

Public Opinion on Climate Change Concerns, Policy Views, and Energy: Evidence from the European Social Survey*

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Abstract: More than three decades of social science research demonstrates climate change as an important social problem commanding international attention. Although a substantial body of scholarship examines patterns of climate views of general publics world-wide, precisely how these are associated with attitudes supportive of renewable energy and energy conservation across nations is less well understood. In this work, we begin by identifying the most consistent predictors of climate views and the frameworks that explain these patterns extend to research on renewable energy attitudes and actions. We use 2016 data from 17 countries in the European Social Survey to investigate how climate change concerns shape policy and energy views. We adopt a welfare state regime organizing framework to discuss findings from our empirical models estimated using structural equation modeling with latent variables, describing the strength and consistency of predictors of these views across national contexts. Our findings reveal cross-national similarities and differences in individuals' climate change concerns, policy views, and energy attitudes and actions. We also discuss our findings in relation to the extensive work on the politicization of climate change and energy views. This study joins a growing body of research seeking to discuss promising avenues through which future research may inform key gaps in our understanding of environmental and political views.

Introduction

Across the globe, publics express varying awareness of environmental problems, climate change views, and levels of engagement in environmental actions (Franzen and Vogl 2013; Hadler 2017; Kvaløy et al. 2012; Marquart-Pyatt 2013, 2016; McCright, Dunlap, and Marquart-Pyatt 2016; Tranter and Booth 2015). Simultaneously, environmental issues like climate change and access to clean water are increasingly recognized as pressing global challenges (UNDP 2014; UNEP 2011; UNESCO 2013). For environmental sociologists who have long been interested in understanding the links between environmental attitudes and environmentally significant behaviors, this relation remains an area of inquiry relevant for continued study, particularly in instances where attitudes may not translate into actions. These relations remain salient, and perhaps increasingly so, given how environmentally themed topics and issues like climate change and energy views have emerged as key issues and continue to grow in international prominence. This is especially true across national contexts as environmental pollutants and CO₂ emissions are not necessarily bounded by administrative units, making clear communication channels vital between governments, non-governmental organizations (NGOs), environmental groups, university researchers, and citizens increasingly important.

Improving our understanding of how climate change views coalesce with other social, political, and environmental views across nations is important for comparative social science scholarship. In the last two decades, social science research reveals climate change¹ to be a politicized issue in the United States especially, with some evidence of this patterning in a handful of countries but less consistent in cross-national context. In the US, the general public's

¹ Following prior work, here we use climate change and global warming interchangeably, even though the former technically connotes all forms of climatic variability introduced by the warming of Earth's surface and oceans resulting from the increased accumulation of greenhouse gases in the Earth's atmosphere stemming from human activities (see U. S. National Research Council 2001).

political polarization has been extensively documented (Dunlap and McCright 2008, Hamilton 2008, 2011, Hamilton and Keim 2009, Malka, Krosnick, and Langer 2009, McCright and Dunlap 2011b) and has held relatively constant in the face of alternative explanations (Hamilton and Shao 2015; Marquart-Pyatt, McCright, Dietz and Dunlap 2014). Although scholars note the United States' outlier status among advanced industrial countries in comparative studies of public opinion on climate change (e.g., Brechin 2010; Leiserowitz 2008; Leonhardt 2014; McCright et al. 2016b), the extent of its uniqueness has only recently been subject to empirical scrutiny.

Climate change has also become somewhat politicized according to public opinion survey research from several other countries around the world, including Australia, Canada, and the United Kingdom (e.g. Hamilton 2007; Hoggan and Littlemore 2009; Lack 2013; Washington and Cook 2011; Young and Coutinho 2013). In fact, a few recent studies further document a political divide on climate change views within the general publics of Australia (Tranter 2011, 2017) and the United Kingdom (Clements 2012a, 2012b; Poortinga et al. 2011; Whitmarsh 2011) and a range of other countries around the world (Kvaløy, Finseraas, and Listhaug 2012; McCright, Dunlap, and Marquart-Pyatt 2016; Tjernström and Tietenberg 2008; Tranter and Booth 2015).

Building from work examining the extent to which the well-established political divide in public opinion on climate change in the United States can be discerned in other nations (besides the United Kingdom and Australia), in this study we examine climate change views in the European context and how climate change views shape energy views. That is, based on prior work we ask whether the political divide on climate change extends to energy views. The purpose of this study is twofold: to describe climate change and energy views across seventeen

European nations and to examine a model of energy views and personal energy-efficiency behavioral intentions and conservation actions comparatively and cross-nationally to determine its consistency.

In this research, we examine the social bases of climate change views and energy policy support views and behavioral intentions for 17 countries using the newly available 2016 European Social Survey Wave 8 data (ESS 2018). We begin by describing previous cross-national research on individual attitudes and attributes that may influence climate views and energy views. Key factors from prior work are incorporated in an analytical model of energy related policy support and behavioral intentions that includes environmental views on use of renewables, energy supply, self-efficacy, climate change beliefs, individual attributes and socio-demographic variables. Results are described using cross-group and cross-country lenses for comparison given the exploratory nature of this study. Namely, similarities and differences in how climate change views shape energy views can inform future empirical work. Overall, the findings advance our collective understanding of key factors affecting environmental views comparatively.

The Relation between Climate Change and Energy Views

A long line of recent work on climate change views in the United States finds a strong effect of political orientation, whereby liberals and Democrats report beliefs about climate change more consistent with mainstream climate science and express greater personal concern about global warming than do their conservative and Republican counterparts (e.g., Borick and Rabe 2010; Dietz, Dan, and Shwom 2007; Dunlap and McCright 2008; Hamilton 2008, 2011; Hamilton and Keim 2009; Krosnick et al. 2000; Leiserowitz 2006; Marquart-Pyatt et al. 2014; McCright and Dunlap 2011a, 2011b; McCright et al. 2016b; Wood and Vedlitz 2007). This

relation persists even when controlling for the effects of relevant social and demographic variables that also affect climate change views. This relation has been extensively studied and includes extensions to moderating effects, whereby political orientation moderates the relationship between educational attainment and climate change views (e.g., Hamilton 2008, 2011; Hamilton and Keim 2009; McCright and Dunlap 2011b).

Ten recent studies also document a political divide on climate change in a range of countries outside of the United States. Six of these studies, which mostly focus on respondents' political party identification, analyze data from the general publics of a single country: Australia (Tranter 2011, 2017) and the United Kingdom (Clements 2012a, 2012b; Poortinga et al. 2011; Whitmarsh 2011). The remaining four studies (Kvaløy et al. 2012; McCright et al. 2016; Tjernström and Tietenberg 2008; Tranter and Booth 2015), which focus on respondents' Left-Right ideology, perform cross-national analyses on data from a wide range of countries. Two use single-item indicators of climate change views (Kvaloy et al. 2012; Tjernström and Tietenberg 2008), a third uses multiple indices encompassing climate change and energy views. To our knowledge, these ten studies are the only non-US examinations of this phenomenon to date.

Tranter (2011) examines the influence of political party identification on climate change views in Australia using two datasets from 2007. With the Australian Survey of Social Attitudes (AuSSA) data, Tranter (2011) finds that respondents self-identifying with the Labor Party or Green Party express more willingness to pay more for renewable energy to reduce global warming than are those self-identifying with parties on the Center-Right. With the AES data, Tranter (2011) finds party differences with regard to global warming beliefs and their likely

occurrence in their lifetimes and views regarding participation in international climate agreements like the Kyoto Protocol.

Analyzing 2009 data from British nationally representative surveys, Clements (2012a) examines the influence of political party identification and Left-Right political ideology on climate change views. Using data from Britain from Eurobarometer 71.1, he finds that Right-identifying British respondents report greater skepticism about climate change than their Left-identifying counterparts. Clements (2012a) finds, using data from the 2009 British Social Attitudes Survey, that both political ideology and party identification are associated with concern about the effects of transportation on climate change; Right-wing beliefs and support for the Conservative Party are associated with reduced concern. In a separate study, Clements (2012b) examines data from the 2008-2009 nationally representative British Household Panel Survey and finds that Conservative Party supporters are less likely to perceive negative impacts of climate change than are Liberal Democrat supporters.

Examining 2010 interview data from the British public, Poortinga and colleagues (2011) find political affiliation to be one of the strongest predictors in their detailed study of climate change skepticism. They utilize two indicators of climate change skepticism: a single item that indicates whether respondents think the world's climate is changing or not and a four-item climate change skepticism scale. Poortinga and colleagues (2011) find that respondents self-identifying with the Conservative Party express greater levels of climate change skepticism than do undecided respondents, while those expressing an intention to vote for Labour, Liberal Democrats, and other parties (e.g., Green Party, Scottish Nationalists, Welsh Nationalists, etc.) are not significantly different from the undecideds.

Similarly, using representative data from a 2008 survey of residents of Hampshire and Norfolk British counties, Whitmarsh (2011) examines how socio-demographic characteristics, knowledge, and values influence respondents' climate change skepticism. Her skepticism scale consists of twelve items dealing with the causes and reality of climate change, the quality of the evidence for climate change, and the media coverage of climate change. In multivariate regression models, Whitmarsh (2011) finds that an intention to vote for the Conservative Party has a strong positive effect on the skepticism scale. Thus, respondents with Right-of-center political views are significantly more skeptical of the reality and seriousness of climate change than are those who are affiliated with Labour, Liberal Democrats, Greens, and others.

Tjernström and Tietenberg (2008) analyze the relationship between liberal political views (a dummy-coded variable created from a Left-Right scale) and an item measuring perceived dangerousness of global warming for the environment using data from the International Social Survey Program's 2000 environment survey administered in 26 countries around the world. In a multivariate probit model including all countries pooled, they find that a liberal political view increases the probability of perceived dangerousness of climate change.

Using data from the 2005-2009 World Values Survey, Kvaløy et al. (2012) examine the relationship between Left-Right political ideology (on a 1-10 scale) and an item measuring perceived seriousness of global warming for the world as a whole. The authors create a series of political ideology dummy variables (with "center" as the reference category) to utilize in their models: extreme left, moderate left, moderate right, and extreme right. In their multilevel random-intercept regression model that includes data from 47 countries around the world, they find that respondents on the extreme left perceive global warming to be more serious than do

those in the political center, while respondents on the moderate right and extreme right perceive global warming to be less serious than do those in the political center.

McCright et al. (2016a) examined whether a Left-Right ideological divide was present in the European context in line with expectations from the US public. Results analyzing data from the late 2000s showed although that citizens on the Left consistently reported stronger belief in climate change and support for action to deal with climate change than did citizens on the Right in 14 Western European countries, no such ideological divide was revealed in 11 former Communist countries. The authors speculated that this difference was likely due to uniqueness of these countries with regard to the low political salience of climate change and differing meaning of Left-Right identification.

The above studies suggest that a political divide on climate change, which is quite large in the United States, is also visible in the United Kingdom, Australia, and a number of other nations. Its existence in the European Union is more complex, as the political divide on climate change is prevalent in Western European countries but less clear to non-existent in former State Socialist countries.

Only a small number of studies examine how climate change views are associated with energy-related attitudes and behaviors in the US (Bord, O'Connor, and Fisher 2000; Dietz et al. 2007; Ding et al. 2011; Leiserowitz 2006; McCright 2009; McCright, Dunlap, and Xiao 2013, 2014a; O'Connor, Bord, and Fisher 1999; O'Connor et al. 2002), UK (Spence et al. 2011; Whitmarsh 2009), and Germany (Engels et al. 2013). These studies find that pro-climate views are related to support for energy conservation policies (Bord, O'Connor, and Fisher 2000; Dietz et al. 2007; Ding et al. 2011; Leiserowitz 2006; McCright 2009; McCright, Dunlap, and Xiao 2013, 2014a; O'Connor, Bord, and Fisher 1999; O'Connor et al. 2002), support for renewable

energy sources and opposition to nonrenewable energy sources(Engels et al. 2013), intentions to reduce energy use in general(Spence et al. 2011), and intentions to perform specific energy conservation behaviors(Bord, O'Connor, and Fisher 2000; O'Connor, Bord, and Fisher 1999; O'Connor et al. 2002; Whitmarsh 2009). We contribute to this emerging group of studies by further investigating these effects with a recently available cross-national dataset.

Given the fairly consistent patterns above, it seems reasonable to predict that belief in the reality of climate change is positively related with support for the development and subsidy of renewable energy and intentions to perform energy conservation behaviors. Further, given the patterns from previous research, it seems reasonable to predict that the relationships between gender, education, environmental views, and political orientation and these energy-related attitudes, behavioral intentions, and conservation actions may be at least partially mediated by belief in climate change. Our analytical model allows us to test such predictions.

The European Union Context

The EU has been quite progressive on climate change policy, particularly in comparison with the US (Selin and VanDeever 2012). The connection between the policy realms and views of the general public is underexplored to date. Previous research shows that for Western European countries, citizens on the Right are less likely than those on the Left to believe that anthropogenic climate change is occurring, perceive climate change to be a serious problem, believe we should deal with climate change, express a personal willingness to pay to deal with climate change, and support policies to reduce greenhouse gas emissions (McCright et al. 2016a). Prior work also demonstrated that the ideological divide on climate change views was not shown in former State Socialist countries, and provided two possible explanations. The first was that climate change (e.g., Lorenzoni and Pidgeon 2006; Schreurs, Selin, and VanDeever

2009) and the environment more generally (e.g., Haller and Hadler 2008; Marquart-Pyatt 2012) have been less salient political issues in former State Socialist countries than in Western European countries. The second was related to the political histories of former State Socialist countries where Left-Right identification in those countries is more difficult to assess. Historically, within Western Europe, the Left has been associated with social change and government efforts to promote greater political, social, and economic equality, while the Right has opposed change and supported a more hierarchical social, political, and economic order (Lipset et al. 1954). These ideological distinctions are either much weaker or have disappeared entirely in former State Socialist countries (e.g., Tavits and Letki 2009; Van Hiel and Kossowska 2007). Indeed, the Left in former State Socialist countries is not currently identified with social change and equality (e.g., Markowski 1997; Thorisdottir *et al.* 2007), and the standard relation between right-wing orientation and traditionalism and acceptance of inequality is weaker in former State Socialist countries than in Western European countries (e.g., Thorisdottir *et al.* 2007).

It is also the case that the West-East distinction, while a useful organizing frame for some work on environmental concerns (Chaisty and Whitfield 2015; DeBardeleben 1997; Marquart-Pyatt 2008, 2012), may inadvertently mask important variability within those geographic distinctions. To this end, in this paper we employ an alternative comparative dimension, organizing countries in the ESS data on the basis of Esping-Anderson's (1990) welfare state regime typology. Esping-Andersen (1990) sought to identify broad typologies of existing welfare state regimes to show the wide variation in institutional composition within the advanced capitalist world and to identify the types of inequalities likely to dominate in each regime type. His work identified three broad regimes types: social democratic, conservative corporatist, and

residual liberal. Subsequent work initiated after the dismantling of the Communist system identified a fourth group: eastern or former communist/state socialist.²

The Study: Data, Methods and Analytical Model and Technique

We utilize publicly available data from the European Social Survey Wave 8 fielded during 2016. The ESS data has more than one hundred questions on a wide range of topics including values, democracy and politics, institutional trust, subjective well-being, immigration, and core socio-demographics. The 2016 ESS survey includes a module of public attitudes toward climate change and energy, such as items that measure respondents' climate change beliefs and concerns, energy security and preferences, personal norms, efficacy and trust, and energy-related behavioral intentions (see ESS 2016). This survey contains individual-level information in 17 European countries, with samples ranging from just over 1,000 to roughly 2,500.³ Respondents were drawn through multistage national probability samples.

Our interest in comparing across welfare state (WS) regime typologies leads us to create four country groups or clusters. The Liberal WS regime group includes three countries: Iceland, Ireland, and Great Britain. The Conservative WS regime group includes four countries: Finland, France, Germany, and Switzerland. The Social-Democratic WS regime group includes five countries: Austria, Belgium, Netherlands, Norway, and Sweden. The Former State Socialist

² Esping-Andersen's seminal work drew heavily upon Korpi's power resources theory (1983; 1989), which argues that political attitudes and policy preferences will be largely shaped by social structural cleavages (Korpi and Palme 1998). Material interests that grow out of one's class position will strongly impact attitudes toward the responsibilities of the state in addressing social inequalities and guaranteeing a basic standard of living. Thus, existing welfare state institutions will shape attitudes to the extent to which they ameliorate or reproduce material inequalities. These may have relevance for other attitudes including views of the state. Here we explore the relevance of these to the energy-related policy views, behavioral intentions, and personal energy conservation actions.

³ The 17 European countries are (with sample sizes in parentheses): Austria (1985), Belgium (1702), Czech Republic (2186), Estonia (1963), Finland (1868), France (2015), Germany (2723), Great Britain (1892), Iceland (2689), Ireland (2457), the Netherlands (1644), Norway (1479), Poland (1630), Russia (2396), Slovenia (1256), Sweden (1511), and Switzerland (1459). Note Israel is excluded from this analysis.

(FSS)/Eastern WS regime group includes five countries: Czech Republic, Estonia, Poland, Russia, and Slovenia. In this section, the measurement of all variables and methodological approach, structural equation modeling with latent variables, are discussed. Multiple imputation procedures were used to account for missing data and retain the sample sizes used in these analyses (Allison 2002).

We use structural equation modeling with latent variables (SEMLV) to estimate our models (Bollen 1989; Hoyle 2012). SEMLV is a multi-equation regression technique that accommodates multiple relationships between multiple exogenous and endogenous variables simultaneously and includes both latent and observed variables. A latent construct, also called a latent variable, is an unobserved variable that captures the relations between the multiple observed variables being used to measure it (Bollen 1989, 2002). As is standard practice in SEMLV, we evaluated the fit of each of the latent variables used as predictors in our model via confirmatory factor analysis (CFA) or measurement models. We use SAS 9.3 and AMOS 24 for our analyses.

We use three latent variables as predictors in our model. CFA results provide fit statistics for each measure included in the latent variable and the overall fit or quality of the latent construct, both of which need to be examined to comprehensively assess the fit of the latent constructs and evaluate their appropriateness for use in the analysis. An ideal latent variable has standardized and unstandardized factor loadings close to 1, which shows that the included measures are valid and reliable measures of the latent construct. Overall model fit statistics for an ideal latent variable include a non-significant chi-square value (indicating that the estimated model is not significantly different from the data), values for the Incremental Fit Index (IFI), Comparative Fit Index (CFI), and Tucker-Lewis Index (TLI) that are above 0.95, and a Root

Mean Square Error of Approximation (RMSEA) that is below 0.05 (West, Taylor, and Wu 2012).

Outcome Variables: Energy Policy Views, Energy Conservation Intentions and Actions

In our analyses, we employ three outcome variables: one measure of energy policy views, one measure of energy efficiency purchasing behavioral intentions, and one measure of personal energy conservation actions. ‘*Energy-related policy views*’ includes three variables that ask survey respondents: ”To what extent are you in favour or against the following policies in [country] to reduce climate change?”. Possible response options include strongly in favour, in favour, neither in favour nor against, somewhat against, strongly against. The three survey items include increasing taxes on fossil fuels, such as oil, gas and coal, using public money to subsidise renewable energy such as wind and solar power, and a law banning the sale of the least energy efficient household appliances. A CFA indicates that a single latent variable underlies all three questions.

The second indicator, “*energy efficiency behavioral intentions*,” is a single item based on this question asked in the beginning of the climate change module: “If you were to buy a large electrical appliance for your home, how likely is it that you would buy one of the most energy efficient ones?” Possible response options ranged from 0 to 10 where 0 would mean not at all likely and 10 would mean extremely likely.

Our third indicator, “*personal energy conservation actions*,” is a single item based on this question asked in the beginning of the climate change module: “There are some things that can be done to reduce energy use, such as switching off appliances that are not being used, walking for short journeys, or only using the heating or air conditioning when really needed. In your daily life, how often do you do things to reduce your energy use?” Possible response options ranged

from 1=Never to 6=Always, with values in between for hardly ever, sometimes, often, and very often.

Tables 1 and 2 provide descriptive information for each of our three outcome variables. Table 1 shows frequencies for the three variables that comprise the energy-related policy views. Survey respondents report the highest percentage in favor of an increase tax on fossil fuels and for public subsidies on renewable energy in Social Democratic nations, followed by Conservative, Former State Socialist and Liberal WS regime types. For establishing a law banning the sale of non-energy efficient appliances, survey respondents report the highest percentage in favor of such a policy in Conservative countries, followed by Social Democratic, Former State Socialist and Liberal WS regime types. Note these patterns can be further disaggregated to individual countries. Table 2 provides information for the latter two personal efficiency behavioral intentions and conservation actions. Survey respondents report the highest percentage for being likely to extremely likely to purchase an energy efficient appliance in Conservative nations, followed by Social-Democratic, Liberal, and Former State Socialist WS regime types. Regarding personal energy conservation actions, more than 6 in 10 of respondents across all regions report they half of the survey respondents report they engage in energy conservation actions often, very often, and always in all four regions. Note in both instances that these patterns can be further disaggregated to individual countries.

Independent Variables

Given expectations from previous research, we employ measures of climate change views, energy concerns, energy supply views, attitudes toward renewable energy, political ideology, personal efficacy, and individual demographic characteristics as independent variables affecting energy policy views, energy efficiency purchasing behavioral intentions, and personal

energy conservation actions. Our first indicator, “*climate change views*,” is a composite item based on two questions asked toward the middle of the climate change module: “You may have heard the idea that the world's climate is changing due to increases in temperature over the past 100 years. What is your personal opinion on this? Do you think the world's climate is changing?” Possible responses include definitely changing, probably changing, probably not changing, and definitely not changing. The second question, “Do you think that climate change is caused by natural processes, human activity, or both?”, included five response options: entirely by natural processes, mainly by natural processes, about equally by natural processes and human activities, mainly by human activity, and entirely by human activity. As shown in descriptive information presented in Table 3, majorities of publics in all nations and Welfare State Regime groups express belief that the world’s climate is changing. And, regarding the causes of climate change, views are split in some respects between those who believe that climate change is caused about equally by natural processes and human activity.

We employ three indicators of environmental views, all of which are latent variables. These items are generally similar in nature to ones routinely used in the single country and cross-national studies reviewed earlier on climate change, energy, and environmental views. They measure crucial views about energy issues covering energy concerns or worries, energy supply concerns, and use of renewable energy sources. For all three latent constructs, a higher value represents a stronger environmental view related to energy concerns, energy supplies, and using renewable energy sources.

The first measure, ‘*renewable energy supply beliefs*’, is a latent construct that includes four variables that ask survey respondents about how much of the electricity used in [country] should be generated from each energy source: a) *hydroelectric power generated by flowing water*

from rivers, dams and seas, b) the sun or solar power, c) wind power, and d) biomass energy generated from materials like, wood, plants and animal waste. Possible response options (note rescaled) include 4=a large amount to 1=a small amount. The CFA results and fit statistics indicate very good fit of this latent construct; the standardized factor loadings range from 0.55 to 0.67 and unstandardized loadings from 1.00 to 1.25 and are all significant. Overall fit statistics are very good—the chi-square value is non-significant ($p = 0.74$), and values for the IFI, CFI, and TLI are 0.98, and the RMSEA is 0.03 (CI=0.00, 0.12) (West, Taylor, and Wu 2012).

The second indicator, '*pragmatic energy concerns*', is a latent construct that includes four variables that ask survey respondents about how worried they are that a) *there may be power cuts in [country]*, b) *energy may be too expensive for many people in [country]*, c) *[country] being too dependent on energy imports from other countries*, and d) *[country] being too dependent on using energy generated by fossil fuels such as oil, gas and coal*. Possible response options include 1=Not at all worried to 5=extremely worried. As before, CFA results and model fit statistics indicate very good fit of this latent construct (West, Taylor, and Wu 2012).

The third indicator, '*energy supply interruption concerns*', is a latent construct that includes four variables that ask survey respondents about how worried they are that energy supplies could be interrupted by a) *natural disasters or extreme weather*, b) *insufficient power being generated*, c) *technical failures*, and d) *terrorist attacks*. Possible response options include 1=Not at all worried to 5=extremely worried. As with previous latent variables, CFA results and model fit statistics indicate very good fit of this latent construct (West, Taylor, and Wu 2012).

In addition, we employed "*personal efficacy*" in the model, since self-efficacy has been found in past studies to be related to pro-environmental attitudes, behavioral intentions, and actions (e.g., Marquart-Pyatt 2012). We created this measure from two survey items: a)

“Overall, how confident are you that you could use less energy than you do now?”, and b) “To what extent do you feel a personal responsibility to try to reduce climate change?”. Both included ten item response options from 0=not at all confident to 10=completely confident and 0=not at all to 10=a great deal. We coded these items so that greater values signify greater perceived efficacy.

To assess respondents’ Left-Right “political ideology,” the ESS used the following survey question: “In politics people sometimes talk of “left” and “right”. Using this card, where would you place yourself on this scale, where 0 means the left and 10 means the right?” We use this item as our measure of Left-Right political ideology—recoded so that smaller numerals denote a Right orientation and larger ones a Left orientation.

Following recent research on the correlates of public concern for the environment (Hadler 2017; Marquart-Pyatt 2007, 2008, 2012, 2016), we also employ three demographic variables in our models. “Gender” of the respondent is coded 0 for males and 1 for females. “Age” is recorded as the respondent’s age at the time of the survey, in response to the following question: “And in what year were you born?”. “Full-time education” records respondents’ answers to the following survey question: “About how many years of education have you completed, whether full-time or part-time? Please report these in full-time equivalents and include compulsory years of schooling.”

We estimated structural equation models⁴ for each of our three outcome variables—energy policy beliefs, energy efficiency behavioral intentions, and personal conservation actions—to examine the effects of climate change views, political ideology, energy views, efficacy, and socio-demographics: one each for Liberal, Social-Democratic, Conservative, and

⁴ Those interested in examining the 17 separate country-level empirical models for each of our outcome variables may contact the corresponding author. We use survey weights for pooled models by WS regime type.

former State Socialist.⁵ We report standardized coefficients in Tables 4 and 5 to facilitate comparison across countries and models.

We begin by discussing the performance of the climate change views variable, for Liberal, Social-democratic, Conservative, and then FSS/Eastern welfare state regime types. We then discuss the performance of energy-related views variables before moving to remarking on other variables across both tables. In line with much social science research predicting environmental concern with socio-demographic variables, the adjusted R^2 values across the models are of decent size in explaining variability in the three outcome variables (Marquart-Pyatt 2007, 2008; McCright et al. 2016a).

Results

Table 4 presents the results for our pooled SEMLV analyses with data from 17 countries grouped into four Welfare State regime types—Liberal, Social-democratic, Conservative, and FSS/Eastern—respectively. Consistent with expectations, there are significant effects of climate change views on energy views across all four Welfare State regime types for progressive energy policy support views. Specifically, citizens who believe that climate change is occurring are more likely than those who do not believe climate change is occurring to favor progressive energy policies designed to increase tax on fossil fuels and subsidize renewable energy development across Liberal, Social-Democratic, Conservative, and Former State Socialist WS regimes. The effects of climate change views on personal energy behavioral intentions and conservation actions, significant in three of the four WS regime types for both outcome

⁵ Pooling observations and including country dummy variables or fixed effects to account for heterogeneity is empirically appropriate as it accounts for clustering but does not attempt to explain it (Steenbergen and Jones 2002). We selected this approach for pragmatic reasons. Conceptually, we are interested in examining whether the political divide on climate change views found in the US and the EU (though likely only in Western Europe) also extends across an additional axes of comparison, WS regime typologies. A next step is to further examine our empirical results to determine the applicability of a multi-level approach.

variables. In Liberal and Former State Socialist WS regimes, citizens who believe climate change is occurring are more likely to express an intention to make personal energy efficient purchases. Citizens in Conservative WS regimes are less likely to express such intent. By the same token, citizens in Liberal and Former State Socialist WS regimes who believe climate change is occurring are more likely to report being engaged in personal conservation actions. Citizens in Conservative WS regimes are less likely to self-report such engagement.

Our results also reveal significant effects of renewable energy views across all four Welfare State regime types for progressive energy policy support views, personal efficiency behavioral intentions, and personal energy conservation actions in line with expectations. Specifically, citizens who support increased use of renewable energy to power energy supplies are more likely than those who do not support use of renewable energy sources to favor progressive energy policies designed to increase tax on fossil fuels and subsidize renewable energy development across Liberal, Social-Democratic, Conservative, and Former State Socialist WS regimes. The effects of renewable energy views on personal energy behavioral intentions and conservation actions are also significant across the four WS regime types for both outcome variables. Across WS regime types, citizens who support increased use of renewable energy to power energy supplies are more likely than those who do not support use of renewable energy sources to express an intention to make personal energy efficient purchases and to report being engaged in personal conservation actions as part of everyday behaviors.

Results for effects of the pragmatic energy concerns on support for progressive energy policies, personal efficiency behavioral intentions, and personal energy conservation actions are also quite consistent. That is, citizens who express higher levels of concern about power cuts, energy costs and not being energy self-reliant are more likely than those who express lower

levels of pragmatic concerns to support more progressive energy policies in Liberal, Social-Democratic and FSS WS regimes. Across WS regime types, citizens who support higher levels of concern about energy costs, possible cuts and self-reliance are more likely than those who express lower degrees of energy concerns to express an intention to make personal energy efficient purchases and to report being engaged in personal conservation actions as part of routine behaviors.

Consistent with previous work on climate change attitudes, there is no effect of political ideology on energy views, personal behavioral intentions or personal conservation actions in countries in the FSS WS regime. There are differences between citizens on the Right and Left in Liberal, Social-Democratic, and Conservative WS regimes for progressive energy policy and in Liberal and Conservative WS regimes for personal energy efficiency behavioral intentions.

We now briefly turn to discussion of the performance of the other variables across the three outcome variables and the 4 WS regime types. Personal efficacy has anticipated positive effects across all three outcome variables in all but one WS regime type. In general, the effects of gender, age, and education on the three outcome variables in Liberal, Social-democratic, Conservative, and FSS WS regimes types are consistent with those shown in earlier studies.

Conclusion

Recent research found that the well-established political divide in public opinion on climate change in the United States can also be discerned in other nations (besides the United Kingdom and Australia), particularly in Western Europe (McCright, Dunlap, and Marquart-Pyatt 2016). Based on this prior work, here we asked whether the political divide on climate change extends to energy views. The purpose of this study was twofold: to describe energy views across seventeen European nations and to examine a model of energy views and personal energy-

efficiency behavioral intentions and conservation actions comparatively and cross-nationally to determine its consistency.

Our analyses found significant effects of climate change views on progressive energy policy support views across all four Welfare State regime types, significant effects of climate change views on personal energy behavioral intentions and conservation actions in three of the four WS regime types, and less consistent effects of climate change views on personal conservation actions. The analyses also revealed significant effects of renewable energy views across all four Welfare State regime types for progressive energy policy support views, personal efficiency behavioral intentions, and personal energy conservation actions in line with expectations. Results for effects of pragmatic energy concerns on support for progressive energy policies, personal efficiency behavioral intentions, and personal energy conservation actions were also quite consistent across WS regime types.

We described our results using primarily cross-group lenses for comparison given the exploratory nature of this study. An important next step is to do so across individual countries. In this way, further identifying similarities and differences in how climate change views shape energy views can inform future empirical work. Overall, the findings advance our collective understanding of key factors affecting environmental views comparatively.

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Table 1. Descriptive Information for Energy Policy Views, Pooled, by WS Regime Type and by country

Country	Increase Tax on Fossil Fuels			Renewable Energy Public Subsidies			Law Banning Non Energy Efficient Appliances		
	Against	Neither in favor nor against	In Favor	Against	Neither in favor nor against	In Favor	Against	Neither in favor nor against	In Favor
<i>All countries</i>	41.5	22.3	37.0	11.5	12.0	74.0	20.4	20.2	56.5
<i>Liberal</i>	47.3	22.5	30.3	17.6	15.6	66.3	23.3	22.0	54.7
Iceland	52.3	16.0	31.7	18.9	13.5	65.9	28.3	18.9	52.8
Ireland	48.9	26.1	25.0	18.0	16.1	65.9	18.9	25.3	55.8
Britain/UK	40.7	25.3	34.1	15.9	17.2	67.0	22.6	21.9	55.5
<i>Conservative</i>	37.2	22.9	39.9	9.7	9.7	80.6	17.1	17.1	65.9
Finland	22.7	25.2	52.1	10.6	11.0	78.4	16.5	25.0	58.5
France	54.4	22.7	22.9	12.0	11.9	76.1	17.0	17.6	65.4
Germany	39.6	23.2	37.2	8.9	7.6	83.5	17.0	13.2	69.8
Switzerland	32.0	20.5	47.5	7.4	8.3	84.4	17.7	12.6	69.8
<i>Social-democratic</i>	37.4	19.7	42.8	6.6	8.9	84.5	21.1	20.1	58.8
Austria	44.8	23.7	31.5	5.1	10.8	84.1	15.4	18.7	65.9
Belgium	47.2	20.5	32.3	11.7	10.3	78.0	15.1	16.6	68.3
Netherlands	40.1	19.1	40.7	6.1	6.1	87.8	26.3	16.1	57.6
Norway	32.5	17.4	50.1	4.7	8.7	86.5	23.2	25.7	51.1
Sweden	22.4	18.0	59.6	5.2	8.8	86.0	25.7	23.2	51.1
<i>F State Socialist</i>	49.7	26.5	32.7	12.2	14.1	73.9	21.4	23.5	55.1
Czech Rep	49.7	20.7	29.6	24.6	13.8	61.6	28.0	14.2	57.8
Estonia	49.5	31.6	18.9	8.2	14.1	77.8	23.0	28.79	48.3
Poland	59.7	25.8	14.5	8.6	13.1	78.4	16.2	23.9	59.8
Russia	42.9	31.8	25.3	15.8	23.5	60.7	21.7	35.0	43.3
Slovenia	46.9	22.8	30.3	3.6	5.9	90.8	18.3	15.5	66.2

Source: European Social Survey 2016 data (ESS 2017) & Author's Calculations

Table 2. Descriptive Information for Energy Efficiency Behavioral Intentions and Conservation Actions, Pooled, by WS Regime Type and by country

Country	Energy Efficiency Behavioral Intentions			Energy Conservation Actions					
	Not at all likely	Neither likely nor unlikely	Likely to extremely likely	Never	Hardly ever	Sometimes	Often	Very often	Always
<i>All countries</i>	6.3	16.7	75.1	2.5	5.4	22.2	29.9	25.5	13.6
<i>Liberal</i>	8.2	18.0	73.8	4.6	5.5	22.4	27.8	24.4	15.2
Iceland	5.7	18.2	76.1	1.3	5.1	25.6	26.0	26.6	15.3
Ireland	9.4	15.6	75.0	10.9	7.4	21.4	31.0	16.2	13.1
Britain/UK	9.5	20.3	70.2	1.6	4.1	20.3	26.5	30.3	17.2
<i>Conservative</i>	4.6	11.2	84.2	0.9	3.3	17.1	30.8	32.5	15.3
Finland	5.5	11.9	82.6	0.6	2.8	20.6	36.1	29.2	10.6
France	4.4	14.5	81.1	1.1	3.7	14.4	28.5	30.9	21.4
Germany	3.1	8.9	87.9	0.9	2.5	14.6	26.1	40.3	15.6
Switzerland	5.5	9.3	85.3	1.3	4.3	18.8	32.6	29.6	13.4
<i>Social-democratic</i>	6.0	16.7	77.3	15.0	5.1	23.9	25.9	26.4	11.1
Austria	3.5	14.9	81.6	2.4	7.0	28.7	27.4	23.1	11.4
Belgium	3.5	11.7	84.8	1.3	3.6	21.4	29.7	29.8	14.2
Netherlands	6.4	15.4	78.2	1.3	4.8	19.9	38.9	22.4	12.7
Norway	10.5	23.1	66.3	1.5	5.0	24.8	32.3	28.4	8.1
Sweden	6.0	18.4	75.6	1.1	5.1	25.0	1.2	28.3	9.3
<i>F State Socialist</i>	6.6	20.5	72.9	2.9	6.6	24.2	31.1	20.8	14.4
Czech Rep	3.7	19.8	76.5	1.6	5.5	29.7	31.1	18.2	13.9
Estonia	6.3	19.2	74.6	1.8	4.4	21.6	31.0	25.2	15.9
Poland	3.9	12.6	83.5	1.8	4.2	25.6	36.0	20.3	12.1
Russia	13.9	37.2	49.0	7.3	15.5	28.5	27.0	9.7	12.1
Slovenia	5.2	13.9	80.8	1.8	3.4	15.7	30.6	30.4	18.1

Source: European Social Survey 2016 data (ESS 2017) & Author's Calculations

Table 3. Descriptive Information for Climate Change Views, Pooled, by WS Regime Type and by country

Country	CC beliefs				Causes of CC				
	Definitely changing	Probably changing	Probably not changing	Definitely not changing	Entirely by natural processes	Mainly by natural processes	About equally by natural processes & human activity	Mainly by human activity	Entirely by human activity
<i>All countries</i>	54.5	36.4	4.7	2.2	1.9	6.7	44.5	35.6	5.9
<i>Liberal</i>	60.7	31.6	4.8	2.9	2.6	8.6	49.2	33.3	6.2
Iceland	66.1	30.0	3.4	0.5	1.4	8.5	52.2	33.4	4.5
Ireland	55.0	32.2	5.9	6.9	4.2	10.1	41.0	34.3	10.3
Britain/UK	61.0	32.5	5.1	1.4	2.2	7.2	54.4	32.3	3.9
<i>Conservative</i>	57.3	38.1	3.6	1.0	1.3	5.1	44.9	42.1	5.4
Finland	41.1	53.1	5.3	0.5	1.4	4.8	42.5	44.8	6.5
France	62.8	33.5	2.8	0.9	1.9	6.7	44.5	35.6	5.9
Germany	61.3	33.7	3.8	1.3	1.0	4.2	42.1	47.5	5.2
Switzerland	64.1	32.2	2.4	1.3	0.9	4.6	50.4	40.3	3.9
<i>Social-democratic</i>	58.9	35.9	4.2	1.0	1.4	6.9	42.2	43.0	6.3
Austria	53.7	38.3	6.2	1.8	1.7	6.4	31.0	50.3	10.6
Belgium	64.2	32.2	3.0	0.6	1.2	4.6	40.1	46.1	8.0
Netherlands	68.5	27.6	2.9	0.9	1.6	6.5	48.9	37.4	5.5
Norway	49.1	43.8	6.0	1.0	1.6	11.5	49.9	35.2	1.9
Sweden	59.2	37.6	2.8	0.5	1.1	5.8	41.3	46.1	5.7
<i>F State Socialist</i>	53.1	38.8	4.7	3.3	2.6	8.5	53.4	29.2	6.3
Czech Rep	64.1	32.2	2.4	1.3	0.9	10.7	51.3	29.2	7.9
Estonia	41.3	49.7	7.3	1.8	1.6	9.7	54.6	28.9	5.2
Poland	48.5	43.9	4.5	3.1	3.0	7.4	58.0	28.4	3.2
Russia	39.7	44.0	6.8	9.5	5.8	9.8	48.3	27.0	9.1
Slovenia	72.1	24.4	2.6	0.9	1.9	4.8	54.8	32.3	6.2

Source: European Social Survey 2016 data (ESS 2017) & Author's Calculations

Table 4: SEMLV Results Predicting Energy Policy Views Across 4 Welfare State Regime Types (n=17) European Countries

Energy-Related Policy Views				
	Liberal	Social-Dem	Conservative	FSS
CC views	0.111**	0.150**	0.085**	0.131**
Pol ideology	0.052**	0.086**	0.026*	0.011
Use of renewables	0.251**	0.251**	0.423**	0.217**
Energy Concerns	0.033*	0.027*	0.014	0.050**
Energy Supply Int	0.076**	-0.064**	-0.106**	-0.016
Personal Efficacy	0.198**	0.214**	0.126**	0.143**
Gender	-0.012	0.019	0.036**	0.054**
Age	0.046**	0.068**	0.134**	0.013
Education	0.139**	0.128**	0.104**	0.008
Adjusted R ²	0.218	0.202	0.204	0.179
N	5438	8321	8065	9431

Notes: Entries are standardized coefficients.

Country dummy variables in each sub-sample are not reported. * p<.05 ** p<.01

Table 5: SEMLV Results Predicting Energy Policy Views and Behavioral Intentions Across 4 Welfare Regime Types in Seventeen European Countries

	Personal Energy Efficiency Intentions				Energy Efficiency Actions			
	Liberal	Social-Dem	Conservative	FSS	Liberal	Social-Dem	Conservative	FSS
CC views	0.032*	0.014	-0.047**	0.071**	0.029*	0.001	-0.060**	0.075**
Political ideology	0.032*	0.007	0.040**	0.029	0.005	-0.017	-0.015	-0.017
Use of renewables	0.138**	0.264**	0.349**	0.145**	0.125**	0.193**	0.263**	0.136**
Energy Concerns	0.122**	0.134**	0.143**	0.064**	0.232**	0.156**	0.135**	0.132**
Energy Supply Int	-0.049**	-0.012	-0.106**	-0.027*	-0.056**	0.010	-0.055**	-0.052**
Personal Efficacy	0.178**	0.157**	0.160**	0.157**	0.058**	0.171**	0.202	0.106**
Gender	0.039**	0.018	0.038**	-0.002	0.015	0.017	0.023*	0.043**
Age	0.209**	0.23**	0.268**	0.085**	0.092**	0.192**	0.240**	0.220**
Education	0.045**	0.053**	0.073**	0.065**	0.040**	0.060**	0.052**	0.017
Adjusted R ²	0.218	0.202	0.204	0.179	0.218	0.202	0.204	0.179
N	5438	8321	8065	9431	5438	8321	8065	9431

Notes: Entries are standardized coefficients.

Country dummy variables in each sub-sample are not reported. * p<.05 ** p<.01