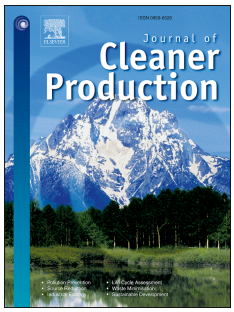
Accepted Manuscript



Renewable energy and politics: A systematic review and new evidence

Tiago Neves Sequeira, Marcelo Serra Santos

PII: S0959-6526(18)31226-5

DOI: 10.1016/j.jclepro.2018.04.190

Reference: JCLP 12771

To appear in: *Journal of Cleaner Production*

Received Date: 8 March 2018

Revised Date: 17 April 2018

Accepted Date: 20 April 2018

Please cite this article as: Sequeira TN, Santos MS, Renewable energy and politics: A systematic review and new evidence, *Journal of Cleaner Production* (2018), doi: 10.1016/j.jclepro.2018.04.190.

Renewable Energy and Politics: A Systematic Review and New Evidence*

Tiago Neves Sequeira†

Univ. Beira Interior and CEFAGE-UBI

Marcelo Serra Santos

Univ. Beira Interior and CEFAGE-UBI

Abstract

This paper reviews the literature in the intersection of renewable energies and politics adopting a multidisciplinary social sciences perspective. We begin by analyzing the recent literature dealing with renewable energies and politics, illustrating the analysis with bibliometric data. The search protocol revealed 853 contributions dated from 1998. Then we focus on the 186 contributions approached from a social sciences perspective, establishing a taxonomy to classify the contributions into the main issues covered. We identify contributions dealing with governance, with public acceptance, with markets and prices, and with political or policy determinants of renewable energies. In an empirical application we show that more democratic countries tend to invest more in renewable energies, taking into account other determinants (e.g. income, energy dependence, pollution emissions) of this investment.

Keywords: Renewable Energy; Politics; Policy; Democracy; Development.

JEL Codes: C35, C36, Q43, O11, O13, O50.

*We gratefully acknowledge financial support from FCT and FEDER/COMPETE, through grant UID/ECO/04007/2013 (POCI-01-0145-FEDER-007659). The usual disclaimer applies.

†Corresponding author. Departamento de Gestão e Economia and CEFAGE-UBI. Universidade da Beira Interior. Estrada do Sineiro. 6200-209 Covilhã, Portugal. email: sequeira@ubi.pt.

1 Introduction

The relationships between politics, policy, and renewable energies have been approached in the literature from very different disciplinary perspectives. These relationships have seen growing interest in the literature after the 2000s. An integrated approach to this varied literature is important not only for future research but also for practitioners, namely in national, federal or local governments, environmental agencies, non-government organizations (NGOs), and firms in the green market. We provide this comprehensive review.

The emphasis on renewable energies investment and climate change mitigation, which are related phenomena, varies a considerably according to political ideologies or priorities and thus varies both in time and by country. Focusing on energy policy, Kester et al. (2015) reviewed 37 related articles included in major scholarly journals in public policy and related fields of study published between 2010 and early 2014. They conclude that those contributions focused on issues such as nuclear energy, energy efficiency, renewable energy, and hydraulic fracturing operations. We enlarge on their work as our analysis includes the whole literature covering issues linked with policy, politics, and renewable energies between 1998 and 2017, and we reach both a different and broader taxonomy. Complementarily to those authors, we perform a systematic review of the literature on the Web of Science, following a strict search protocol defined below.

We begin by asking two main research questions: (1) is it possible to delimit a literature covering issues relating policy, politics, and renewable energies from a social sciences point of view and define a clear taxonomy to characterize this literature? (2) is it possible to define a clear relationship between more democratic institutions and renewable energies? In order to help answer these questions, we contribute is two ways. First, a review of the disperse and very recent literature relating political institutions and the rising consumption of energy produced by renewable sources is provided. We identify a search protocol and highlight the main bibliometric features of the whole literature relating politics with renewable energy. Then we review in detail the literature that approaches these issues from a social sciences perspectives. We offer a taxonomy for classification of this literature by issues. In doing so, we also highlight some possible topics for future research. Second, the first worldwide cross-country analysis of the relationship between democracy and investment in renewable energy covering all countries with available data is pre-

sented. This is provided using information collected from the three sources of democracy indexes available to date.

This paper is organized as follows. Section 2 provides the description of the search protocol. It begins by a description of the larger set of articles that were retrieved first. Then it justifies our emphasis on the social sciences fields, i.e. published in journals indexed in social sciences fields. Section 3 continues the bibliometric analysis even further on the references database that comes from the social sciences fields, including citations, countries and words networks. Based on that this Section also offers a classification of themes covered by the literature reviewed, identifying the main questions addressed and how the literature answers them and highlighting some of the gaps in the analysed literature. Section 4 aims to fill one of those gaps. It describes the dataset analyzed in this paper, providing quantitative analysis for the relationship between democracy and renewable energy share in consumption at the national level. The aim of this Section is to establish a quantitative relationship between democracy and investment in renewable energy, thus answering to the second research question posed above. Finally, Section 5 presents some final remarks and policy implications.

2 Renewable energy, policy and politics: the search protocol

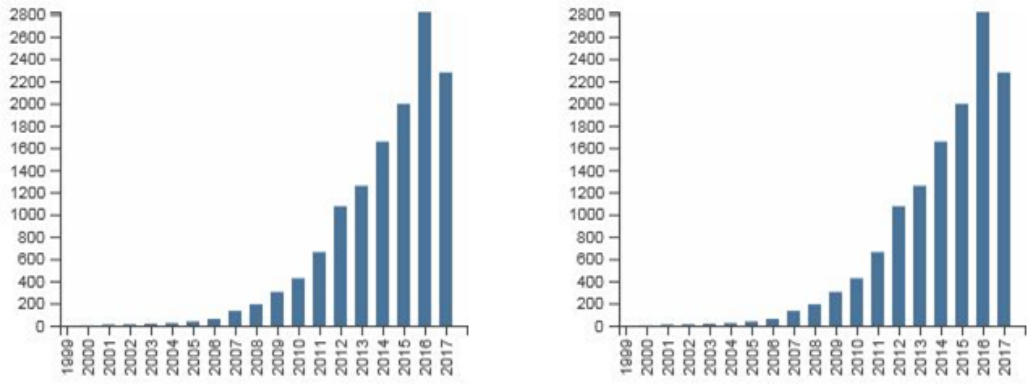
2.1 An Overview of the Literature

In this Section we begin by describing the review protocol and present a quantitative assessment of the literature (Section 2.1). We then present the taxonomy of issues covered by the literature and describe them in detail (Section 2.2).

Our systematic review protocol began by searching the web of science database on 10 October 2017 using the words “renewable energy” and “politics” or “renewable energy policies”, using plural and singular variants, covering all the period of the Web of Science (WoS) (1900–).[1] We obtained 853 publications that range from 1998 to 2017. A brief analysis of the bibliographic features of these publications highlight a very recent, growing, and highly disperse literature link-

[1] As an example, the comparison of WoS and Scopus, the two biggest bibliographic databases, discovers that WoS has strong coverage which goes back to 1900 and most of its journals written in English. However, Scopus covers a superior number of journals but with lower impact and limited to more recent articles (Chadegani et al., 2013). Please see Appendix B to details on the search protocol.

ing those two concepts throughout different scientific fields. Both the number of publications and citations grow exponentially since the early 2000s (Figure 1) highlighting the current importance of this literature.

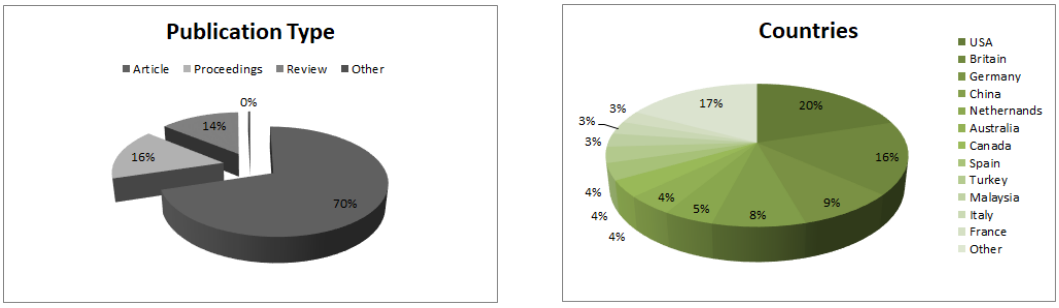


(a) Total publications by year (b) Sum of times cited by year

Source: Web of Science Clarivate Analytics Tool

Figure 1: Renewable energy, politics and policy

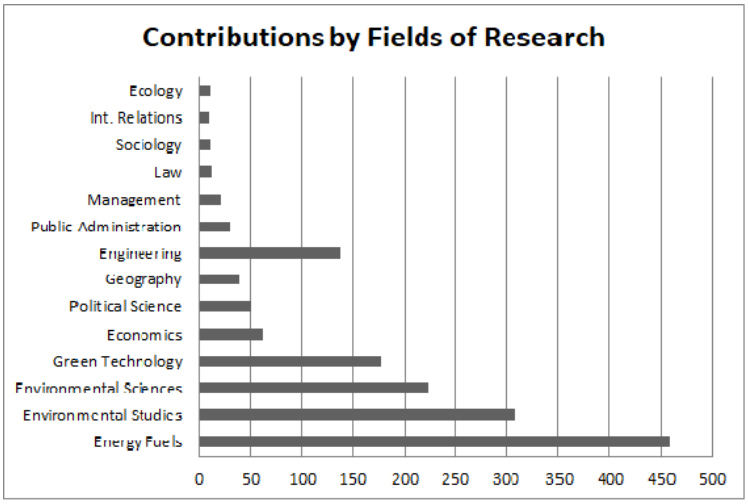
Of these publications, an overwhelming majority are published in English (98%) and in journals (77%) - see Figure 4a. Concerning authors' nationality, the USA, UK, Germany, and China account for more than 50% of the publications (see Figure 4b). Regarding research fields, these publications are dominated by Energy Fuels (54%), Environmental Studies (36%), Environmental Sciences (26%), and Green Sustainable Science Technology (21%) - see Figure 3. It becomes clear that a publication can be classified into different research fields.



(a) Publication Type (b) Countries

Source: Web of Science Clarivate Analytic Tool

Figure 2: Publication Type and Countries



Source: Web of Science Clarivate Analytics Tool

Figure 3: Publication By Field

2.2 The focus on the Social Sciences fields

As our main objective is to detail the findings of a literature bridging renewable energies, policy, and politics, we restrict a detailed analysis to the publications falling into the following research fields: history, philosophy of science, cultural studies, economics, political science, urban studies, social studies, women's studies, public administration, multidisciplinary sciences, social work, social sciences, planning development, educational research, area studies, anthropology, management, business, sociology, religion, industrial relations, and labor. This emphasizes our approach from a social sciences viewpoint. Thus, we will detail our review on the resulting 186 articles that meet these criteria. However we an also compare the purposed taxonomy on the sample of the contributions coming from the Social Sciences Web of Science fields with one applicable to the complementary sample which resulted from all the other Web of Science fields. We conclude that both taxonomies are consistent and we focus our review on the sample coming from the Social Sciences fields (as we stated from the beginning). With this result, we argue that the subset of the literature that is deeply reviewed can be considered a representative subset of the whole literature.[2]

[2]This argument can be obviously object to further research. We present the comparison on Table A.1, on the Appendix and thank a referee for a criticism that led us to perform this comparison.

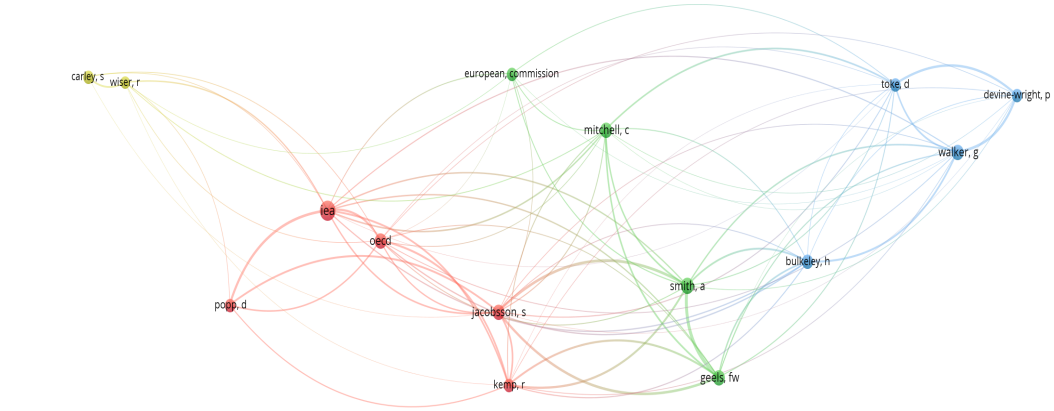
3 Contributions published on the Social Sciences Field

3.1 Citations analysis

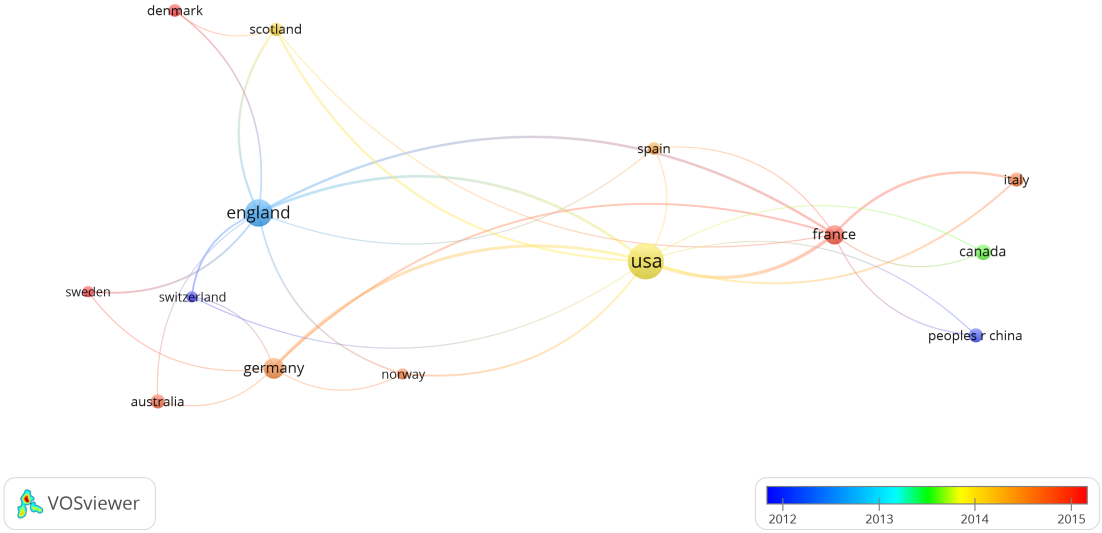
Even though we restrict the publications to review to the fields of the Web of Science that have been listed above, there is still a great heterogeneity of approaches to deal with the effects of renewable energies (RE). In what follows, we use VosViewer® [3] software to analyse the most common keywords and co-citations between authors and countries. Figure 4 - panel a) analysis the most cited authors in this literature and the relationship between them. The analysis of the network highlights that international institutions such as the OECD, the international energy agency and the european commission are much cited and in particular the first two international organizations cited by the same references. These organizations are much related to the Staffan Jocobsson, Roger Kemp and David Poop (red). Those authors common research topic is on innovation with a focus from a market perspective, as their main research fields are economics and management. Related to these authors but a bit further (in yellow) is Sanya Carley and Ryan Wiser, which are concerned with the regulatory and policy of energy. There are also strong connections between Catherine Mitchell, Adrian Smith and Frank Geels (green), which adopt a more sociological and political view linked with governance, which also cite the European Commission. The third group of most connected authors (blue) are Harriet Burkeley, Gordon Walker, David Toke and Patrick Divine-Right. Those authors are more focused in politics issues, some of which linked with the energy distribution and the related concepts of poverty, justice and social change related to energy and resources. Most of these authors have also papers which are included in the analysis below. It is natural then that this division of networks also influence the taxonomy defined below. Figure 4 - panel b) - show the countries of the cited authors and the evolution through time. This allows us to identify not only the most productive (in what citations are concerned) countries but also a time pattern of those production. England and USA emerge as the most productive countries, the first around 2012 and the second around 2014. Several developed countries (Australia, Germany, Switzerland, Norway, Denmark and Scotland) are mostly linked with England, although there is a strong link between Germany and France, which by its turn is linked with Spain, Italy and Canada. With the exception of Switzerland, Scotland and Canada, those countries obtained citations more

[3] http://www.vosviewer.com/.

recently (around 2015). The only developing country that appears in the figure is China.



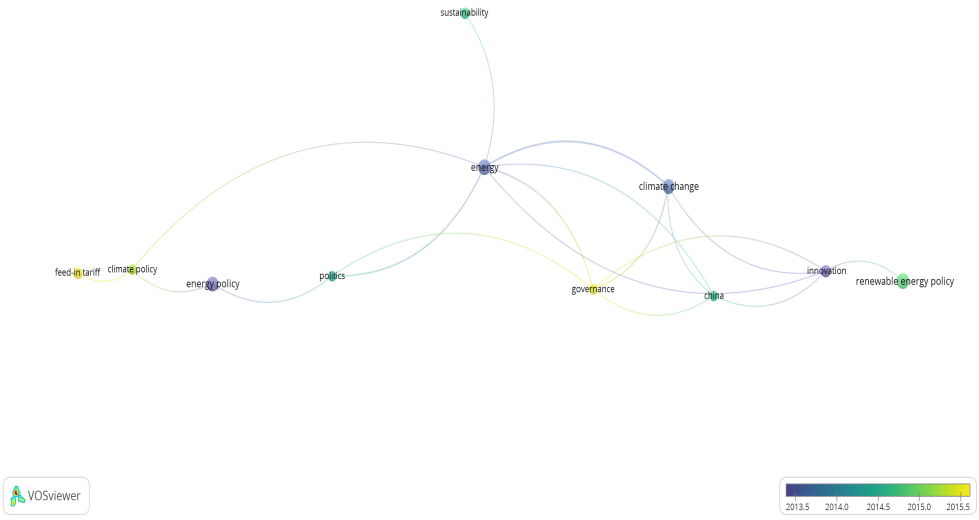
(a) Co-citations (minimum number: 20)



(b) Countries (minimum number of documents: 5)
Source: VosViewer - database of 186 references

Figure 4: Co-citations by authors and countries

Figure 5 shows the main terms used in this literature. Those terms are around policy and politics, governance, climate change, sustainability and a specific market instrument (feed-in-tariffs). Those occurrences have also a time line. While climate change, energy policy and innovation initiated to be approached with high intensity in 2013, renewable energy policy, politics and sustainability were approached around 2015. Feed-in-tariffs, climate change, governance were the most recent terms to be intensively approach. Those words are identified also below when we characterized the proposed taxonomy of these literature.



Source: VosViewer - database of 186 references

Figure 5: Co-occurrence words

3.2 A Taxonomy of the publications in the Social Sciences Field

Most papers deal with the governance or politics issues and market and price of the renewable energies (RE) or some of them (35.5%). Fewer deal with public acceptance of renewable energies (16.7%), market structures and incentives for renewable energies (25.3%), political (or institutional) determinants of renewable energies (17.2%), or the influence of investments on renewable energies on macroeconomic variables, such as employment or economic growth (2%). A minority of references, (six, namely conferences) were classified as other. In the Appendix we list the

contributions by the classes according to the main issue they study, which amounts to 96.7% of the 186 contributions reviewed.

Table 1 includes information of the main fields, methods, and regional focus of the literature in each of the classifications of the proposed taxonomy. In order to summarize the information, 'politics and policy', includes politics, international relations, law, and sociological fields while 'economics' includes economics, public administration, and management. The method 'modelling and econometrics' includes any type of mathematical modelling and statistical method.

The first classification (Governance and Politics) includes articles in the main fields of 'politics and policy'and 'economics' almost equally split, with the analysis mostly dominated by politics and policy methods (62%). In this classification only 22% of the articles reviewed use quantitative methods typical to the economics science. In the second classification 'public acceptance', the main field is by far the 'politics and policy' with 90% of the articles, and only 25% using quantitative methods such as modelling and econometrics. In the third classification 'markets and prices', economics dominates (60%) the field of study and 'modelling and econometrics' covers 49% of the articles reviewed. In the fourth classification 'influence in macro variables', half of the articles are from the 'economics' and the another half from 'politics and policy', but a great majority apply quantitative methods (75%). In the last classification 'political determinants', most articles are from the economics field (82%) and use quantitative methods (75%). In all the literature reviewed, developed countries are the most analyzed, with a minimum of 62% of the articles in the 'Markets and Prices' classification and a maximum of 84% in the 'Political Determinants' classification.

Table 1: Main fields, methods, and regional focus

Classification	**Main field**	**Main method**	**Regional focus**
Governance and Politics	politics (52%); economics (48%)	politics and policy (62%); modelling and econometrics (22%) conceptual (16%)	developed (63%)
Public Acceptance	politics (90%); economics (10%)	politics and policy (75%); modelling and econometrics (25%)	developed (71%)
Markets and Prices	politics (40%); economics (60%)	politics and policy (51%); modelling and econometrics (49%)	developed (62%)
Influence in Macro variables	politics 50%); economics (50%)	politics and policy (25%); modelling and econometrics (75%)	developed (75%)
Political Determinants	politics (28%); economics (82%)	politics and policy (17%); modelling and econometrics (72%) conceptual (10%)	developed (84%)

In order to gain an overall perception of this literature we include in Table 2 the main issues

covered by each of the classifications of the proposed taxonomy. Those issues are developed in the five following subsections. In the end of each of those subsections, a small Table highlight the main conclusions raised by those literature.

Table 2: Main issues discussed in the Literature

Classification	Main issues approached
Governance and Politics	climate change, multi-country agreements
Public Acceptance	acceptance of new renewable plants (essentially wind plants), acceptance by interest groups, environmentalism, influence of culture and religion, sustainability
Markets and Prices	market incentives (feed-in tariffs, cap and trade, subsidies), description of specific market conditions
Influence in Macro variables	influence of renewable energies in economic growth and employment
Political Determinants	influence of democracy, ideologies in cabinet, strictness of environmental regulations, comparison between market with non-market policies

3.2.1 Governance and Politics

The publications classified as dealing with governance issues are those describing policies devised to combat climate change or to promote renewable energies (RE) in country-specific, multi-country, or multi-regional environments. According to Kester et al. (2015), recent research has a greater focus on studying many types of renewable energy, energy efficiency, important policies, and technological diffusion with both theoretical and empirical approach. For example, Muller (2017) and Van de Graaf (2013) deal with a description of the emergence and the role of IRENA – International Renewable Energy Agency. Also, Ponte & Daugbjerg (2015) describe the transnational governance of biofuel along with the World Trade Organization agreements, and Harnesk & Brogaard (2017) analyze the influence of European renewable energy directive and policies in Tanzania. Inter-state dependence on energy policies and standards are analyzed in Bowen & Lacombe (2017). Continuing on international relations, Piksryte & Mazylis (2015) analyzes the intergovernamental and domestic factors in negotiations for the renewable support schemes within the European Union. In a given country, policies cause spillovers outside its borders, for example (Harnesk & Brogaard, 2017; Bowen & Lacombe, 2017; Reina, 2016), or even the learning process of Norway by just gathering information about policies adopted by Sweden, as pointed out by Gullberg & Bang (2015). In fact, identifying the right policies and politics for sustainability transitions may have an important role. According to Rogge & Reichardt (2016), Betsill & Stevis

(2016), and Shi (2009), the key is encouraging technological transitions. In Bernauer (2013) climate change politics are analyzed, pointing out the increased centrality of the politics relating to climate change, and some prospects for these politics in the future are highlighted.

Country specific analyses include the German (Albrecht, 2017; Eckersley, 2017; Kern, 2014; Strunz, 2014; Hillebrand, 2013; Schreurs , 2012), US (Konisky & Woods, 2016; Kim et al., 2016; Berry et al., 2015; Shum, 2015), UK (Toke & Nielsen, 2015; Royles & McEwen, 2015; Johnstone, 2014; Toke, 2010; Walker et al., 2007; Eyre, 2001), China (Chen & Lees, 2016; Ong, 2012; Jing & Mingshan, 2007; Wu et al., 2006), Latvia (Rubins & Pilvere, 2017), South Korea (Lee & Kim, 2016), South Africa (Satgar, 2015), Jordan (Verdeil, 2014), Croatian (Sercer & Kavic, 2014), Romania (Stefan & Coca, 2013), and Taiwan (Lee & Shih, 2010) in regional or federal states (Betsill & Stevis, 2016; Park, 2015; Mander, 2007) cases or in native American lands (Pasqualetti et al., 2016). The role of NGOs in promoting renewable energy in Africa is analyzed in MacLean et al. (2015). Schmitz (2017) compares climate relevant policies in China, Brazil, India and South Africa. Another example of this type of contribution is Konisky & Woods (2016), who examine the Obama presidency environmental policy and relate the central level policy with the federal level policies. Also in the US, Kim et al. (2016) analyze lobbying by electric companies, while Shaw & Ozaki (2016) analyze environmental standards. von Strokirch (2016) analyzes the environmental policy of Abbott's coalition government in Australia, while Bocquillon & Evrard (2016) compare the French renewable energy policies with European ones and how the latter influence the former, and Gonel (2006) compares renewable energy usage in Turkey with the EU counterpart. Moreover, Toke (2010) analyzes the UK renewable energy policy under New Labour. Sahovic & da Silva (2016), Wyns & Khatchadourian (2016), Lawrence et al. (2016), Cetkovic & Buzogany (2016), Burgin (2015), Laurent (2015), Lauber & Schenner (2011), and Sauter (2009) deal with the description of the European Union renewable energy policies (sometimes specifying policies for some sectors such as the biofuels) and argue whether this policy should be reshaped after the 2020 horizon. This group of publications also includes several institutional analyses (Winickoff & Mondou, 2017; Cullen, 2017; Kern, 2014; Rutherford & Coutard, 2014; Zelli & van Asselt, 2013; Lauber & Schenner, 2011). Cullen (2017) discusses policy mixes for sustainable transitions. Zelli & van Asselt (2013) discuss different domains of the global environmental analysis. In Bernauer (2013) climate change politics are analyzed, pointing out the increased

centrality of the policies relating to climate change, and some prospects for these policies in the future are highlighted. Somewhat in the same line, Karlsson-Vinkhuyzen et al. (2012) argue that global governance is essential to the sustainable energy system. Their article identifies some types of international collaboration measures that would be both efficient and necessary to promote a sustainable energy system. In Skjolsvold (2013) the criteria to define sustainability are discussed. More specifically, Fischhendler & Katz (2013) discuss the use of the 'security' jargon in the sustainable development discourse. In an economics framework, de Arce et al. (2016) study the effects of energy policy in reducing CO_2 emissions and conclude that the policy efficiency depends on the reserves constraints.

Overall these contributions rely mostly on case studies of specific countries and a minority of studies at the international level, dealing with both the implementation of renewable energies policies and the related climate change mitigation policies. Some of the studies at the international level deal with climate change agreements (as in Saran (2010)).

Table 3: Brief Summary of "Governance and Politics"

Issues	**Main Conclusions**
Climate Change	addresses how international organizations promote climate change mitigation policies and thus RE
Multi-country agreements	study the effects of multi-country agreements about emissions reduction, identify types of efficient international collaboration policy efficiency depends on reservers constraints

3.2.2 Public Acceptance

Another major issue covered with the literature surveyed is the acceptance of support for investments in renewable energy, studying the consumers' attitude toward renewable sources of energy. For example, Eagle et al. (2017) and Fischhendler et al. (2015) analyze marketing practices relating to energy produced by renewable sources. Some of the sources analyze the public acceptance of new wind farms in US (Phadke, 2010), Denmark (Papazu, 2017, 2016), UK (Armeni, 2016), Australia (Hindmarsh, 2014; Bulkeley, 2000), and Mexico (Howe, 2014), solar farms in Israel (Fischhendler et al., 2015), and electrification and solar plants in rural Spain (Munda & Russi, 2008). For example, Bell et al. (2013) summarize the arguments for and against wind farms. While there is a general acceptance of wind firms detected in surveys, there is general opposition to local wind farms, meaning that people accept wind farms unless they were placed in "their

backyard". In Mozumder et al. (2011) estimations of willingness-to-pay for renewable energy in New Mexico are presented.

Another strand in this literature deals with acceptance by interest groups in society. For example Lennon & Scott (2017) and Aitken et al. (2016) study competing storylines about the transformation of rural places driven by the building of renewable energy production facilities. In the same line, (Hanna, 2016; Armeni, 2016; Gailing, 2016; Coles et al., 2016; Shaw & Ozaki, 2016; Aylett, 2013; Mander, 2008; Bulkeley, 2000) approach power relations and public participation in decision-making in the process of transformation due to investments in renewable energy. For example, Gailing (2016) applies a case study to the German Energiewende program. Eaton (2016) studies how industrial cultures shape community responses to bioenergy developments. The paper is also based on a case study of two industrial communities in Northern Michigan and shows that communities shape their response taking into account past industrial development, current environmental degradation, and future prospects of benefits from the bioenergy investments. Aylett (2013) investigates the role of civil society groups in speeding the urban adoption of green technologies, focusing on the case study of a community-based solar energy program in Portland. Additionally Manderson (2016) and Schick & Winthereik (2016) study the role that art plays in shaping public interest for energy and influencing public interventions. Shaw & Ozaki (2016) analyze how the improvement of environmental standards change the socio-technological relationships. Jacques & Knox (2016) analyze the climate change denial discourses. Most of that discourse argues that climate change arguments are used to enhance government size and power and cast doubts about the truth of the climate science. Ravikrishna (2011) studies the effect of religion and philosophy in India in the practical implementation of energy projects. Hunsberger (2010) analyzes the acceptance of a single agricultural species, Jatropha, for the production of biofuel, among Kenyan peasants. The environmentalism movement is analyzed in Schlosberg & Coles (2016), Bay (2016) and Shaw (2011). On the firms' side, Pacheco & Dean (2015) study how they respond to social movements' demands relating to wind power adoption.

Overall, this class of contribution deals with acceptance of new renewable plants (essentially wind plants), acceptance by interest groups, the environmentalism movement, and influence of culture and religion.

Table 4: Brief Summary of "Public Acceptance"

Issues	Main Conclusions
acceptance of new renewable plants	generally people accept RE 'farms' but not close to their home (NIMBY)
acceptance by interest groups	the level of acceptance depends on history, market power of interest groups and many other variables,
environmentalism and sustainability	analysis how sustainability is dependent on social, religion and cultural habits and groups

3.2.3 Markets and Prices

There are many papers in the literature that are related to policy instruments that intervene in the renewable energy markets and prices. Instruments such as feed-in-tariffs (Farrell et al., 2017; Tobin , 2014; Smith & Urpelainen, 2014; Solorio, 2013), subsidies (Blazquez et al., 2017; Kalkuhl et al., 2013; Grafton et al., 2012), profits tax scheme (Worthington, 1984), cap and trade system (Jarke & Perino, 2017), policy market agreements for specific sectors (von der Fehr & Ropenus, 2017; Kim et al., 2017; Cointe, 2017; Crago & Chernyakhovskiy, 2017; Nicolli & Vona, 2016), and mixed policies (Treki & Urban, 2015; Kalkuhl et al., 2015; Yi & Feiock, 2014; Dechezlepretre & Glachant, 2014; Twomey, 2012; Boute, 2011; Gross et al., 2010; Bode, 2006), are analyzed. For instance von der Fehr & Ropenus (2017) describe the effects of green certificates in market power in the energy sector, Madlener & Stagl (2005) compare the effects of green certificates with guaranteed prices and quota targets, and Kim et al. (2017) study the effects of several policies in the market for solar and wind energies. In Nicolli & Vona (2016) different regulation policy effects on markets are studied, concluding that reducing entry barriers is more effective in promoting innovation in renewable energies, especially when small and independent producers enter the market. In Grafton et al. (2012) it is shown that under some conditions subsidies targeting the substitution of fossil fuels by bio-fuels can indeed accentuate climate change due to hastening fossil fuel extraction. Other European Union regulation policies and their effects on market outcomes are analyzed in Doganova & Laurent (2016) and Aldea et al. (2012). The application of German renewable policies and ideas in Morrocco are studied in Steinbacher (2015). Finally Kim et al. (2016) analyze the effect of the electricity market deregulation in the US on the promotion of renewable energy. While the study concludes that there is no direct influence on renewable energy investments, the deregulation process induces the legislator to benefit those that prefer renewable. Thus, this indicates that a deregulation process is associated with more ambitious renewable policies.

Other contributions describe the market conditions of renewable energies in some countries, such as a description of the wind energy sector in Spain (Matti et al., 2017), wind energy sector in the US (Hitaj, 2013), several renewable energy markets in Russia (Grechukhina et al., 2016), in China (Hou, 2015), a description of the German-Austrian Bidding zone (Szabo, 2017), a comparison of renewable energy policies across several countries in Europe with special emphasis on the price mechanism (Argentiero et al., 2017), an analysis of spatial processes linked with sustainable transitions (McEwan, 2017; Coenen et al., 2012), and an analysis of the increasing demand for bioenergy in Europe (Johnston & van Kooten, 2016). Melece & Krievina (2016) analyze bioenergy production in Latvia while Groba et al. (2015) study the role of policy and markets for exports of China's renewable energy technologies.

Funding of renewable energy projects is also covered (Rodriguez et al., 2015; Reboredo, 2015; Wang, 2015). For example, Rodriguez et al. (2015) use financial microdata to assess the effect of government policies on private sector investment in renewable energy, while Reboredo (2015) analyzes the comovement of stock prices of oil and renewable energies. Market policies oriented to Innovation in renewable energy are analyzed in Conti et al. (2015), Nesta et al. (2014), and Luthi & Wuestenhagen (2012). A cost-benefit analysis of renewable energy is provided in Hsu (2010).

To sum up, several policy instruments intervene in the renewable energy market. Notably feed-in tariffs increase investment in renewable energy, influencing the market price for electricity. Thus, optimal levels of feed-in tariffs can be obtained taking into account the risks of the market prices oscillation, such as in Farrell et al. (2017). Despite several studies on the policies aimed at the rise of investments in renewable energies, we did not find any analysis that takes into account the budgetary cost of these instruments, and consequently of the potential intertemporal Ricardian effect on the consumers' budget. This is a branch of literature mainly approached by an Economics science perspective.

Table 5: Brief Summary of "Markets and Prices"

Issues	**Main Conclusions**
market incentives	market incentives generally increase the production and consumption of RE; reducing entry barriers are sometimes more effective monetary incentives are not always superior to regulation; under some conditions subsidies to RE can foster climate change
description of market conditions	the analysis of markets in several countries reveal that there are inter-regional effects and also focus on the risk of price oscillations for the RE sector

3.2.4 Influence on Macroeconomic and Macro-social variables

A minority of the reviewed contributions analyze the effect of investment or policies linked with renewable energies in macroeconomic variables such as employment and economic growth. For example Jaraite et al. (2017) find that renewable energy policy-induced wind and solar power capacity promotes growth and/or employment in the short run, but these capacity increases do not stimulate economic growth in the long run in the EU-15 region. Bohringer et al. (2017) analyze the effect of renewable energy policies on prices in Germany and conclude for an inflationary effect. Bildirici & Ozaksoy (2016) conclude for a positive effect of biomass energy consumption in economic growth in Sub-Saharan Africa. Health effects of wind and solar investments in New Jersey are analyzed and quantified in Siler-Evans et al. (2013).

This small group of contributions concentrates on the effect of implementation of renewable energies on macroeconomic level variables. Although there are few contributions in this class, it seems that negative (or at least non-positive) effects of renewable energy investments have been identified in rich countries and positive effects have been identified in poor ones.

Table 6: Brief Summary of "Influence on Macroeconomic and Macro-social variables"

Issues	Main Conclusions
influence of renewable energies in macro variables	Positive effects of RE in income and growth – mainly in the short run, and inflationary effects

3.2.5 Political Determinants of Renewable Energy

This topic is related to the previous one in the sense that it also describes incentives to invest in renewable energies. However, in this case literature describe mostly non-monetary incentives linked with politics or institutions. These political determinants are linked to political constraints, environmental standards, democratic, and constitutional features. According to this review, these political features may influence renewable energy investments. For example, while there is no direct evidence of an effect of democratization on renewable energy (which we provide in the following section for the first time for a large cross-section of countries), there is evidence of an effect of democracies and left-wing parties in office in the adoption of feed-in tariffs: Cadoret & Padovano (2016), Bayer & Urpelainen (2016), and Dumas et al. (2016); and a study on the interaction between democratic processes and climate change in the UK is provided in Aitken

(2012). In fact, in this last reference, it is shown that the partisan ideologies shape renewable energies policies mostly when there is strong political competition. Bayulgen & Ladewig (2017) also shows that the fewer the political constraints (i.e. veto players), the faster the transition to cleaner energy production. The argument is that the powerful *status quo* voters see their power to deter energy transitions increased the greater the political constraints of the system.

Vasseur (2016) concludes that an affinity to neoliberal ideology, US senatorial environmental voting records, and prior policy actions predict the type (but not the number) of policies the state adopts. There are also studies that compare political factors with market oriented policy factors. For instance, Flynn (2015) concludes that the amount of subsidies and political support are more important in promoting renewable energy than feed-in tariffs. In the same line Vasseur (2014) concludes that the presence of Democratic politicians and the presence of environmental organizations influence the type of policies adopted by a given state (in the US). Also, Aklin & Urpelainen (2013) study how exogenous shocks interact with domestic political evolutions, such as the growing strength of the renewables advocacy coalition on path dependence and on outcomes of sustainable energy transitions. Ciocirlan (2008) and Ciocirlan (2009) compare renewable energy outcomes throughout US states.

On the determinants of the strictness of environmental policies, Carley & Miller (2012) discovered that the ideology of electors and of government determines the degree of policy strictness. Behavior and religious factors are also mentioned by Rasmussen et al. (2011) and Wang & Xue (2011). In Johnston & van Kooten (2015) the authors discuss the premise according to which investment in biomass energy is carbon neutral, which is an argument that has been used to implement policy incentives for the use of forest biomass as a source of renewable energy. They argue that the carbon neutrality of biomass hinges on weak discount of the future, or in other words, in assuming that climate change is not an urgent matter. Contributions in (Lockwood et al., 2017; Maguire, 2016; Hellsmark et al., 2016; Bromley-Trujillo et al., 2016; Novan, 2015; De Laurentis, 2015; Li et al., 2015; Smith & Raven, 2012; Essletzbichler, 2012; Zilouchian & Abtahi, 2012; Johnstone et al., 2010; Glenna & Thomas, 2010; Ciocirlan, 2008) deal with the effect of policy standards on renewable energies adoption or innovation in country, state, and energy-specific studies. Lekakis & Kousis (2013) study the effects of policies taken during the crises in the environment in Greece. Bacon et al. (2011) analyze the implementation of an integrated

sustainability university curriculum.

Although less developed than some other aspects in the literature, it becomes clear from the review that there is increasing evidence (mainly for the US) of influence of political non-monetary features in the adoption of renewable energies. Overall, more democratic and left-wing countries and countries or states with fewer veto instances tend to adopt renewable energy-friendly policies. In Section 3 we present evidence that more democratic countries tend to consume a larger share of energy coming from renewable sources.

Table 7: Brief Summary of "Political Determinants of Renewable Energy"

Issues	**Main Conclusions**
influence of democracy and ideologies	democracies and left-wind parties implement more feed-in tariffs to incentive RE; the powerful voters deter energy transitions increased the greater the political constraints of the system
strictness of environmental regulations	preference towards the future, religion, voters and government ideologies influence the strictness of regulations

4 Democracy and Renewable Energy

In this section we present new evidence regarding the relationship between democratization processes and the renewable energy shares in a panel data of countries. In the previous Sections we revise the literature in the intersection between politics and renewable energies. In particular, it becomes clear from the review that there is increasing evidence (mainly for the US) of influence of political non-monetary features in the adoption of renewable energies. Thus this is a strand of the literature that deserves more research. This Section contributes to filling that gap.

In comparison with existing evidence, we relate democracy as a direct determinant of renewable energy and not as a determinant of the adoption of feed-in-tariffs (as e.g., Bayer & Urpelainen (2016)). The argument that more democratic countries gather incentives to invest in renewable sources of energy may be based on some evidence that supports that democracies limit lobby and market power of incumbent firms operating in non-renewable energy sectors. Moreover, they are naturally more sensitive to the environmental arguments that are arising in modern societies than in autocratic societies. In other words, in more democratic societies, citizens vote for renewable energies, while in more autocratic societies, citizens cannot vote and choices are dominated by interest groups.

4.1 Methodology

Energy share of renewable sources is, by definition, on the interval [0,1], and is thus a fractional response variable. Ramalho & Murteira (2016) demonstrated the relevance of taking into account this feature of the data; see also Papke & Wooldridge (1996) on the same issue. The inadequacy of simple linear models to describe these variables is especially likely to occur in the framework under analysis, due to the fact that the share of energy produced by renewable energy sources is quite small and close to zero, leading to predictions that can become negative. Thus the econometric approach to obtain the results in this paper is a fractional probit estimator.[4] On the other hand, the incorporation of endogeneity in nonlinear models imposes additional challenges, but can be implemented using a control function approach; see Wooldridge (2015). Basically, a control function, which consists of the residual of a regression of the endogenous variable on the exogenous variables and one or more instrumental variable(s), is added to the explanatory variables matrix in the fractional probit regression. This gives rise to scaled versions of the parameters of the models, but provides the correct sign and significance of the effect of the explanatory variables, as well as their marginal effects on the shares, and is a simple test to assess the presence of endogeneity, which we also implement.

4.2 Variables and Data: sources and definitions

4.2.1 The dependent variable

We use data from the dataset provided by the International Energy Association (IEA) summing up shares of geothermal, solar, wind, and ocean wave in total energy consumption.[5]

4.2.2 Democracy

As the measurement of democracy or democratization has been discussed in the development literature, we use the three measures available to date to proxy for democracy. We naturally argue that as results appear to be quite similar regardless of the proxy used for democracy, this highlights the robustness of our result. First, we use the POLITY IV dataset Marshall & Jaggers (2008).

[4] This is implemented through a *fracreg probit* command in STATA®.

[5] We focus on these sources of renewable energies as these are clearly the environmentally friendly renewable energies, and thus we also call them *modern renewables*.

The dataset contains annual data for a polity index for the period between 1800 and 2013 for 193 countries. This index includes items that stand for democracy and items that count for autocracy, subtracting autocracy from democracy (using sub-items such as competitiveness of executive recruitment, openness of executive recruitment, constraint on chief executive, and competitiveness of political participation, regulation of participation, competitiveness of participation). As a result, the index ranges from -10 (full autocracy) to 10 (full democracy), assuming discrete integer values. The Polity IV project defines a classification of five main levels of autocracy/democracy: autocracies (-10 to -6), closed anocracies (-5 to 0), open anocracies (1 to 5), democracies (6 to 9), and full democracy (10). The polity variable is the one widely used as a proxy for democracy in the literature that relates democracy with development or education levels (see e.g., Acemoglu et al. (2005), Acemoglu et al. (2008) and Sequeira (2017)).

Second, we use the Polyarchy dataset Vanhanhen (2000). This includes annual data between 1810 and 2000 for 187 countries. The Polyarchy index is based on the notions of competition for political power and of participation in elections. The democracy index is then the product of the participation index multiplied by the competition index. These are seen as very different measures of democracy.

Finally, we use a very recent source of a democracy index: Gründler & Krieger (2016). The Support Vector Machines Democracy Index (SVMDI) is continuous on the [0,1] interval and allows for very detailed and sensitive measurement of democracy for 185 countries in the period between 1981 and 2011. This is a novel approach to measure democracy that is based on machine learning algorithms for pattern recognition. The advantage gained via application of these algorithms is that they give computers the ability to learn without being explicitly programmed. In this sense, the function that combines several features of democracy (e.g. competition, participation, openness of executive recruitment, constraint on chief executive, competitiveness of political participation, regulation of participation, and competitiveness of participation) is endogenously determined.

4.2.3 Other explanatory variables

We describe below the additional determinants of renewable energy consumption as well as their data sources. We use the following variables:

- GDP *per capita* at PPP constant prices (chain index) from the Penn World Tables. The relationship between income and energy shares (not restricted to renewable energy sources) has been studied (e.g., Burke (2010)).

- industry share in production from the databanks international. This should proxy the economic constraints to adopt renewable and more expensive energies in economies that depend heavily on high consumption sectors, such as industry.

- Carbon dioxide (CO_2) emissions from the databanks international. In countries committed to international agreements, the higher the emissions, the greater the incentives to adopt renewable sources of energy consumption.

- Energy trade balance from the databanks international. The higher the energy dependence, the greater the incentive to adopt renewable sources of energy consumption.

  All these regressors were also used in a recent study that approaches the political drivers of renewable energies in the European Union, Cadoret & Padovano (2016).

  In order to account for specific lobbying or market power of existing non-renewable or potentially polluting energy sources, we control for initial shares of oil, coal, and nuclear energies. We measure these shares in 1971 (at the beginning of or prior to the period of analysis), to account for reverse causality using data from the International Energy Association (IEA). In the absence of proxies of energy prices in the wide cross-section of countries used in this paper, those initial shares may also proxy for the initial relative price of different sources of energy.

The database is available upon request. The number of countries varies with the number of covariates used in each regression between 100 and 126. The number of observations is included in the notes to each table. Table 8 presents descriptive statistics for the main variables used in the regressions.

4.3 Empirical Findings

In this Section we present the empirical evidence regarding the influence of democratization in Renewable energies consumption (as a share of total energy consumption) in a large cross-section

Table 8: Descriptive Statistics

Variable for Democracy	Mean	S.D	Min	Max
Modern Renewables	0.007	0.035	0	0.613
GDP *per capita*	8.658	1.079	5.823	11.343
Democracy - Polity IV	1.410	7.691	-10	10
Democracy -Poliarchi	13.262	13.805	0	47.08
Democracy - SVMDI	0.484	0.391	0.007	0.981
Industry Share	31.20	12.70	7	85
Carbon Dioxide	5.710	8.235	0.004	87.653
Energy Trade Balance	51371.69	193838	-17011	2209394

of countries for the available time span according to the different available sources for proxies of democratization. There is strong evidence of a positive effect of democratization on consumption of energy produced using modern renewable sources, even when controlling for endogeneity.

Table 9 shows the main results. Table 10 shows results robust to endogeneity, using the control function approach described above. Tests for endogeneity often reject and consequently changes in the results presented in both tables are minor, which is a strong sign of the high robustness of these results. Columns (1) to (3) show regressions for the baseline specification and (4) to (6) add the share of oil, coal, and nuclear at the beginning of the period of analysis. Moreover, each of the three regressions on each group uses one of the three proxies for democracy that we described above.

Interestingly, results are very consistent among different specifications. The coefficient for GDP shows us that the higher the country income, the more the energy consumption comes from modern renewable sources. This effect is significantly positive across all specifications. Marginal effects indicate a 0.9 percentage point increase in the share of modern renewables consumption for a 2.72 USD increase in GDP *per capita*. This means that if GDP increases by 100 USD, then the share of renewables should increase nearly 3 percentage points. As the average share is 0.7%, this is a very important effect.

The industry share and the carbon dioxide emissions both have a negative effect on the renewable shares. This may be due to the lobbying power of heavily energy dependent activities that resist change-over to the renewable sources, which are potentially more expensive. At a national level (even considering subsidies to renewables) a highly industrialized and polluting country may face more adjustment costs to produce energy through renewables than a less industrialized and polluting country. Quantitatively, an increase in the industrial share by 1 percent point would de-

crease the share of renewable energy consumption between 0.04 and 0.06 percent points. Again, this is a quantitatively important effect. Additionally, a 1 percent point increase in the carbon dioxide emission can be responsible for the reduction in investment in renewable energy consumption of 0.2 to 0.3 percentage points, a very significant quantitative effect. Energy dependence has no significant influence on the dependent variable.

The effect of democracy on renewable energy consumption is the focus of this evidence. In fact, democracy proved to be a statistically highly significant determinant of renewable energy consumption. A 1 point increase in the polity IV index (which ranges from -10 to 10) and in the poliarchy index (which ranges theoretically from 0 to 100) implies an increase in renewable energy consumption of 0.01 to 0.03 percentage points. Given the average value of the dependent variable, this is not a negligible effect. Note that an increase of 10 points in the poliarchy index can raise the share of renewable energy consumption from 0.7% to 0.8%. Using the last available measure of democracy, the SVDMI[6], the effect of democracy is greatly increased. A 1 point increase in the index of democracy should increase the share of renewable energy by 1.8 to 2.3 percentage points, which emerges as a very important quantitative effect.

The shares of the major sources of energy consumption (oil, coal, and nuclear) at the beginning of the period are included to account for the possible effect of lobbying groups related to these non-renewable (or more polluting) industries in reducing the transition to the modern renewable sources. In fact, the results in Tables 9 and 10 indicate that those initial situations with high prevalence of those energy sources prevent a faster transition to modern renewable sources of energy. This is seen in the significant negative signs of all those shares in at least one regression. However, the main results hardly change, and in particular the effect of democracy on the share of renewable sources in consumption is maintained even when those additional variables are included. This is additional evidence of robustness.

[6]Note also that the data coverage of SVDMI is more recent than that of the other proxies for democracy.

Table 9: Parameter estimates and marginal effects

Variable for Democracy	Polity IV	Poliarchy	SVDMI	Polity IV	Poliarchy	SVDMI
Dependent Variable	Renewable Energy Share in Energy consumption					
GDP per capita	0.593***	0.784***	0.317***	0.571***	0.704***	0.242***
	[0.098]	[0.134]	[0.081]	[0.119]	[0.151]	[0.090]
	[[0.220]]	[[0.069]]	[[0.156]]	[[0.231]]	[[0.289]]	[[0.157]]
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.008)
Democracy	0.022***	0.015**	0.798***	0.022**	0.015**	0.852***
	[0.008]	[0.006]	[0.169]	[0.009]	[0.007]	[0.167]
	[[0.012]]	[[0.069]]	[[0.326]]	[[0..014]]	[[0.012]]	[[0.334]]
	(0.0003)	(0.0001)	(0.024)	(0.0003)	(0.0003)	(0.030)
Industry Share	-0.032***	-0.042***	-0.025***	-0.032***	-0.042***	-0.021***
	[0.008]	[0.013]	[0.008]	[0.009]	[0.012]	[0.008]
	[[0.016]]	[[0.069]]	[[0.015]]	[[0.017]]	[[0.021]]	[[0.013]]
	(-0.0005)	(-0.0005)	(-0.0007)	(-0.0004)	(-0.0005)	(-0.0007)
Carbon Dioxide	-0.151***	-0.201***	-0.095***	-0.127***	-0.169***	-0.061***
	[0.026]	[0.048]	[0.023]	[0.029]	[0.046]	[0.021]
	[[0.061]]	[[0.069]]	[[0.043]]	[[0.058]]	[[0.078]]	[[0.040]]
	(-0.002)	(-0.002)	(-0.003)	(-0.002)	(-0.002)	(-0.002)
Energy Trade Balance	0.000	0.000	0.000	0.000***	0.000**	0.000
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
	[[0.000]]	[[0.000]]	[[0.000]]	[[0.000]]	[[0.000]]	[[0.000]]
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Oil share 1971	—	—	—	-0.001	-0.004**	-0.001
				[0.001]	[0.002]	[0.002]
				[[0.004]]	[[0.003]]	[[0.004]]
				(-0.0002)	(-0.0003)	(-0.00004)
Coal share 1971	—	—	—	-0.009***	-0.010**	-0.009***
				[0.002]	[0.005]	[0.002]
				[[0.004]]	[[0.007]]	[[0.004]]
				(-0.0001)	(0.000)	(-0.0003)
Nuclear share 1971	—	—	—	-0.058**	-0.027	-0.087***
				[0.023]	[0.025]	[0.032]
				[[0.059]]	[[0.060]]	[[0.005]]
				(-0.001)	(0.000)	(-0.003)

Notes: Bootstrapped and Cluster standard deviations are presented below coefficients in square and double square brackets. ***, **, * and denote significance at the 1%, 5%, and 10% level respectively, according to Bootstrapped standard deviations. Marginal effects are indicated in curved parentheses. Number of Observations: columns (1) and (4): 1583 and 1491; columns (2) and (5): 1341 and 1297; columns (3) and (6): 529 and 433. All regressions include a complete set of time dummies.

5 Conclusion and policy implications

We provide an integrated approach to the sparse literature about the relationship between politics, policy, and renewable energies. We follow a precise protocol to systematically review the literature indexed in the Web of Science and offer a taxonomy of a sub-group of the literature related with the social sciences, mainly economics, sociology, law, management, international relations, and politics. Methodologies are divided between qualitative approaches mostly linked with the politics analysis and quantitative methods (both mathematical modelling and statistical and econometrics approaches).

Most papers deal with politics and governance of renewable energies and sustainability, focusing on international agreements and climate change mitigation associated with renewable ener-

Table 10: Parameter estimates and marginal effects (endogeneity)

Variable for Democracy	Polity IV	Poliarchy	SVDMI	Polity IV	Poliarchy	SVDMI
Dependent Variable	Renewable Energy Share in Energy consumption					
GDP per capita	0.584***	0.745***	0.312***	0.560***	0.655***	0.248***
	[0.105]	[0.145]	[0.086]	[0.114]	[0.153]	[0.083]
	(0.009)	(0.009)	(0.009)	(0.009)	(0.008)	(0.009)
Democracy	0.025***	0.019***	0.783***	0.025***	0.019***	0.827***
	[0.009]	[0.006]	[0.183]	[0.010]	[0.007]	[0.194]
	(0.0003)	(0.0002)	(0.023)	(0.0004)	(0.002)	(0.029)
Industry Share	-0.032***	-0.041***	-0.024***	-0.032***	-0.041***	-0.020***
	[0.009]	[0.011]	[0.008]	[0.009]	[0.013]	[0.008]
	(-0.0005)	(-0.0005)	(-0.0007)	(-0.0005)	(-0.0005)	(-0.0007)
Carbon Dioxide	-0.152***	-0.213***	-0.104***	-0.129***	-0.183***	-0.079***
	[0.027]	[0.048]	[0.022]	[0.027]	[0.044]	[0.023]
	(-0.0006)	(-0.003)	(-0.003)	(-0.002)	(-0.002)	(-0.003)
Energy Trade Balance	0.000	0.000	0.000	0.000	0.000	0.000
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Oil share 1971	—	—	—	-0.001	-0.004**	-0.001
				[0.002]	[0.002]	[0.002]
				(-0.000)	(-0.000)	(-0.000)
Coal share 1971	—	—	—	-0.009***	-0.011***	-0.009***
				[0.002]	[0.004]	[0.002]
				(-0.0001)	(-0.0001)	(-0.0003)
Nuclear share 1971	—	—	—	-0.062***	-0.028	-0.078***
				[0.024]	[0.031]	[0.030]
				(-0.001)	(-0.0003)	(-0.003)
Control function $\hat{u}_{GDP}$	-0.967	0.0002	0.0002	-0.229	-0.0002	0.0003**
	[1.265]	[0.0002]	[0.0002]	[1.482]	[0.0002]	[0.0001]
Control function $\hat{u}_{Democracy}$	-0.035	-0.014	0.491	-0.035	-0.016	0.179
	[0.031]	[0.020]	[1.195]	[0.034]	[0.020]	[1.156]

Notes: Bootstrapped standard deviations are presented below coefficients in square brackets. ***, **, * and denote significance at the 1%, 5%, and 10% level respectively. Marginal effects are indicated in curved parentheses. Number of Observations: columns (1) and (4): 1502 and 1410; columns (2) and (5): 1257 and 1214; columns (3) and (6): 528 and 432. All regressions include a complete set of time dummies.

gies. The second largest group deals with market determinants of investment in renewable energy and focuses on market incentives (feed-in tariffs, cap and trade, subsidies), and description of specific market conditions. There are two slightly smaller groups dealing with the public acceptance of investments in renewable energies and the political determinants of renewable energies investment. We identified a gap in the literature concerning the influence of more democratic institutions in the development of renewable energies. In the second part of the paper, we contribute to fill this gap. Finally, the smallest class of contributions deals with the influence of renewable energies investment in macroeconomic variables. In fact, such a smaller group with quite different results is an indication of the need for further work accessing the influence (positive or negative) of renewable energies on macroeconomic variables such as employment, prices, economic growth, and income in both the short and long runs.

As a second contribution, we provide new worldwide evidence on the influence of democracy

on investment in renewable energies. Among other determinants, more democratic countries tend to increase investment in renewable energies, a quite important quantitative effect.

Thus in the paper we contribute to answer to our two research questions: (1) it is possible to delimit a literature covering issues relating policy, politics, and renewable energies from a social sciences point of view and classify it in five branches of the literature: governance and politics, public acceptance, markets and prices, and with political or policy determinants of renewable energies; (2) it is possible to define a clear positive relationship between more democratic institutions and the investment in renewable energies, which is robust to different measures of democracy.

An integrated approach to this varied literature is important not only for future research but also for practitioners. Just as an example, if a government agency is interested in evaluating the public acceptance of wind or solar farms, it should rely on this survey to identify the main effects obtained and the studies that cover the issue.

References

Acemoglu, D., S. Johnson, J. Robinson, P. Yared (2005). From education to democracy? *American Economic Review*, Papers and Proceedings of the One Hundred Seventeenth Annual Meeting of the American Economic Association.

Acemoglu, D., S. Johnson, J. Robinson, P. Yared (2008). Income and Democracy. *American Economic Review*, 98(3):808–842.

Aitken, M. (2012). Changing Climate, Changing Democracy: A Cautionary Tale. *Environmental Politics*, 21(2):211–229.

Aitken, M., C. Haggett D. Rudolph (2016). Practices and Rationales of Community Engagement with Wind Farms: Awareness Raising, Consultation, Empowerment. *Planning Theory Practice*, 17(4):557–576.

Aklin, M., J. Urpelainen (2013). Political Competition, Path Dependence, and the Strategy of Sustainable Energy Transitions. *American Journal of Political Science*, 57(3):643–658.

Albrecht, M. (2017). The Role of Translation Loops in Policy Mutation Processes: State Designated Bioenergy Regions in Germany. *Environment and Planning C-Politics and Space*, 35(5):898–915.

Aldea, A., A. Ciobanu I. Stancu (2012). The Renewable Energy Development: A Nonparametric Efficiency Analysis. *Romanian Journal of Economic Forecasting*, 15(1):5–19.

Anonymous (1981). The Castel Gandolfo Report - Renewable Energy - Policies and Options Development-Seeds of Change-Village Through Global Order. 2:43–46.

Apak, S., E. Atay, G. Tuncer (2012). New Innovative Activities in Renewable Energy Technologies and Environmental Policy: Evidence from An EU Candidate Country. *Social and Behavioral Sciences*, 58:493– 502.

Argentiero, A., T. Atalla, S. Bigerna, S. Micheli, P. Polinori (2017). Comparing Renewable Energy Policies in EU15, US and China: A Bayesian DSGE Model. *Energy Journal*, 38(1):77–96.

Armeni, C. (2016). Participation in Environmental Decision-Making: Reflecting on Planning and Community Benefits for Major Wind Farms. *Journal of Environmental Law*, 28(3):415–441.

Aylett, A. (2013). Networked Urban Climate Governance: Neighborhood-Scale Residential Solar Energy Systems and The Example of Solarize Portland. *Environment and Planning C-Government and Policy*, 31(5):858–875.

Bacon, CM., D. Mulvaney, TB. Ball, EM. DuPuis, SR. Gliessman, RD. Lipschutz, A. Shakouri (2011). The Creation of An Integrated Sustainability Curriculum and Student Praxis Projects. *International Journal of Sustainability in Higher Education*, 12(2):193–208.

Bay, U. (2016). Biopolitics, Complex Systems Theory and Ecological Social Work: Conceptualising Ways of Transitioning to Low Carbon Futures. *Aotearoa New Zealand Social Work*, 28(4):89–99.

Bayer, P., J. Urpelainen (2016). It Is All About Political Incentives: Democracy and The Renewable Feed-In Tariff. *Journal of Politics*, 78(2):603–619.

Bayulgen, O., JW. Ladewig (2017). Vetoing the Future: Political Constraints and Renewable Energy. *Environmental Politics*, 26(1):49–70.

Bell, D., T. Gray, C. Haggett, J. Swaffield (2013). Re-Visiting The "Social Gap": Public Opinion and Relations of Power in The Local Politics of Wind Energy. *Environmental Politics*, 22(1):115–135.

Bernauer, T. (2013). Climate Change Politics. *Book Series: Annual Review of Political Science*, 16:421–448.

Berry, MJ., FN. Laird, CH. Stefes (2015). Driving Energy: The Enactment and Ambitiousness of State Renewable Energy Policy. *Journal of Public Policy*, 35(2):297–328.

Betsill, M., D. Stevis (2016). The Politics and Dynamics of Energy Transitions: Lessons from Colorado's (USA) "New Energy Economy". *Environment and Planning C-Government and Policy*, 34(2):381–396.

Bi, TY. (2013). Research of Chinese Renewable Energy Industry Policy. *2013 International Conference on Management Innovation and Business Innovation (ICMIBI 2013), PT II, Book Series: Lecture Notes in Management Science*, 16:413–418.

Bildirici, M., F. Ozaksoy (2016). Woody Biomass Energy Consumption and Economic Growth in Sub-Saharan Africa. *5th Istanbul Conference of Economics and Finance, Book Series: Procedia Economics and Finance*, 38:287–293.

Blazquez, J., LC. Hunt, B. Manzano (2017). Oil Subsidies and Renewable Energy in Saudi Arabia: A General Equilibrium Approach. *Energy Journal*, 38(1):29–45.

Bocquillon, P., A. Evrard (2016). Catching Up with Or Getting Ahead of Europe? French Renewable Energy Policies and Europeanization Dynamics. *Politique Europeenne*, 52(2):32–56.

Bode, S. (2006). Promoting Renewable Energies Under The CDM: Combining National Quotas in Europe and the CDM. *Climate Policy*, 6(2):253–256.

Bohringer, C., F. Landis, MAT. Reanos (2017). Economic Impacts of Renewable Energy Promotion in Germany. *Energy Journal*, 38(1):189–209.

Boute, A. (2011). A Comparative Analysis of The European and Russian Support Schemes for Renewable Energy: Return on European Experience for Russia. *Journal of World Energy Law Business*, 4(2):157–180.

Bowen, E., DJ. Lacombe, (2017). Spatial Dependence in State Renewable Policy: Effects of Renewable Portfolio Standards on Renewable Generation Within NERC Regions. *Energy Journal*, 38(3):177–193.

Bromley-Trujillo, R., JS. Butler, J. Poe, W. Davis (2016). The Spreading of Innovation: State Adoptions of Energy and Climate Change Policy. *Review of Policy Research*, 33(5):544–565.

Bulkeley, H. (2000). Common Knowledge? Public Understanding of Climate Change in Newcastle, Australia. *Public Understanding of Science*, 9(3):313–333.

Burgin, A. (2015). National Binding Renewable Energy Targets For 2020, But Not For 2030 Anymore: Why the European Commission Developed from A Supporter to A Brakeman. *Journal of European Public Policy*, 22(5):690–707.

Burke, P. (2010). Income, resources, and electricity mix. *Energy Economics*, 32:613–626.

Cadoret, I., F. Padovano (2016). The Political Drivers of Renewable Energies Policies. *Energy Economics*, 56:261–269.

Carley, S., CJ. Miller (2012). Regulatory Stringency and Policy Drivers: A Reassessment of Renewable Portfolio Standards. *Policy Studies Journal*, 40(4):730–756.

Cetkovic, S., A. Buzogany (2016). Varieties of Capitalism and Clean Energy Transitions in The European Union: When Renewable Energy Hits Different Economic Logics. *Climate Policy*, 16(5):642–657.

Chadegani, A., H. Salehi, M. Yunus, H. Farhad, M. Mooladi, M. Farhadi and N. Ebrahim (2013). A Comparison between Two Main Academic Literature Collections: Web of Science and Scopus Databases. *Asian Social Science* Vol. 9, No. 5; 2013.

Chakauya, E., R. Chikwamba, EP. Rybicki (2006). Riding the Tide of Biopharming in Africa: Considerations for Risk Assessment. *South African Journal of Science*, 102(7-08):284–288.

Chen, GC., C. Lees (2016). Growing China's Renewables Sector: A Developmental State Approach. *New Political Economy*, 21(6):574–586.

Ciocirlan, CE. (2008). Analyzing Preferences Towards Economic Incentives in Combating Climate Change: A Comparative Analysis of US States. *Climate Policy*, 8(6):548–568.

Ciocirlan, CE. (2009). Analyzing the Relative Strength of Policy Instruments to Stimulate Renewable Energy Markets: A Comparative State Analysis. *Journal of Comparative Policy Analysis*, 11(4):515–538.

Coenen, L., P. Benneworth, B. Truffer (2012). Toward A Spatial Perspective on Sustainability Transitions. *Research Policy*, 41(6):968–979.

Cointe, B. (2017). Managing Political Market Agencements: Solar Photovoltaic Policy in France. *Environmental Politics*, 26(3):480–501.

Coles, AM., A. Piterou, A. Genus (2016). Sustainable Energy Projects and The Community: Mapping Single-Building Use of Microgeneration Technologies in London. *Urban Studies*, 53(9):1869–1884.

Conti, C., ML. Mancusi, F. Sanna-Randaccio, R. Sestini, E. Verdolini (2015). Intra-EU Knowledge Flows in The Renewable Energy Sector: A Patent Citation Analysis. *IFKAD 2015: 10th International Forum on Knowledge Asset Dynamics: Culture, Innovation and Entrepreneurship: Connecting the Knowledge Dots*:1378–1390.

Crago, CL., I. Chernyakhovskiy (2017). Are Policy Incentives for Solar Power Effective? Evidence from Residential Installations in The Northeast. *Journal of Environmental Economics and Management*, 81:132–151.

Cullen, R. (2017). Evaluating Renewable Energy Policies. *Australian Journal of Agricultural and Resource Economics*, 61(1):1–18.

de Arce, MP., E. Sauma, J. Contreras (2016). Renewable Energy Policy Performance in Reducing CO_2 Emissions. *Energy Economics*, 54:272–280.

De Laurentis, C. (2015). Innovation and Policy for Bioenergy in the UK: A Co-Evolutionary Perspective. *Regional Studies*, 49(7):1111–1125.

Dechezlepretre, A., M. Glachant (2014). Does Foreign Environmental Policy Influence Domestic Innovation? Evidence from The Wind Industry. *Environmental Resource Economics*, 58(3):391–413.

Doganova, L., B. Laurent, (2016). Keeping Things Different: Coexistence Within European Markets for Cleantech and Biofuels. *Journal of Cultural Economy*, 9(2):141–156.

Dumas, M., J. Rising, J. Urpelainen (2016). Political Competition and Renewable Energy Transitions Over Long Time Horizons: A Dynamic Approach. *Ecological Economics*, 124:175–184.

Eagle, L., A. Osmond, B. McCarthy, D. Low, H. Lesbirel (2017). Social Marketing Strategies for Renewable Energy Transitions. *Australasian Marketing Journal*, 25(2):141–148.

Eaton, WM. (2016). What's the Problem? How "Industrial Culture"Shapes Community Responses to Proposed Bioenergy Development in Northern Michigan, USA . *Journal of Rural Studies*, 45:76–87.

Eckersley, P. (2017). Cities and Climate Change: How Historical Legacies Shape Policy-Making in English and German Municipalities. *Politics*, 37(2):151–166.

Essletzbichler, J. (2012). Renewable Energy Technology and Path Creation: A Multi-Scalar Approach to Energy Transition in the UK. *European Planning Studies*, 20(5):791–816.

Eun Kim, S., J. Yang, J. Urpelainen (2016). Does Power Sector Deregulation Promote or Discourage Renewable Energy Policy? Evidence from The States, 1991-2012. *Review of Policy Research*, 33(1):22–50.

Eyre, N. (2001). Carbon Reduction in The Real World: How the UK Will Surpass Its Kyoto Obligations. *Climate Policy*, 1(3):309–326.

Farrell, N., MT. Devine, WT. Lee, JP. Gleeson, S. Lyons (2017). Specifying an Efficient Renewable Energy Feed-In Tariff. *Energy Journal*, 38(2):53–75.

Fischhendler, I., D. Katz (2013). The Use of “Security”Jargon in Sustainable Development Discourse: Evidence from UN Commission on Sustainable Development. *International Environmental Agreements, Politics Law and Economics*, 13(3):321–342.

Fischhendler, I., D. Nathan, D. Boymel (2015). Marketing Renewable Energy Through Geopolitics: Solar Farms in Israel. *Global Environmental Politics*, 15(2):98–.

Flynn, B. (2015). Ecological Modernisation of A Renewable”? The Emerging Politics of Global Ocean Energy. *Environmental Politics*, 24(2):249–269.

Gailing, L. (2016). Transforming Energy Systems by Transforming Power Relations Insights from Dispositive Thinking and Governmentality Studies Innovation. *The European Journal of Social Science Research*, 29(3):243–261.

Garcia, EMH., M.H. Bergondo DeannaL. (2013). US Coast Guard Academy Marine Renewable Energy Seminar: Second Offering. *2013 ASEE Annual Conference*, Book Series: ASEE Annual Conference Exposition.

Glenna, LL., RR. Thomas (2010). From Renewable to Alternative: Waste Coal, The Pennsylvania Alternative Energy Portfolio Standard, and Public Legitimacy. *Society Natural Resources*, 23(9):856–871.

Gonel, FD. (2006). Perspectives of Renewable Energy Usage in Turkey: How Far - How Close to EU Standards. *World Sustainable Development. Outlook 2006: Global and Local Resources in Achieving Sustainable Development*:282–293.

Grafton, RQ., T. Kompas, NV. Ngo Van Long (2012). Substitution Between Biofuels and Fossil Fuels: Is There a Green Paradox? *Journal of Environmental Economics and Management*, 64(3):328–341.

Grechukhina, IA., OV. Kudryavtseva, EY. Yakovleva (2016). Evaluation of The Development of The Renewable Energy Markets in Russia. *Ekonomika Regiona-Economy of Region*, 12(4):1167–1177.

Groba, F., J. Cao (2015). Chinese Renewable Energy Technology Exports: The Role of Policy, Innovation and Markets. *Environmental Resource Economics*, 60(2):243–283.

Gross, R., W. Blyth, P. Heptonstall (2010). Risks, Revenues and Investment in Electricity Generation: Why Policy Needs to Look Beyond Costs. *Energy Economics*, 32(4):796–804.

Gründler, K., T. Krieger (2016). Democracy and Growth: Evidence from a machine learning indicator. *European Journal of Political Economy*, 45:85–107.

Gullberg, AT., G. Bang (2015). Look to Sweden: The Making of a New Renewable Energy Support Scheme in Norway. *Scandinavian Political Studies*, 38(1):95–114.

Hanna, RL. (2016). Accelerating Sustainability: The Variations of State, Market and Society Dynamics in Diverse Contexts. *Institute of Development Studies*, 47(2A):117–124.

Harnesk, D., S. Brogaard (2017). Social Dynamics of Renewable Energy how The European Union's Renewable Energy Directive Triggers Land Pressure in Tanzania. *Journal of Environment Development*, 26(2):156–185.

Hellsmark, H., J. Frishammar, P. Soderholm, H. Ylinenpaa (2016). The Role of Pilot and Demonstration Plants in Technology Development and Innovation Policy. *Research Policy*, 45(9):1743–1761.

Hillebrand, R. (2013). Climate Protection, Energy Security, and Germany's Policy of Ecological Modernisation. *Environmental Politics*, 22(4):664–682.

Hindmarsh, R. (2014). Hot Air Ablowin! "Media-Speak", Social Conflict, and the Australian "Decoupled"Wind Farm Controversy. *Social Studies of Science*, 44(2):194–217.

Hitaj, C. (2013). Wind Power Development in The United States. *Journal of Environmental Economics and Management*, 65(3):394–410.

Hoffman, MZ., ZM. Lerman (2015). The Malta Conferences: Fostering International Scientific Collaborations Toward Peace in The Middle East. *Jobs, Collaborations, and Women Leaders in The Global Chemistry Enterprise. Book Series: ACS Symposium Series*, 1195:81–95.

Hou, L. (2015). System Dynamics Simulation of Large-Scale Generation System for Designing Wind Power Policy in China. *Discrete Dynamics in Nature and Society*, Article Number 475461.

Howe, C. (2014). Anthropocenic Ecoauthority: The Winds of Oaxaca. *Anthropological Quarterly*, 87(2):381–404.

Hsu, KJ. (2010). Cost-Benefit Risk of Renewable Energy. *Environmental Economics and Investment Assessment III. Book Series: WIT Transactions on Ecology and The Environment*, 131:85–94.

Hunsberger, C. (2010). The Politics of Jatropha-Based Biofuels in Kenya: Convergence and Divergence Among NGOs, Donors, Government Officials and Farmers. *Journal of Peasant Studies*, 37(4):939–962.

Jacques, PJ., CC. Knox (2016). Hurricanes and Hegemony: A Qualitative Analysis of Micro-Level Climate Change Denial Discourses. *Environmental Politics*, 25(5):831–852.

Jaraite, J., A. Karimu, A. Kazukauskas (2017). Policy-Induced Expansion of Solar and Wind Power Capacity: Economic Growth and Employment in EU Countries. *Energy Journal*, 38(5):197–222.

Jarke, J., G. Perino (2017). Do Renewable Energy Policies Reduce Carbon Emissions? On Caps and Inter-Industry Leakage. *Journal of Environmental Economics and Management*, 84:102–124.

Jing, D., S. Mingshan (2007). Integrated Management for Renewable Energy Resources and CDM Resources: A Case Study. *Globalization Challenge and Management Transformation*, I-III:1708–1713.

Johnston, CMT., GC. van Kooten (2015). Back to The Past: Burning Wood to Save The Globe. *Ecological Economics*, 120:185–193.

Johnston, CMT., GC. van Kooten (2016). Global Trade Impacts of Increasing Europe's Bioenergy Demand. *Journal of Forest Economics*, 23:27–44.

Johnstone, N., I. Hascic, D. Popp (2010). Renewable Energy Policies and Technological Innovation: Evidence Based on Patent Counts. *Environmental Resource Economics*, 45(1):133–155.

Johnstone, P. (2014). Planning Reform, Rescaling, and the Construction of the Postpolitical: The Case of The Planning Act 2008 and Nuclear Power Consultation in the UK. *Environment and Planning C-Government and Policy*, 32(4):697–713.

Kalkuhl, M., O. Edenhofer, K. Lessmann (2013). Renewable Energy Subsidies: Second-Best Policy or Fatal Aberration for Mitigation? *Resource and Energy Economics*, 35(3):217–234.

Kalkuhl, M., O. Edenhofer, K. Lessmann (2015). The Role of Carbon Capture and Sequestration Policies for Climate Change Mitigation. *Environmental Resource Economics*, 60(1):55–80.

Karlsson-Vinkhuyzen, SI., N. Jollands, L. Staudt (2012). Global Governance for Sustainable Energy: The Contribution of a Global Public Goods Approach. *Ecological Economics*, 83:11–18.

Kern, T. (2014). The Environmental Movement and The Rise of a New Institutional Logic on The Electricity Market. *Zeitschrift Fur Soziologie*, 43(5):322–340.

Kester, J., R. Moyer, G. Song (2015). Down the Line: Assessing the Trajectory of Energy Policy Research Development. *Policy Studies Journal*, 43:S40–S55.

Kim, K., E. Heo, Y. Kim (2017). Dynamic Policy Impacts on A Technological-Change System of Renewable Energy: An Empirical Analysis. *Environmental Resource Economics*, 66(2):205–236.

Kim, SE., J. Urpelainen, J. Yang (2016). Electric Utilities and American Climate Policy: Lobbying by Expected Winners and Losers. *Journal of Public Policy*, 36(2):251–275.

Konisky, DM., ND. Woods (2016). Environmental Policy, Federalism, and the Obama Presidency. *Publius-The Journal of Federalism*, 46(3):366–391.

Lauber, V., E. Schenner (2011). The Struggle Over Support Schemes for Renewable Electricity in The European Union: A Discursive-Institutionalist Analysis. *Environmental Politics*, 20(4):508–527.

Laurent, B. (2015). The Politics of European Agencements: Constructing A Market of Sustainable Biofuels. *Environmental Politics*, 24(1):138–155.

Lawrence, A., B. Sovacool, A. Stirling (2016). Nuclear Energy and Path Dependence in Europe's "Energy Union": Coherence or Continued Divergence? *Climate Policy*, 16(5):622–641.

Lee, JS., JW. Kim (2016). South Korea's Urban Green Energy Strategies: Policy Framework and Local Responses Under the Green Growth Cities. *0*, 54:20–27.

Lee, SC., LH. Shih (2010). Renewable Energy Policy Evaluation Using Real Option Model - The Case of Taiwan. *Energy Economics*, 32:S67–S78.

Lekakis, JN., M. Kousis (2013). Economic Crisis, Troika and The Environment in Greece. *South European Society and Politics*, 18(3):305–331.

Lennon, M., M. Scott (2017). Opportunity or Threat: Dissecting Tensions in a Post-Carbon Rural Transition. *Sociologia Ruralis*, 57(1):87–109.

Li, SJ., HK. Yoo, M. Macauley, K. Palmer, JS. Shih (2015). Assessing the Role of Renewable Energy Policies in Landfill Gas to Energy Projects. *Energy Economics*, 49:687–697.

Lockwood, M., C. Kuzemko, C. Mitchell, R. Hoggett (2017). Historical Institutionalism and The Politics of Sustainable Energy Transitions: A Research Agenda. *Environment and Planning C-Politics and Space*, 35(2):312–333.

Luthi, S., R. Wuestenhagen (2012). The Price of Policy Risk - Empirical Insights from Choice Experiments with European Photovoltaic Project Developers. *Energy Economics*, 34(4):1001–1011.

MacLean, LM., JN. Brass, S. Carley, A. El-Arini, S. Breen (2015). Democracy and The Distribution of NGOs Promoting Renewable Energy in Africa. *Journal of Development Studies*, 51(6):725–742.

Madlener, R., S. Stagl (2005). Sustainability-Guided Promotion of Renewable Electricity Generation. *Ecological Economics*, 53(2):147–167.

Maguire, K. (2016). What's Powering Wind? The Effect of The US State Renewable Energy Policies on Wind Capacity (1994-2012). *Applied Economics*, 48(58):5717–5730.

Mander, S. (2007). Regional Renewable Energy Policy: A Process of Coalition Building. *Global Environmental Politics*, 7(2):45–.

Mander, S. (2008). The Role of Discourse Coalitions in Planning for Renewable Energy: A Case Study of Wind-Energy Deployment. *Environment and Planning C-Government and Policy*, 26(3):583–600.

Manderson, L. (2016). Ethnography at Its Edges: Forces in The Wind. *American Ethnologist*, 43(4):752–754.

Marshall, M., K. Jaggers (2008). Polity IV Project http://www.systemicpeace.org/polity/polity4.htm.

Matti, C., D. Consoli, E. Uyarra (2017). Multi Level Policy Mixes and Industry Emergence: The Case of Wind Energy in Spain. *Environment and Planning C-Politics and Space*, 35(4):661–683.

McEwan, C. (2017). Spatial Processes and Politics of Renewable Energy Transition: Land, Zones and Frictions in South Africa. *Political Geography*, 56:1–12.

Melece, L., A. Krievina (2016). Bioenergy Production for Sustainable Rural Development: Latvia's Case. *Sgem 2016, Bk 2: Political Sciences, Law, Finance, Economics and Tourism Conference Proceedings, Vol V. Book Series: International Multidisciplinary Scientific Conferences on Social Sciences and Arts*:101–108.

Mozumder, P., WF. Vasquez, A. Marathe (2011). Consumers' Preference for Renewable Energy in The Southwest USA. *Energy Economics*, 33(6):1119–1126.

Muller, F. (2017). IRENA as a Glocal Actor: Pathways Towards Energy Governmentality Innovation. *The European Journal of Social Science Research*, 30(3):306–322.

Munda, G., D. Russi (2008). Social Multicriteria Evaluation of Conflict Over Rural Electrification and Solar Energy in Spain. *Environment and Planning C-Government and Policy*, 26(4):712–727.

Nesta, L., F. Vona, F. Nicolli (2014). Environmental Policies, Competition and Innovation in Renewable Energy. *Journal of Environmental Economics and Management*, 67(3):396–411.

Nicolli, F., F. Vona (2015). The Evolution of Renewable Energy Policy in OECD Countries: Aggregate Indicators and Determinants. *Political Economy and Instruments of Environmental Politics Book Series: CESIFO Seminar Series*:117–148.

Nicolli, F., F. Vona (2016). Heterogeneous Policies, Heterogeneous Technologies: The Case of Renewable Energy. *Energy Economics*, 56:190–204.

Novan, K. (2015). Valuing the Wind: Renewable Energy Policies and Air Pollution Avoided. *American Economic Journal-Economic Policy*, 7(3):291–326.

Ong, LH. (2012). The Apparent "Paradox"In China's Climate Policies Weak International Commitment on Emissions Reduction and Aggressive Renewable Energy Policy. *Asian Survey*, 52(6):1138–1160.

Pacheco, DF., TJ. Dean (2015). Firm Responses to Social Movement Pressures: A Competitive Dynamics Perspective. *Strategic Management Journal*, 36(7):1093–1104.

Paehlke, R. (1984). Life After Oil - A Renewable Energy-Policy for Canada - Bott, R, Brooks, D, Robinson. *Canadian Public Policy-Analyse De Politiques*, 10(4):493–495.

Papazu, I. (2016). Nearshore Wind Resistance on Denmark's Renewable Energy Island: Not Another NIMBY Story. *Science and Technology Studies*, 29(4):4–24.

Papazu, I. (2017). Nearshore Wind Resistance on Denmark's Renewable Energy Island: Not Another NIMBY Story. *Science and Technology Studies*, 30(1):4–24.

Papke, L. E., J. M. Wooldridge (1996). Econometric Methods for Fractional Response Variables with an Application to 401(k) Plan Participation Rates. *Journal of Applied Econometrics*, 11(6):619–632.

Park, S. (2015). State Renewable Energy Governance: Policy Instruments, Markets, or Citizens. *Review of Policy Research*, 32(3):273–296.

Pasqualetti, MJ., TE. Jones, L. Necefer, CA. Scott, BJ. Colombi (2016). A Paradox of Plenty: Renewable Energy on Navajo Nation Lands. *Society Natural Resources*, 29(8):885–899.

Phadke, R. (2010). Steel Forests or Smoke Stacks: The Politics of Visualisation In the Cape Wind Controversy. *Environmental Politics*, 19(1):1–20.

Piksryte, A., L. Mazylis (2015). Intergovernmental and Domestic Factors in The Negotiation Process on Renewable Energy Support Schemes. *European Integration Studies*, 9:34–52.

Ponte, S., C. Daugbjerg (2015). Biofuel Sustainability and The Formation of Transnational Hybrid Governance. *Environmental Politics*, 24(1):96–114.

Price, TJ. (2004). Is Renewable Energy Planning Blowing in The Wind? *Local Government Studies*, 30(2):266–275.

Ramalho, J.J., S. J. Murteira (2016). Regression Analysis of Multivariate Fractional Data. *Econometric Reviews*, 35(4):515–552.

Rasmussen, LL., NM. Laurendeau, D. Solomon (2011). Introduction To "The Energy Transition: Religious and Cultural Perspectives". *Zygon*, 46(4):872–889.

Ravikrishna, RV. (2011). Sustainable Energy for Rural India. *Zygon*, 46(4):942–956.

Reboredo, JC. (2015). Is There Dependence and Systemic Risk Between Oil and Renewable Energy Stock Prices? *Energy Economics*, 48:32–45.

Reina, G. (2016). Landscape Conservation and Sustainable Development: Towards an Innovative Sicily. *Proceedings of the 19th Ipsapa/Ispalem International Scientific Conference: The Turning Point of The Landscape- Cultural Mosaic: Renaissance Revelation Resilience*:157–166.

Rodriguez, MC., I. Hascic, N. Johnstone, J. Silva, A. Ferey (2015). Renewable Energy Policies and Private Sector Investment: Evidence from Financial Microdata. *Environmental Resource Economics*, 62(1):163–188.

Rogge, KS., K. Reichardt (2016). Policy Mixes for Sustainability Transitions: An Extended Concept and Framework for Analysis. *Research Policy*, 45(8):132–147.

Royles, E., N. McEwen (2015). Empowered for Action? Capacities and Constraints in Sub-State Government Climate Action in Scotland and Wales. *Environmental Politics*, 24(6):1034–1054.

Rubins, M., I. Pilvere (2017). Development of Renewable Energy Policy in Latvia. *Rural Development and Entrepreneurship Bioeconomy Production and Co-Operation in Agriculture. Book Series: Economic Science for Rural Development*, 44:281–291.

Rutherford, J., O. Coutard (2014). Urban Energy Transitions: Places, Processes and Politics of Socio-Technical Change. *Urban Studies*, 51(7):1353–1377.

Sahovic, N., PP. da Silva (2016). Community Renewable Energy - Research Perspectives. *Energy Economics Iberian Conference, Eeic 2016. Book Series: Energy Procedia*, 106:46–58.

Saran, S. (2010). Irresistible Forces and Immovable Objects: A Debate on Contemporary Climate Politics. *Climate Policy*, 10(6):678–683.

Satgar, V. (2015). A Trade Union Approach to Climate Justice: The Campaign Strategy of The National Union of Metalworkers of South Africa. *Global Labour Journal*, 6(3):267–282.

Sauter, R. (2009). EU Agenda-Setting and European Energy Policy: The "EU Nuclear Package". *Osterreichische Zeitschrift Fur Politikwissenschaft*, 38(4):453–.

Sawhney, A. (2013). Policy Monitor Renewable Energy Policy in India: Addressing Energy Poverty and Climate Mitigation. *Review of Environmental Economics and Policy*, 7(2):296–312.

Schick, L., BR. Winthereik (2016). Making Energy Infrastructure: Tactical Oscillations and Cosmopolitics. *Science as Culture*, 25(1):44–68.

Schlosberg, D., R. Coles (2016). The New Environmentalism of Everyday Life: Sustainability, Material Flows and Movements. *Contemporary Political Theory*, 15(2):160–181.

Schmitz, H. (2017). Who Drives Climate-Relevant Policies in The Rising Powers? *New Political Economy*, 22(5):521–540.

Schreurs, MA. (2012). The Politics of Phase-Out. *Bulletin of The Atomic Scientists*, 68(6):30–41.

Sequeira, T. (2017). Democracy and Income: taking parameter heterogeneity and cross-country dependency into account. *BE Journal of Macroeconomics*, Advances, 17(2).

Sercer, M., Z. Kavic (2014). The Role and Importance of Wood Biomass in Croatian Energetics. *Medunarodni Znanstveni Simpozij Gospodarstvo Istocne Hrvatske - Vizija I Razvoj. Book Series: Medunarodni Znanstveni Simpozij Gospodarstvo Istocne Hrvatske-Jucer Danas Sutra*, :510–519.

Shaw, I., R. Ozaki (2016). Emergent Practices of an Environmental Standard. *Science Technology Human Values*, 41(2):219–242.

Shaw, K. (2011). Climate Deadlocks: The Environmental Politics of Energy Systems. *Environmental Politics*, 20(5):743–763.

Shi, D. (2009). Analysis of China's Renewable Energy Development Under the Current Economic and Technical Circumstances. *China World Economy*, 17(2):94–109.

Shum, RY. (2015). Where Constructivism Meets Resource Constraints: The Politics of Oil, Renewables, and a US Energy Transition. *Environmental Politics*, 24(3):382–400.

Siler-Evans, K., IL. Azevedo, MG. Morgana, J. Apt (2013). Regional Variations in The Health, Environmental, and Climate Benefits of Wind and Solar Generation. *Proceedings of The National Academy of Sciences of The United States of America*, 110(29):11768–11773.

Skjolsvold, TM. (2013). What We Disagree About When We Disagree About Sustainability. *Society Natural Resources*, 26(11):1268–1282.

Smith, A., R. Raven (2012). What Is Protective Space? Reconsidering Niches in Transitions to Sustainability. *Research Policy*, 41(6):1025–1036.

Smith, MG., J. Urpelainen (2014). The Effect of Feed-In Tariffs on Renewable Electricity Generation: An Instrumental Variables Approach. *Environmental Resource Economics*, 57(3):367–392.

Smith-Nonini, S. (2011). The Illegal and The Dead: Are Mexicans Renewable Energy? *Medical Anthropology*, 30(5):454–474.

Solorio, I. (2013). Renewable Energy Policy Convergence in the EU: The Evolution of Feed- In Tariffs in Germany, Spain and France. *JCMS-Journal of Common Market Studies*, 51(6):1213–1213.

Stefan, G., O. Coca (2013). Are There Strategic Sectors? *Creating Global Competitive Economies: 2020 Vision Planning Implementation*, 1-03:289–295.

Steinbacher, K. (2015). Drawing Lessons When Objectives Differ? Assessing Renewable Energy Policy Transfer from Germany To Morocco. *Politics and Governance*, 3(2):34–50.

Strunz, S. (2014). The German Energy Transition as a Regime Shift. *Ecological Economics*, 100:150–158.

Sun, D., XP. Jiang (2015). Research on The Renewable Energy Investment Performance and Influence Factors. *Proceedings of the 2015 International Conference on Management Engineering and Management Innovation. Book Series: AEBMR-Advances in Economics Business and Management Research*, 3:17–22.

Szabo, V. (2017). The German-Austrian Bidding Zone and Its Compatibility with The Free Movement of Goods in the EU. *Journal of World Energy Law and Business*, 10(1):55–69.

Tobin, P. (2014). Renewable Energy Policy Convergence in the EU: The Evolution of Feed-In Tariffs in Germany, Spain and France. *Political Studies Review*, 12(3):459–459.

Toke, D. (2010). Politics by Heuristics: Policy Networks with a Focus on Actor Resources, as Illustrated by The Case of Renewable Energy Policy Under New Labour. *Public Administration*, 88(3):764–781.

Toke, D., H. Nielsen (2015). Policy Consultation and Political Styles: Renewable Energy Consultations in The UK and Denmark. *British Politics*, 10(4):454–474.

Treki, A., B. Urban (2015). Drivers of Effective Renewable Energy Policies. *Inzinerine Ekonomika-Engineering Economics*, 26(3):306–314.

Twomey, P. (2012). Rationales for Additional Climate Policy Instruments Under a Carbon Price. *Economic and Labour Relations Review*, 23(1):7–31.

Tyner, WE., F. Taheripour (2007). Renewable Energy Policy Alternatives for The Future. *American Journal of Agricultural Economics*, 89(5):1303–1310.

Van de Graaf, T. (2013). Fragmentation in Global Energy Governance: Explaining the Creation of IRENA. *Global Environmental Politics*, 13(3):14–.

Vanhanhen, T. (2000). A New Dataset for Measuring Democracy, 1810-1998. *Journal of Peace Research*, 37(2):251–265.

Vasseur, M. (2014). Convergence and Divergence in Renewable Energy Policy Among US States From 1998 to 2011. *Social Forces*, 92(4):1637–1657.

Vasseur, M. (2016). Incentives or Mandates? Determinants of the Renewable Energy Policies of US States, 1970-2012. *Social Problems*, 63(2):284–301.

Verdeil, E. (2014). The Contested Energy Future of Amman, Jordan: Between Promises of Alternative Energies and a Nuclear Venture. *Urban Studies*, 51(7):1520–1536.

von der Fehr, NHM., S. Ropenus (2017). Renewable Energy Policy Instruments and Market Power. *Scandinavian Journal of Economics*, 119(2):312–345.

von Strokirch, K. (2016). Abbott's War on The Environment and Turnbull's Hot Air. *Social Alternatives*, 35(2):23–31.

Walker, G., S. Hunter, P. Devine-Wright, B. Evans, H. Fay (2007). Harnessing Community Energies: Explaining and Evaluating Community-Based Localism in Renewable Energy Policy in the UK. *Global Environmental Politics*, 7(2):64–.

Wang, JZ. (2015). Financial Support for The Energy Market Research. *Industry Development of Renewable. Proceedings of 2015 International Symposium - Open Economy Financial Engineering*:20–26.

Wang, XT., HF. Xue (2011). Study on The Efficiency Evaluation of Performance of RE Investment Policy. *2011 International Conference on Economic, Education and Management (ICEEM2011)*, VolII:322–325.

Winickoff, DE., M. Mondou (2017). The Problem of Epistemic Jurisdiction in Global Governance: The Case of Sustainability Standards for Biofuels. *Social Studies of Science*, 47(1):7–32.

Wooldridge, J.M. (2015). Control Function Methods in Applied Econometrics. *The Journal of Human Resources*, 50420-445.

Worthington, RK. (1984). Renewable Energy-Policy and Politics - The Case of The Windfall Profits Tax. *Policy Studies Journal*, 13(2):365–375.

Wu, GH., G. Liu, C. Zhang, H. Yu (2006). Strategic Environment Analysis to The Energy Development in China. *Proceedings of the 13th International Conference on Industrial Engineering and Engineering Management*, Vols 1-5 Industrial Engineering and Management Innovation in New-Era Book Series International Conference on Industrial Engineering and Engineering Management IEEM:3603–3610.

Wyns, T., A. Khatchadourian (2016). Situational Analysis of EU Renewable Energy Legislation. *Climate Policy*, 16(5):568–585.

Yi, HT., RC. Feiock (2014). Renewable Energy Politics: Policy Typologies, Policy Tools, and State Deployment of Renewables. *Policy Studies Journal*, 42(3):391–415.

Zelli, F., H. van Asselt (2013). The Institutional Fragmentation of Global Environmental Governance: Causes, Consequences, and Responses. *Global Environmental Politics*, 13(3):1–.

Zilouchian, A., A. Abtahi (2012). A New Certificate Program in Renewable Energy. *2012 ASEE Annual Conference Book Series: ASEE Annual Conference Exposition.*

A Appendix

A.1 Governance and Politics

(Albrecht, 2017), Harnesk & Brogaard (2017),Eckersley (2017),Bowen & Lacombe (2017),Winickoff & Mondou (2017),Rubins & Pilvere (2017),Schmitz (2017),Muller (2017),Cullen (2017),Chen & Lees (2016),Rogge & Reichardt (2016),Konisky & Woods (2016),Kim et al. (2016),Lee & Kim (2016),Betsill & Stevis (2016),de Arce et al. (2016),Reina (2016),Bocquillon & Evrard (2016),von Strokirch (2016),Sahovic & da Silva (2016)Wyns & Khatchadourian (2016),Lawrence et al. (2016),Cetkovic & Buzogany (2016),Pasqualetti et al. (2016),Toke & Nielsen (2015),Royles & McEwen (2015),Satgar (2015),Berry et al. (2015),MacLean et al. (2015),Burgin (2015),Shum (2015),Park (2015),Kester et al. (2015),Gullberg & Bang (2015),Ponte & Daugbjerg (2015),Laurent (2015),Piksryte & Mazylis (2015),Kern (2014),Rutherford & Coutard (2014),Verdeil (2014),Strunz (2014),Sercer & Kavic (2014),Johnstone (2014),Skjolsvold (2013),Fischhendler & Katz (2013),Zelli & van Asselt (2013),Van de Graaf (2013),Hillebrand (2013),Sawhney (2013),Stefan & Coca (2013),Aylett (2013),Bernauer (2013),Ong (2012),Karlsson-Vinkhuyzen et al. (2012),Schreurs (2012),Lauber & Schenner (2011),Lee & Shih (2010),Saran (2010),Toke (2010),Shi (2009),Sauter (2009),Mander (2007),Walker et al. (2007),Jing & Mingshan (2007),Wu et al. (2006),Gonel (2006),Eyre (2001).

A.2 Public Acceptance

Eagle et al. (2017),Papazu (2017),Lennon & Scott (2017),Hanna (2016),Armeni (2016),Manderson (2016),Gailing (2016),Coles et al. (2016),Eaton (2016),Schlosberg & Coles (2016),Shaw & Ozaki (2016),Schick & Winthereik (2016),Papazu (2016),Aitken et al. (2016),Bay (2016),Jacques & Knox (2016),Pacheco & Dean (2015),Fischhendler et al. (2015),Hindmarsh (2014),Howe (2014),Bell et al. (2013),Aylett (2013),Ravikrishna (2011),Mozumder et al. (2011),Shaw (2011),Phadke (2010),Hunsberger (2010),Munda & Russi (2008),Mander (2008),Price (2004),Bulkeley (2000).

A.3 Markets and Prices

Jarke & Perino (2017),Matti et al. (2017),von der Fehr & Ropenus (2017),Farrell et al. (2017),Szabo (2017),Kim et al. (2017),Blazquez et al. (2017),Argentiero et al. (2017),Cointe (2017),Crago & Chernyakhovskiy (2017),McEwan (2017),Nicolli & Vona (2016),Johnston & van Kooten (2016),Grechukhina et al. (2016),Melece & Krievina (2016),Doganova & Laurent (2016),Kim et al. (2016),Rodriguez et al. (2015),Reboredo (2015),Groba et al. (2015),Nicolli & Vona (2015),Wang (2015),Steinbacher (2015),Conti et al. (2015),Treki & Urban (2015),Hou (2015),Kalkuhl et al. (2015),Tobin (2014),Yi & Feiock (2014),Dechezlepretre & Glachant (2014),Nesta et al. (2014),Smith & Urpelainen (2014),Solorio (2013),Kalkuhl et al. (2013),Hitaj (2013),Grafton et al. (2012),Luthi & Wuestenhagen (2012),Coenen et al. (2012),Twomey (2012),Aldea et al. (2012),Boute (2011),Gross et al. (2010),Hsu (2010),Chakauya et al. (2006),Bode (2006),Madlener & Stagl (2005),Worthington (1984).

A.4 Influence in Macro variables

Jaraite et al. (2017),Bohringer et al. (2017),Bildirici & Ozaksoy (2016),Siler-Evans et al. (2013).

A.5 Political Determinants

Lockwood et al. (2017),Bayulgen & Ladewig (2017),Maguire (2016),Hellsmark et al. (2016),Bromley-Trujillo et al. (2016),Cadoret & Padovano (2016),Vasseur (2016),Bayer & Urpelainen (2016),Dumas et al. (2016),Johnston & van Kooten (2015),Novan (2015),De Laurentis (2015),Sun & Jiang (2015),Li et al. (2015),Flynn (2015),Vasseur (2014),Lekakis & Kousis (2013),Aklin & Urpelainen (2013),Smith & Raven (2012),Carley & Miller (2012),Essletzbichler (2012),Aitken (2012),Zilouchian & Abtahi (2012),Rasmussen et al. (2011),Bacon et al. (2011),Wang & Xue (2011),Johnstone et al. (2010),Glenna & Thomas (2010),Ciocirlan (2009),Ciocirlan (2008),Tyner & Taheripour (2007),Anonymous (1981).

A.6 Taxonomy applied to the complementary sample of studies

Table A.1: Comparing the studied sample with the complementary set of contributions

Classification	from WoS Social Sciences Field	from WoS Other Fields
Governance and Politics	66 (35.5%)	317 (47.5%)
Public Acceptance	31 (16.7%)	108 (16.2%)
Markets and Prices	47 (25.3%)	128 (19.2%)
Influence in Macro variables	4 (2.0%)	5 (0.7%)
Political Determinants	32 (17.2%)	42 (6.3%)
No Classification	6 (3.21%)	67 (10.0%)
Total	186 (100%)	667 (100%)

Legend: WoS: Web of Science. The sum of 186 and 667 publications is the set of 853 publications retrieved from our search protocol.

B Search protocol: some details

Note that the search protocol is dated. This one has been implemented in 10^{th} October 2017. As the bibliographical databases are including references every day, complete replicability is not possible. However just an approximation of our search would be always possible limiting the ending date of the search.
In the Web of Science site (http://apps.webofknowledge.com) we implemented the following protocol: TOPIC: (”renewable energy”) AND TOPIC: (politics) OR TOPIC: (”renewable energies policies”) OR TOPIC: (”renewable energy policies”) OR TOPIC: (”renewable energies policy”) OR TOPIC: (”renewable energy policy”). With this search 853 publication were retrieved. Then we restrict a detailed analysis to the publications falling into the following research fields: history, philosophy of science, cultural studies, economics, political science, urban studies, social studies, women’s studies, public administration, multidisciplinary sciences, social work, social sciences, planning development, educational research, area studies, anthropology, management, business, sociology, religion, industrial relations, and labor. This was made using the following protocol:
TOPIC: (”renewable energy”) AND TOPIC: (politics) OR TOPIC: (”renewable energies policies”) OR TOPIC: (”renewable energy policies”) OR TOPIC: (”renewable energies policy”) OR TOPIC: (”renewable energy policy”) Refined by: WEB OF SCIENCE CATEGORIES: (HISTORY PHILOSOPHY OF SCIENCE OR CULTURAL STUDIES OR ECONOMICS OR POLITICAL SCIENCE OR URBAN STUDIES OR SOCIAL ISSUES OR WOMEN S STUDIES OR PUBLIC ADMINISTRATION OR MULTIDISCIPLINARY SCIENCES OR SOCIAL WORK OR SOCIAL SCIENCES BIOMEDICAL OR PLANNING DEVELOPMENT OR EDUCATION EDUCATIONAL RESEARCH OR AREA STUDIES OR ANTHROPOLOGY OR MANAGEMENT OR BUSINESS OR SOCIOLOGY OR RELIGION OR INDUSTRIAL RELATIONS LABOR). This yield our restricted sample of 186 references.

Highlights for

Renewable Energy and Politics: A Systematic Review and New Evidence

- *We review the literature dealing with politics, policy an renewable energies;*
- *We offer a taxonomy for that literature with five classes;*
- *One refers to the influence of political institutions in renewables energies;*
- *We present evidence that democratic institutions favor renewable energies.*