050 compared to 1990 levels Commission 2015u: 11)	8.64	12,839	UK government has decided phase-out of coal by 2025. The last coal mine will close in the coming years (Vaugham 2016)
Visegrad+ Group								
Bulgaria	18%	18.9%	Has supported renewable energy with feed-in tariffs.	No specific targets	Climate Change Mitigation Act (2014). Has	8.01	34,506	Seemingly no plans to phase out coal power

			Achieved EU target early. Implemented retroactive policies from 2013–2015 (KeepOnTrackEU 2014: 26–27; Primova 2015)	(Commission 2015c: 10)	energy strategy for 2020, but not for the period after that. No specific long-term GHG targets (Commission 2015c: 10)			production (Williams 2017)
Czech Republic	13.4%	13.9%	Has supported renewable energy with feed-in tariffs and a green bonus. End of support to solar PV and other types of renewable energy in 2014 (KeepOnTrackEU 2014: 32; Norton Rose Fulbright 2014). Biomass largest source of electricity and heat in 2013 (EurObserv'ER 2015a: 4)	State Energy Policy (2015) for 2040 formulated 17–22% of renewable energy of primary energy sources and 18–25% of secondary energy sources (Commission 2015f: 10)	Indicative target of reduction of CO_2 emissions of 40% between 1990 and 2030 formulated in State Energy Policy (Commission 2015f: 10)	12.13	51,651	Declining coal consumption from 1973 onwards. Wants to be less dependent on coal (IEA 2014q: 127, 130). Gradual phase out of hard coal mines in Eastern Czech Republic by 2022 (Lopatka 2016). Coal industry struggles economically (Stefanini 2016)
Hungary	9.5%	7.3%	Uncertainty about reform of support mechanisms have impeded growth in electricity from renewable sources (KeepOnTrackEU	Indicative forecast of 20% by 2030 (Commission 2015l: 11)	National Climate Change Strategy (2008–2025). For 2025: 16–25% GHG emissions reduction	5.91	10,528	Declining consumption from 1973–2014 (IEA 2014h: 230)

			2014: 53). Biomass largest source of renewable electricity and heat (EurObserv'ER 2015b: 4)		compared to 1990 levels (Commission 2015l: 11)			
Poland	11.4%	12.4%	Various support mechanisms. Expanding wind power production, biomass largest source of electricity and heat (EurObserv'ER 2014: 4)	No overarching renewables targets (Commission 2015s: 11)	No specific targets, but overall aim of GHG emissions reduction. Prepares National Programme for Development of Low Emission Economy (2016) (Commission 2015s: 11)	10.12	150,374	Decline in consumption from 1987 onwards. The Polish government wants to protect the domestic coal industry (e.g. Ancygier & Szulecki 2016). Coal industry struggles economically (Stefanini 2016)
Romania	23.9%	41.7%	Have supported renewable energy with a quota system. Hydropower largest source or renewable electricity, biomass of renewable heat. Large growth in solar PV (EurObserv'ER 2015c: 4). 2014: reduced support for renewable electricity	Does not seem to have specific long-term renewable energy targets (Commission 2015u: 11; KeepOnTrackEU 2014: 83)	Does not seem to have specific targets (Commission 2015u: 11)	5.82	25,976	Reduced coal production in recent years. Three out of seven mines will be closed by 2018 (Commission 2012). Coal industry struggles economically (Stefanini 2016)

			(KeepOnTrackEU 2014: 83)					
Slovakia	9.8%	22.9%	The Renewable Energy Act. Has supported renewable energy with feed-in tariffs, reductions in these from 2013. Hydropower largest source of electricity, biomass largest source of heat in 2013 (EurObserv'ER 2015d: 3–4)	No specific target. Forecast of 24% renewable energy in the final energy consumption in 2030 (Commission 2015v: 10)	Does not seem to have specific targets. Energy Policy (2014), Low-carbon Development Strategy is prepared (as of 2016) (Commission 2015v: 10)	7.53	2,412	Gradual reduction in coal consumption from 1970s onwards (IEA 2014m: 389)

Part 2: Petroleum Policy, Nuclear Energy Policy, Shale Gas Policy and CCS Policy

	Net oil import or export, kb/d (2012)	**Net gas import or export, mcm/y (2012)**	**Petroleum policy**	**Nuclear energy share of the electricity mix**	**Nuclear energy policy**	**Government and popular attitude towards shale gas**	**CCS**
Ambitious Group of Member States							
Austria	234.2	7132	Receives natural gas by pipeline. Russia largest exporter. Austrian authorities work to diversify supply (Commission 2015a)	0% (Commission 2015a)	National Parliament has decided that Austria is to be an anti-nuclear country (Austrian Government 2013)	Controversial topic. Long licensing procedures	Moratorium on CCS (Austrian Government 2013)

Belgium	310.8 (IEA 2014a: 96)	1130 (IEA 2014a: 96)	Heavy import dependence of oil, gas and coal (Commission 2015b: 2–3). Diversified oil and import, fairly diversified gas import (IEA 2014a, 2016a: 79)	47% in 2014	Banned construction of new reactors in 2003. Government decided in 2011 phase-out by 2025 if new generation could be replaced from other power sources (Commission 2015b: 11; WNA 2015b)	Controversial topic. Shale gas extraction is explored (Devos 2014)	Views the geology as unsuitable for CCS in the Brussels region (Shogenova et al. 2014: 6664)
Denmark	-42.7 (exports) (IEA 2014b: 140)	-2517 (exports) (IEA 2014b: 140)	Petroleum exporter, but this is expected to change (IEA 2014b: 144)	0% of domestic production	1985: Parliament decision that nuclear power plants will not be built (WNA 2015a)	Controversial topic. Limited reserves found (Jacobsen 2015)	Temporary restrictions, no public acceptance (ZERO 2015)
Germany	2309.2 (IEA 2014f: 199)	74903 (IEA 2014f: 199)	Diversification of supply, several gas suppliers. No LNG harbors, receives gas by pipelines (Commission 2015j)	15.8% in 2014	Nuclear energy will be completely phased out by 2022 according to decision in 2011 (WNA 2016a)	Very negative in the population. Government has opened for (very) limited exploration of shale gas (EurActiv 2014)	Population strongly critical. Restrictions from the government (Inderberg & Wettestad 2015). Has two pilot projects (Global CCS Institute 2017)
Ireland	132.2 (IEA 2014i: 244)	4512 (IEA 2014i: 244)	Heavy import dependence on petroleum. Most	0% domestically produced	Act from 1999 legally prohibits nuclear power	Has given licenses for exploring	Moratorium on CCS (Shogenova et al. 2014: 6664)

			oil imported from Africa, the rest from Norway, refined products from the UK. Imports gas mainly from the UK (Commission 2015m; IEA 2014i: 248, 250, 255)		(Irish Statute Book 1017)	fracking previously (IEA 2012: 104)	
Luxembourg	58.8 (IEA 2014k: 302)	1214 (IEA 2014k: 302)	Fully import dependent in petroleum. Imports oil products from its neighbors and gas from Norway and Russia (IEA 2014k: 302)	0%	Government and population staunchly opposed to the Cattledom nuclear power plant in France (Paterson 2014)	Parliament has voted against fracking (2013) (Devos 2014: 21)	Views the geology as unsuitable for CCS. Prohibited except for research (Shogenova et al. 2014: 6664)
Portugal	233.6 (IEA 2014m: 374)	4629 (IEA 2014m: 374)	Import of oil from several sources, gas from Nigeria and Algeria. Gas pipelines to Algeria and Spain (Commission 2015t: 3; IEA 2014m: 378)	0%	Considerable popular opposition. The government rejected plans for building a new nuclear power plant in 2004 (*Portuguese American Journal* 2011)	Has considered exploration	Restricted area available for exploration (Shogenova et al. 2014: 6664)
Sweden	310.8 (IEA 2014p: 418)	1130 (IEA 2014p: 418)	Fully dependent on import of oil	About 40 % (WNA 2016c)	Highly controversial	Public opposition.	Permitting CCS only offshore (Shogenova

			and gas. Low share of petroleum in the energy mix compared to other IEA countries (Commission 2015y: 3; IEA 2014p: 418)		topic. Referendum in 1980 required phase-out. This decision was repealed in 2010. New reactors may replace old reactors. 2015 decision: closure of four old reactors (WNA 2016c)	Apparently small reserves (Erlström 2014)	et al. 2014: 6664). Has two pilot projects (Global CCS Institute 2017)
Member states with middle positions							
Croatia	No data	No data	Production from domestic sites covers about 60% of domestic gas demand. Heavily dependent on import of oil (Commission 2015d: 3). Might develop offshore oil fields (BNE Intellinews 2014)	About 20% (WNA 2016b)	Has no domestic nuclear power plants	Domestic reserves will be explored (Reuters 2015)	CCS permitted on the whole territory (Shogenova et al. 2014: 6664)
Cyprus	No data	0	Petroleum dominates energy mix. Fully dependent on import of petroleum. No	0%	Has no domestic nuclear power plants (Commission 2014a: 38)	Apparently small/no shale gas reserves (Commission 2015e)	CCS permitted on the whole territory (Shogenova et al. 2014: 6664)

			gas consumption. Might develop own gas offshore fields (Commission 2015e: 2–3; Ellinas 2014)				
Estonia	14.2 (IEA 2014c: 155)	670 (IEA 2014c: 155)	Imports about half of its oil and all its gas. Produces oil shale. Diversification of oil supplies. Imports all gas from Russia (Commission 2015g: 2; IEA 2014c: 162)	0%	In 2009, the Estonian government launched a plan of establishing a nuclear power plant by 2023, but has not acted to achieve this target (Tere 2009). Potential shareholder in the Visaginas nuclear project in Lithuania (Ozharovsky 2014; WNA 2015h)	Seems to have little potential (Boros 2014). Produces significant quantities of *shale oil* (e.g. Estonian Government 2013)	Moratorium on CCS (Shogenova et al. 2014: 6664)
Finland	196.5 (IEA 2014d: 169)	3671 (IEA 2014d: 169)	Highly dependent on import of oil, gas and coal from Russia. Bioenergy important domestic energy source (Commission	Ca 30% of the electricity (WNA 2015e)	New reactor under construction in Olkiluoto, new nuclear power plant in Fennovioima to	Seems to have little potential for shale gas extraction (Boros 2014)	Views the geology as unsuitable for CCS. Prohibited except for research purposes (Shogenova et al. 2014: 6664)

			2014b: 21, 2015h: 3; IEA 2013a: 99, 2014d: 173)		start construction (WNA 2015e)		
France	1712.9 (IEA 2014e: 184)	43606 (IEA 2014e: 184)	Heavy import dependence on petroleum import. Imports gas and oil from various countries (Commission 2015i: 3)	About 75% (WNA 2015f)	Ambivalent, plans to reduce nuclear power production to 50% of electricity generation by 2025. Has prolonged the running time of several existing nuclear reactors (WNA 2015f)	Law bans fracking (2011). Licenses have been given earlier, which have been cancelled (ENDS Europe 2013; Patel & Viscusi 2013)	Private actors have launched pilot CCS projects (Shogenova et al. 2014: 6664–6665)
Greece	316.3 (IEA 2014g: 214)	4,349 (IEA 2014g: 214)	Heavy import dependency of oil and natural gas. Well diversified oil supply. Russia largest supplier of oil and natural gas (Commission 2014b: 21, 2015k: 3)	0% domestically produced for commercial purposes (OECD 2014: 12)	2009: moratorium on future investments in nuclear energy (Bond 2009)	The Greek Parliament (2014) has ratified contracts with petroleum companies that do not exclude fracking (WWF 2014)	Selected areas are excluded for CCS. Does not seem to have any CCS projects (Shogenova et al. 2014: 6664)
Italy	1248.2 (IEA 2014j: 248)	66310 (IEA 2014j: 248)	Heavy import dependence of petroleum. Works on securing gas supplies. Diversified supplies of	0% domestically produced	Will not have nuclear energy. This has been decided by referendums (WNA 2014a)	Controversial. Aims to extract some gas domestically. Apparently small reserves (Erlström 2014)	Has a demonstration project (Global CCS Institute 2017). Some areas are excluded for CCS (Shogenova et al. 2014: 6664)

			petroleum, Russia largest exporter of gas (Commission 2015n: 3; IEA 2014j)				
Latvia	(no data)	1716	Highly dependent on import of oil, gas and coal from Russia. Bioenergy important domestic energy source (Commission 2014b, 20150: 3)	0% (ENSREG 2015)	Potential shareholder in the Visaginas nuclear project in Lithuania (WNA 2015h)	Seems to have little potential for shale gas extraction (Boros 2014)	Moratorium on CCS (Shogenova et al. 2014: 6664)
Lithuania	(no data)	3320	Has opened for import of LNG at Klaipeda, which has improved Lithuania's energy security significantly. Works on decreasing dependence on Russian imports (Masiulis 2015). Heavily import dependent on import of oil, coal and gas	0%, 70% of the electricity generated by nuclear power until 2009 (WNA 2015h)	Rejected in referendum in 2012. Controversial. Agreement between several parties in 2014 to support the construction of a new nuclear power plant, Visaginas (WNA 2015h)	No plans for shale gas extraction (Shale Gas International 2015)	Permitted on the whole territory (Shogenova et al. 2014: 6664)

			(Commission 2015p: 3)				
Netherlands	969.1 (IEA 2014r: 315)	-34155 (exports) (IEA 2014r: 315)	Heavy import dependency on oil, large exporter of natural gas. Oil supply diversification. Most electricity is produced from natural gas (Commission 2015z: 2–3)	3.5% (WNA 2014c)	One new nuclear power plant planned, but the project has been postponed (WNA 2014c)	Moratorium on licenses to extract shale gas. Large popular protest against fracking (Devos 2014: 18)	Dutch Government promotes CCS (Shogenova et al. 2014: 6664; ZERO 2015)
Malta	(no data)	0	Petroleum dominates energy mix. Fully dependent on import of petroleum. No gas consumption (Commission 2015r: 1–3)	0% (Commission 2015r: 2)	Has no domestic nuclear power plants (Commission 2015r: 2)	Apparently small/no shale gas reserves (Boros 2014)	CCS permitted on the whole territory (Shogenova et al. 2014: 6664)
Slovenia	(no data)	(no data)	Large import dependence of oil and gas. Russia is the largest supplier (Commission 2015w: 2–3)	About 38% (WNA 2016b)	Closure of the country's single plant set to 2023, but has since extended to 2043. The reactor is shared with Croatia (WNA 2016b)	Apparently small shale gas reserves (Boros 2014)	Moratorium on CCS (Shogenova et al. 2014: 6664)

Spain	1284.9 (IEA 20140: 403)	32435 (IEA 20140: 403)	Heavily dependent on import of oil and gas, from various sources (Commission 2015x: 3)	About 20% (WNA 2017)	Uncertain what will happen with nuclear energy in the future (WNA 2017)	Permits for exploration of shale gas have been issued. Backed by the government in 2015. Controversial (Benítez 2015)	CCS demonstration projects (Global CCS Institute 2017)
United Kingdom	551.9 (IEA 2014s: 462)	37029 (IEA 2014s: 462)	Dependent on importing about 40% of its oil consumption and about half of its gas consumption. Diversified sources of petroleum, Norway a major supplier (Commission 2015aa: 2–3)	21% (WNA 2015k)	The UK government has agreed to the construction of a new reactor at the Hinkley site. Several nuclear power plants are expected to shut down in the two next decades (Vaugham 2017; WNA 2015k)	UK Government positive to shale gas. 2015: moratorium in Scotland, vote against in Wales (SEPA 2015)	CCS permitted on the whole territory, European frontrunner (Commission 2015u: 11; Shogenova et al. 2014: 6664). CCS demonstration projects (Global CCS Institute 2017)
Visegrad+ Group							
Bulgaria	No data	No data	Russia single supplier of gas. Almost fully dependent on imported oil and gas (Commission 2015c: 3)	About 33% (WNA 2015c)	Government has planned construction of a new reactor at a present plant (WNA 2015c)	Moratorium on hydraulic fracturing (fracking) (2012) (Shale Gas Europe 2016)	Government seems positive to CCS, but seemingly no projects (2016). Limited exploration areas (Shogenova et al. 2014: 6664)
Czech Republic	188.7 (IEA 2014q: 126)	8123 (IEA 2014q: 126)	Large import dependency of oil	About 33% (WNA 2015d)	New nuclear reactors have	Controversial topic. Licenses	Temporary restrictions on CCS

			and gas. Russia large exporter of crude oil, single supplier of gas (Commission 2015f: 3)		been planned (WNA 2015d)	given have been annulled (Bieliszczuk 2014; Daborowski & Groszkowski 2012: 14–19)	until 2020, only allowed for research (Shogenova et al. 2014: 6664)
Hungary	108.5 (IEA 2014h: 229)	7998 (IEA 2014h: 229)	Heavy import dependence on oil and gas. Diversified sources of oil. Russia has supplied almost all gas (Commission 2015l: 3)	More than 33% (WNA 2015g)	In 2014, the made a contract with Russian Rosatom for construction of two reactors (WNA 2015g)	Government (2013 onwards) appears positive to shale gas extraction. License for research and preparation for extraction has been issued (*Budapest Telegraph* 2015)	Limited exploration areas (Shogenova et al. 2014: 6664)
Poland	501.8 (IEA 2014l: 359)	11919 (IEA 2014l: 359)	Almost fully dependent on import of oil, about 66% dependent on gas import. Oil products are imported from various countries. Russia supplies 64% of the gas consumed and most crude oil	0% (WNA 2015i)	Parliament decision in 2005 to opt for nuclear power. Unclear when and if the projects will be realized (WNA 2015i)	Government positive to shale gas extraction, strong proponent in the EU (Neslen 2014)	Government positive to CCS. Until 2024, there will be no permits except for demonstration projects (Shogenova et al. 2014: 6664)

			(Commission 2015s: 2–3)				
Romania	No data	No data	In 2013, 47% of petroleum consumption was met by import. Low dependence on imported gas (Commission 2015u: 2–3)	About 20% (WNA 2014b)	Two more nuclear reactors are planned (WNA 2014b)	Government has been positive to shale gas exploration. Large public opposition. Seemingly small/no reserves (Bieliszczuk 2014; Michalacke 2015)	CCS is allowed on the whole territory (Shogenova et al. 2014: 6664)
Slovakia	65.3 (IEA 2014n: 388)	5139 (IEA 2014n: 388)	Heavy import dependence on petroleum. Diverse sources of oil products (IEA 2014n, 394). Russia supplies almost 100% of gas consumed (Commission 2015v: 2–3)	About 50% (WNA 2015j)	Two nuclear reactors are under construction (WNA 2015j)	Government has shown little interest in shale gas exploration (AFP 2013)	Government seems positive, has supported funding of CCS through NER400 (NER 400 Innovation Fund 2015)

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Appendix 6 Overarching Coalitions Based on Similar Political Views

Overarching label	Coalition/ stakeholder label	Member name if member of coalition	GHG	At least	RES	Binding/ non-binding	At least	EE	Binding/ non-binding	At least
Comparatively "greenest" stakeholders	**Ambitious Group of Member States**	Austria, (Belgium), Denmark, Germany, (Ireland), Luxembourg, Portugal, Sweden	40%	Yes	30–40%	Binding, national level or EU level	Yes	30%	Binding	
	Broad Green Community	EREC, ERECs former members, CoE, CAN, EEB, Oxfam, E3G, Sandbag and others	55%	Yes	45%	Binding, national level	Yes	40%	Binding	Yes
		Friends of the Earth Europe	60%	Yes	45%	Binding, national level	Yes	50%	Binding	Yes
		Green Budget Europe	45%	Yes	45%	Binding, national level	Yes	45%	Binding, national level	Yes
		European Trade Union Confederation	40%		30%	Binding, national level		40%	Binding, national level	
	Coalition of Progressive European Energy Companies	Acciona, Dong, Edp Renewables, Eneco, Enovos, EWE, SSE and Swim	Ambitious		30%	Binding		Ambi-tious	Binding	
	Prince of Wales's Corporate Leaders Group	Acciona, Alstom, Aviva, Unilever, Ferrovial, Shell and others	40%		30%	Binding		Ambiti ous	Binding	
	European Parliament	Consensus decision, ITRE and ENVI responsible committees	40%	Yes	30%	Binding, national level	Yes	40%	Binding	No
Stakeholders with position at the middle of the spectrum	**European Commission**	DG Clima, DG Energy responsible DGs, Commission President[1]	40%	No	27%	Binding EU-level	Yes	30%	Non-binding	No
		Croatia Cyprus, Estonia, Finland, (France), Greece, Italy, (Malta), Netherlands, Latvia, Lithuania,	40%	No	27%		Yes	30%		

[1] There were highly diverging views within the Commission, see Ydersbond (2016).

Appendix 7 Path Dependency in the EU's Climate and Energy Policy Targets

Target	Greenhouse gas emissions	Renewable energy sources	Energy efficiency	Electricity grid interconnection
1990–2000	Stabilize GHG emissions at the 1990 level by 2000 (Council of the European Communities 1993c, 1990a)	Council decision in 1986: use of fossil fuels in electricity generation should be reduced to under 15% by 1995 (Council of the European Communities 1986). 1988: recommendation on developing renewable energy (Council of the European Communities 1988). 1993: establishment of the ALTENER program (Council of the European Communities 1993b). The Commission decided to promote renewable energy in the Green Paper in 1996 (Commission 1996)	Council decision in 1986: improvement of energy efficiency of final energy demand by at least 20% by 1995 (Council of the European Communities 1986). 1991: establishment of the SAVE program (Council of the European Communities 1991). The member states were to have programs for improvement of energy efficiency in buildings (Council of the European Communities 1993c)	General targets like establishing a common energy market, adequate and secure supply of energy, improvement of energy infrastructure and cooperation on high voltage electricity grids (Commission 1995; Commission of the European Communities 1988; Council of the European Communities 1986, 1990b)
2000–2010	2003: EU ETS directive to fulfil Kyoto Protocol commitments: 8% reduction in GHG emissions compared to 1990 levels in the period 2008–2012 (Parliament & Council 2002a, 2003)	8% of final energy demand should be renewable by 2005 (Council of the European Communities 1993b). In 1996, the Commission suggested 12% renewable energy by 2010 as indicative target for the Community (Commission 1996, 1997). 2001 renewable electricity directive: national indicative targets consistent with 12% renewable energy in national energy consumption and a 22.1% share of renewable electricity in the EU by 2010 (Parliament & Council 2001)	1998: Council recommendation that the member states should adopt energy efficiency strategies. Indicative target of reducing energy intensity of final energy consumption by one percentage point per year more than otherwise would have been achieved until year 2010 considered useful (Council 1998). 2006 directive: Member states were to adopt national indicative energy efficiency targets of at least 9% to promote end-use efficiency (Parliament & Council 2006)	10% interconnection within 2005 (Council 2002). Then achieve 10% interconnection within 2010 (Council 2007: 18; Council 2006: 15), non-binding target. Completion of the internal energy market for gas and electricity an area of considerable focus

2010–2020	Binding target of 20% reduction of GHG emissions by 2020, 30% if other developed countries also participate in a global climate agreement. Differentiated and binding commitments for the member states (Council 2007: 12)	20% of total energy consumed should stem from renewable energy by 2020, binding target at the member state level (Commission 2007b; Council 2007; Parliament & Council 2009a)	From 2008: indicative national energy savings targets of 9% within the directive's ninth year of application (Parliament & Council 2006). 20% improvement in energy efficiency by 2020, non-binding target (Commission 2006; Council 2007)	Elimination of all "energy islands" by 2015 (Council 2011). EU must achieve at least 10% interconnection within 2020 to achieve free flow of electricity in a "fully connected and functioning internal energy market" (Commission 2015: 2; Council 2014: 7)
2020–2030	40% reduction in GHG emissions by 2030, binding target. Differentiated commitments by the member states (Council 2014)	At least 27% of energy consumed should stem from renewable energy by 2030, binding target at the EU-level (Council 2014)	At least 27% improvement in energy efficiency by 2030, non-binding target (Council 2014)	15% interconnection within 2030, non-binding target (Council 2014)
2030–2050	80–95% reduction in GHG emissions (Commission 2011)	No overarching target yet (2017)	No overarching target yet (2017)	No overarching target yet (2017)

Additional sources: Commission (2007a), Commission of the European Communities (1988), Council of the European Communities (1990a), Council of the European Communities (1993a), Parliament & Council (2002a, 2002b, 2005, 2008, 2009b, 2010, 2012).

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Council of the European Communities (1993c). *Council Directive 93/76/EEC of 13 September 1993 to limit carbon dioxide emissions by improving energy efficiency* (*SAVE*). 13 September. Brussels: Council of the European Communities.
Parliament & Council (2001). *Directive 2001/77/EC of the European Parliament and of the Council of 27 September 2001 on the promotion of electricity from renewable energy sources in the internal electricity market.* Brussels: European Parliament and Council of the European Union.
Parliament & Council (2002a). *Decision No 1600/2002/EC of the European Parliament and of the Council of 22 July 2002 laying down the Sixth Community Environment Action Programme.* Brussels: European Parliament and Council of the European Union.
Parliament & Council (2002b). *Directive 2002/91/EC of the European Parliament and of the Council of 16 December 2002 on the energy performance of buildings.* Brussels: European Parliament and Council of the European Union.
Parliament & Council (2003). *Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC.* Brussels: European Parliament and Council of the European Union.
Parliament & Council (2005). *Directive 2005/32/EC of the European Parliament and of the Council of 6 July 2005 establishing a framework for the setting of ecodesign requirements for energy-using products and amending Council Directive 92/42/EEC and Directives 96/57/EC and 2000/55/EC of the European Parliament and of the Council.* Brussels: European Parliament and Council of the European Union.
Parliament & Council (2006). *Directive 2006/32/EC of the European Parliament and of the Council of 5 April 2006 on energy end-use efficiency and energy services and repealing Council Directive 93/76/EEC.* Brussels: European Parliament and Council of the European Union.
Parliament & Council (2008). *Proposal for a Directive of the European Parliament and of the Council amending Directive 2003/87/EC so as to improve and extend the greenhouse gas emission allowance trading system of the Community* (*Revised EU ETS directive*). Brussels: European Parliament and Council of the European Union.
Parliament & Council (2009a). *Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC.* Brussels: European Parliament and Council of the European Union.
Parliament & Council (2009b). *Directive 2009/125/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for the setting of ecodesign requirements for energy-related products* (*recast*). Brussels: European Parliament and Council of the European Union.
Parliament & Council (2010). *Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings* (*recast*). Brussels European Parliament and Council of the European Union.
Parliament & Council (2012). *Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC.* Brussels: European Parliament and Council of the European Union.

	Member states with middle positions[2]	Slovenia, Spain, (United Kingdom)				Binding EU-level			Non-binding	
	Eurelectric	Eurelectric and their affiliates	40%	Yes	27%	Binding EU-level	No	25%	Binding	No
	Institutional Investors Group on Climate Change	Various insurance companies and pension funds	40%		Ad-justed to the GHG target			Ad-justed to the GHG target		
Stakeholders with the comparatively lowest ambitions	**Visegrad+ Group**	Bulgaria, Czech Republic, Hungary, Poland, Romania, Slovakia	40%	No		Non-binding			Non-binding	
	Foratom	European nuclear industry	40%		No target			No target		
	Eurogas	European gas industry, midstream	40%		No target			No target		
	Gas Infrastructure Europe	European gas transport industry	40%		No target			No target		
	Alliance of the Energy Intensive Industries	CEFIC, CEMBUREAU, FuelsEurope and others	Depen-dent on global treaty	No	No target			No target		
	Magritte Group	GDF Suez, RWE, Fortum, OMV, Iberdrola, E.On, ENI, ENEL and others	Single target		No target			No target		
	Business-Europe	All European national business associations	Single target, with an eye on the outcome of a global treaty		No target			No target		
	Euracoal	European coal industry	Depen-dent on global treaty		No target			No target		
	International Organization of Oil and Gas Producers	International upstream petroleum producers and their national interest organizations	Single target, dependen t on global treaty		No target			No target		

Explanation: GHG: the stakeholder's position on the EU target on GHG emissions reduction. At least: if the stakeholder argued for a formulation that enabled upward adjustment at later stages. RES: the stakeholder's position on the

[2] As shown in Table 3, not all members of the different groups held exactly the same positions. Those deviating from the figure presented here are put in parentheses.

renewable energy target. Binding/non-binding: whether the stakeholder wanted a binding or non-binding target. EE: the stakeholder's position on the energy efficiency target.

Appendix 7 Path Dependency in the EU's Climate and Energy Policy Targets

Target	Greenhouse gas emissions	Renewable energy sources	Energy efficiency	Electricity grid interconnection
1990–2000	Stabilize GHG emissions at the 1990 level by 2000 (Council of the European Communities 1993c, 1990a)	Council decision in 1986: use of fossil fuels in electricity generation should be reduced to under 15% by 1995 (Council of the European Communities 1986). 1988: recommendation on developing renewable energy (Council of the European Communities 1988). 1993: establishment of the ALTENER program (Council of the European Communities 1993b). The Commission decided to promote renewable energy in the Green Paper in 1996 (Commission 1996)	Council decision in 1986: improvement of energy efficiency of final energy demand by at least 20% by 1995 (Council of the European Communities 1986). 1991: establishment of the SAVE program (Council of the European Communities 1991). The member states were to have programs for improvement of energy efficiency in buildings (Council of the European Communities 1993c)	General targets like establishing a common energy market, adequate and secure supply of energy, improvement of energy infrastructure and cooperation on high voltage electricity grids (Commission 1995; Commission of the European Communities 1988; Council of the European Communities 1986, 1990b)
2000–2010	2003: EU ETS directive to fulfil Kyoto Protocol commitments: 8% reduction in GHG emissions compared to 1990 levels in the period 2008–2012 (Parliament & Council 2002a, 2003)	8% of final energy demand should be renewable by 2005 (Council of the European Communities 1993b). In 1996, the Commission suggested 12% renewable energy by 2010 as indicative target for the Community (Commission 1996, 1997). 2001 renewable electricity directive: national indicative targets consistent with 12% renewable energy in national energy consumption and a 22.1% share of renewable electricity in the EU by 2010 (Parliament & Council 2001)	1998: Council recommendation that the member states should adopt energy efficiency strategies. Indicative target of reducing energy intensity of final energy consumption by one percentage point per year more than otherwise would have been achieved until year 2010 considered useful (Council 1998). 2006 directive: Member states were to adopt national indicative energy efficiency targets of at least 9% to promote end-use efficiency (Parliament & Council 2006)	10% interconnection within 2005 (Council 2002). Then achieve 10% interconnection within 2010 (Council 2007: 18; Council 2006: 15), non-binding target. Completion of the internal energy market for gas and electricity an area of considerable focus

2010–2020	Binding target of 20% reduction of GHG emissions by 2020, 30% if other developed countries also participate in a global climate agreement. Differentiated and binding commitments for the member states (Council 2007: 12)	20% of total energy consumed should stem from renewable energy by 2020, binding target at the member state level (Commission 2007b; Council 2007; Parliament & Council 2009a)	From 2008: indicative national energy savings targets of 9% within the directive's ninth year of application (Parliament & Council 2006). 20% improvement in energy efficiency by 2020, non-binding target (Commission 2006; Council 2007)	Elimination of all "energy islands" by 2015 (Council 2011). EU must achieve at least 10% interconnection within 2020 to achieve free flow of electricity in a "fully connected and functioning internal energy market" (Commission 2015: 2; Council 2014: 7)
2020–2030	40% reduction in GHG emissions by 2030, binding target. Differentiated commitments by the member states (Council 2014)	At least 27% of energy consumed should stem from renewable energy by 2030, binding target at the EU-level (Council 2014)	At least 27% improvement in energy efficiency by 2030, non-binding target (Council 2014)	15% interconnection within 2030, non-binding target (Council 2014)
2030–2050	80–95% reduction in GHG emissions (Commission 2011)	No overarching target yet (2017)	No overarching target yet (2017)	No overarching target yet (2017)

Additional sources: Commission (2007a), Commission of the European Communities (1988), Council of the European Communities (1990a), Council of the European Communities (1993a), Parliament & Council (2002a, 2002b, 2005, 2008, 2009b, 2010, 2012).

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