![European Social Survey logo]

QUESTION MODULE DESIGN TEAM (ESS ROUND 8) APPLICATION FORM FOR NEW MODULES[1]	
Please return this form by email to:	Mary Keane ess@city.ac.uk (PDF files only)
CLOSING DATE FOR APPLICATIONS: 17:00 hours UK Time on 12th May 2014	

USE THE ARROW KEYS TO NAVIGATE ROUND THE FORM

1. Principal Applicant *(person to whom all correspondence will be sent):*

Forename: Wouter	**Surname:** Poortinga
Position: Reader in Environmental Psychology	
Department: Welsh School of Architecture/ School of Psychology	
Institution: Cardiff University	
Full Address: Bute Building King Edward VII Avenue Cardiff CF10 3NB Wales, United Kingdom	
Tel No: + -4402920874755	Email: PoortingaW@cardiff.ac.uk

2. Co-Applicants *(up to 4):*

(i) Forename: Lorraine	**Surname:** Whitmarsh
Department: School of psychology	
Institution: Cardiff University	
Country: Wales, United Kingdom	Email: WhitmarshLE@cardiff.ac.uk

(ii) Forename: Gisela	**Surname:** Böhm
Department: Faculty of Psychology	
Institution: University of Bergen	
Country: Norway	Email: gisela.boehm@psysp.uib.no

(iii) Forename: Linda	**Surname:** Steg
Department: Department of Psychology	
Institution: University of Groningen	
Country: the Netherlands	Email: e.m.steg@rug.nl

(iv) Forename: Stephen	**Surname:** Fisher
Department: Department of Sociology	
Institution: University of Oxford	
Country: England, United Kingdom	Email: stephen.fisher@trinity.ox.ac.uk

---

[1] A totally new topic not previously fielded as a rotating module on the ESS OR a module that includes some questions from an earlier rotating module but uses a different approach or intends to repeat fewer than 66% of questions from an existing module in an identical format.

3. Proposed title of module *(max 80 characters):*
Public Attitudes to Climate Change, Energy Security, and Energy Preferences

4. Abstract *(max 200 words)*
Climate change is arguably the greatest environmental threat the world is facing. Fundamental shifts in the way energy is used and produced are needed to mitigate its risks to natural and economic systems. This proposal will address the public component of the transition to a low-carbon Europe by making a systematic and detailed comparison of attitudes to climate change, energy security and energy preferences.

This proposal uses Stern's Value-Belief-Norm model (2000) as a general framework, covering the four broad areas of (1) beliefs on climate change, (2) concerns about climate change and energy security, (3) personal norms, efficacy and trust, and (4) energy preferences. The module is specifically designed to fit within the core ESS questionnaire to create a comprehensive dataset that directly contributes to a better understanding of the situated nature of environmental attitudes in this area.

This module will help to make robust comparisons of Europeans' perceptions of climate change, energy security, and energy preferences; increase our understanding of how they are shaped by national socio-political factors; examine the role of socio-political values and engagement; and examine the relative importance of individual-motivational versus national-contextual variables in public energy preferences.

5. Curriculum vitae

(Please provide a brief CV for each applicant, including subject expertise, questionnaire design and analysis experience, relevant publications and record of joint working – maximum one page per applicant.)

Principal Applicant:

Wouter Poortinga is a Reader in environmental psychology at the Welsh School of Architecture and School of psychology, Cardiff University. His research interests are in public responses to environmental and technological risks, and has written extensively on the topics of environmental risk perception, trust in risk regulation, and environmental attitudes and behaviour. He has previously examined the role of environmental values and attitudes in household energy use, and contributed to two major research syntheses covering the academic and non-academic literatures on public attitudes to environmental change and low-carbon energy. He has a special interest in the use of multilevel modelling to analyse large-scale social survey datasets (e.g. Poortinga 2005) and specialised himself in questionnaire design. Poortinga organised numerous nationally representative social surveys on (among others) Public Perceptions of Risk, Science and Governance (2003), Public Perceptions of Genetically Modified Food and Crops (2005), Public Perceptions of Nuclear Power, Climate Change and Energy Options (2006), Public Perceptions of Climate Change and Energy Futures (2010), and the Welsh Sustainable Attitudes and Behaviour survey (2012). In these studies he has adopted the practice of involving government, industry and NGO stakeholders to ensure that the theory-based design of surveys are policy relevant. Wouter used ESS Round 1 data to examine social capital as a resource for health (Poortinga 2006).

Demski, C., Poortinga, W., & Pidgeon, N. (2014). Exploring public perceptions of energy security risks in the UK. Energy Policy, 66, 369-378.

Poortinga, W., Aoyagi, M., & Pidgeon, N. F. (2013). Public perceptions of climate change and energy futures before and after the Fukushima accident: A comparison between Britain and Japan. Energy Policy, 62, 1204-1211.

Poortinga, W., Spence, A., Whitmarsh, L., Capstick, S., & Pidgeon, N. (2011). Uncertain climate: an investigation of public scepticism about anthropogenic climate change. Global Environmental Change, 21, 1015-1024.

Spence, A., Poortinga, W., Butler, C., & Pidgeon, N (2011). Perceptions of climate change and willingness to save energy related to flood experience. Nature Climate Change, 1, 46-49.

Corner, A., Spence, A., Venables, D., Poortinga, W., & Pidgeon, N. (2011). Nuclear power, climate change and energy security: Exploring British public attitudes. Energy Policy, 39, 4823-4833.

Parag, Y., Capstick, S., & Poortinga, W. (2011). Policy attribute framing: a comparison between three policy instruments for personal emissions reduction. Journal of Policy Analysis and Management, 30, 889-905.

Spence, A., Poortinga, W., Pidgeon, N., & Lorenzoni, I. (2010). Public perceptions of energy choices: The influence of beliefs about climate change and the environment. Energy & Environment, 21, 385-407.

Bickerstaff, K., Lorenzoni, I. Poortinga, W., Pidgeon, N.F., & Simmons, P. (2008). Reframing the nuclear debate in the UK: radioactive waste and climate change mitigation. Public Understanding of Science, 17, 145-169.

Pidgeon, N.F., Lorenzoni, I., & Poortinga, W. (2008). Climate change or nuclear power – no thanks! A quantitative study of public perceptions and risk framing in Britain. Global Environmental Change, 18, 69-85.

Poortinga, W., & Pidgeon, N.F. (2006). Prior attitudes, salient value similarity and dimensionality: towards an integrative model of trust in risk regulation. Journal of Applied Social Psychology, 26, 1673-1699.

Poortinga, W. (2006). Social capital: An individual or collective resource for health? Social Science & Medicine, 62, 292-302.

Poortinga, W. (2005). The use of multilevel modelling in risk research. A secondary analysis of a study of public perceptions of genetically modified food. Journal of Risk Research, 8, 583-597.

Poortinga, W., & Pidgeon, N.F. (2005). Trust in risk regulation: cause or consequence of the acceptability of GM food? Risk Analysis, 25, 197-207.

Curriculum vitae (continued):

Co-applicant 1:

Lorraine Whitmarsh is a Senior Lecturer in environmental psychology in the School of Psychology, Cardiff University, and partner coordinator for the Tyndall Centre for Climate Change Research. Her research focusses on perceptions of climate change, energy and sustainability issues; and environmental behaviour and policy support. She currently holds a prestigious European Research Council Starting Grant studying low-carbon lifestyles; and has led or contributed to various European and UK projects on public attitudes and behaviour, which have explored the roles of values, experience, language, social influence and contextual factors in influencing responses to environmental issues and policies. These studies include several nationally-representative postal and online surveys on climate change risk perceptions, attitudes and behaviours (Bath University 2003; Tyndall Centre 2008; Cardiff University/BRASS Centre, 2012); large-scale UK public surveys on attitudes to energy systems (NERC, 2012) and waste (WG, 2011); as well as various laboratory-based studies employing a range of personality, attitudinal, value and behavioural measures (Cardiff University, 2010, 2011). Within this work, she has designed survey instruments; developed highly-reliable scales (e.g., climate change scepticism; Whitmarsh, 2011; pro-environmental identity, Whitmarsh & O'Neill, 2010); and tested several theoretical models (e.g., Value-Belief-Norm; Theory of Planned Behaviour; Attitude-Behaviour-Context; Whitmarsh, 2009a; Whitmarsh & O'Neill, 2010). Analysis has included reliability, factor, regression, mediation, correlation, ANOVA, and other statistical tests. She has worked with a range of researchers, spanning several disciplines and countries, and with policy-makers, industry and third sector organisations. Through her role on the Climate Change Commission for Wales and regular provision of advice to UK Government (DECC, DEFRA, House of Lords), she is able to ensure her research addresses critical social policy questions. Publications include:

Corner, A. Whitmarsh, L. & Xenias, D. (2012). Uncertainty and attitudes towards climate change: biased assimilation but no polarisation. Climatic Change, published online 10 March 2012.

Poortinga, W., Spence, A., Whitmarsh, L., Capstick, S. & Pidgeon, N. (2011). Uncertain climate: An investigation into public scepticism about anthropogenic climate change. Global Environmental Change, 31, 1015–1102.

Whitmarsh, L. (2011). Scepticism and uncertainty about climate change: dimensions, determinants and change over time. Global Environmental Change, 21, 690–700.

Whitmarsh, L., O'Neill, S. & Lorenzoni, I. (2011a). Climate change or social change? Debate within, amongst, and beyond disciplines. Environment & Planning A, 43, 258 – 261.

Whitmarsh, L., Upham, P., Poortinga, W., Darnton, A., McLachlan, C, Devine-Wright, P., & Sherry-Brennan, F. (2011b). Public Attitudes to Low-Carbon Energy - Research Synthesis. RCUK. www.rcukenergy.org.uk/news.html

Whitmarsh, L., Seyfang, G. & O'Neill, S. (2011). Public engagement with carbon and climate change: To what extent is the public 'carbon capable'? Global Environmental Change, 21, 56-65.

Whitmarsh, L. & O'Neill, S. (2010). Green identity, green living? The role of pro-environmental self-identity in determining consistency across diverse pro-environmental behaviours. Journal of Environmental Psychology, 30, 305–314.

Whitmarsh, L. & Lorenzoni, I. (2010). Behaviour, perceptions and communication of climate change. Wiley Interdisciplinary Reviews: Climate Change, 1, 158-161.

Nye, M., Whitmarsh, L. & Foxon, T. (2010). Socio-psychological perspectives on the active roles of domestic actors in transition to a lower carbon electricity economy. Environment & Planning A, 42, 697-714.

Whitmarsh, L. (2009a). Behavioural responses to climate change: Asymmetry of intentions and impacts. Journal of Environmental Psychology, 29, 13-23.

Whitmarsh, L. (2009b). What's in a name? Commonalities and differences in public understanding of "climate change" and "global warming". Public Understanding of Science, 18, 401–420.

Whitmarsh, L. (2008). Are flood victims more concerned about climate change than other people? The role of direct experience in risk perception and behavioural response. Journal of Risk Research, 11(3), 351-374.

Lorenzoni, I., Nicholson-Cole, S., & Whitmarsh, L. (2007). Barriers perceived to engaging with climate change among the UK public and their policy implications. Global Environmental Change, 17(3-4), 445-459.

**Curriculum vitae (continued)*:*

<u>Co-applicant 2:</u>

Gisela Böhm is Professor of psychometrics and research methods in psychology as well as head of the research group DICE-Lab (Decision, Intuition, Consciousness, and Emotion) at the University of Bergen (Norway). Her main research fields are risk perception and decision making. Recent research projects deal with the determinants of sustainable behavior, the public perception of climate change, the role of emotions in environmental risk perception and behavior, and the interplay between risk and morality in responses to climate change. She has extensive experience in the design and analysis of questionnaires, including international representative surveys, and has led or coordinated various projects on the psychology of climate change. She lead a multidisciplinary research group on global change risk perception (German Research Council). She is currently engaged in an interdisciplinary research group (e.g., climate science, linguistics, political sciences, media sciences) at the University of Bergen on social and psychological science perspectives on climate changen. She chairs (together with Endre Tvinnereim) the "climate and environment" segment of the Norwegian Citizen Panel, a newly started national online survey panel owned by the University of Bergen. She was course leader at two editions of the Bergen Summer Research School, where she organized and taught courses on perception, communication, and behavior concerning climate change. She served as reviewer for the IPCC Fifth Assessment Report Working Group II (impacts, adaptation, and vulnerability) and Working Group III (mitigation of climate change).

Böhm, G. (2003). Emotional reactions to environmental risks: Consequentialist versus ethical evaluation. Journal of Environmental Psychology, 23, 199-212.

Böhm, G., & Pfister, H.-R. (2005). Consequences, morality, and time in environmental risk evaluation. Journal of Risk Research, 8, 461-479.

Böhm, G., & Pfister, H.-R. (2008). Anticipated and experienced emotions in environmental risk perception. Judgment and Decision Making, 3, 73-86.

Böhm, G., & Pfister, H.-R. (2008). Antinomies of environmental risk perception: Cognitive structure and evaluation. In M. J. Casimir (Ed.), Culture and the changing environment. Uncertainty, cognition, and risk management in cross-cultural perspective (pp. 61-77). Oxford: Berghahn.

Böhm, G., & Pfister, H.-R. (2011). Tourism in the face of environmental risks: Sunbathing under the ozone hole, and strolling through polluted air. Scandinavian Journal of Hospitality and Tourism, 11, 250-267.

Böhm, G., & Tanner, C. (2013). Environmental risk perception. In L. Steg, A. E. van den Berg, & J. I. M. de Groot (Eds.), Environmental psychology: An introduction (pp. 15-25). New York: Wiley-Blackwell.

Bostrom, A., O'Connor, R. E., Böhm, B., Hanss, D., Bodi, O., Ekström, F., Halder, P., Jeschke, S., Mack, B., Qu, M., Rosentrater, L., Sandve, A., & Sælensminde, I. (2012). Causal thinking and support for climate change policies: International survey findings. Global and Environmental Change: Human and Policy Dimensions, 22, 210-222.

Hanss, D., & Böhm, G. (2010). Can I make a difference? The role of general and domain-specific self-efficacy in sustainable consumption decisions. Umweltpsychologie, 14, 46-74.

Hanss, D., & Böhm, G. (2013). Promoting purchases of sustainable groceries: An intervention study. Journal of Environmental Psychology, 33, 53-67

Hanss, D., & Böhm, G. (2012). Sustainability seen from the perspective of consumers. International Journal of Consumer Studies, 36, 678-687

Pfister, H.-R., & Böhm, G. (2008). The multiplicity of emotions: A framework of emotional functions in decision making. Judgment and Decision Making, 3, 5-17.

Pfister, H.-R., & Böhm, G. (2012). Responder feelings in a three-player three-option ultimatum game: Affective determinants of rejection behavior. Games, 3, 1-29.

Pfister, H.-R., & Böhm, G. (2014). Independent decisions are fictional from a psychological perspective. Behavioral and Brain Sciences, 37(1), 95-96.

Rosentrater, L., Sælensminde, I., Böhm, G., Ekström, F., Hanss, D., O'Connor, R., & Bostrom, A. (2012). Understanding support for climate change policies in Norway. Environment and Behavior, 45, 935-970.

Curriculum vitae (continued)

<u>Co-applicant 3</u> *(if applicable):*

Linda Steg is Professor of environmental psychology at the University of Groningen. Her research focuses on understanding, and changing environmental behaviour, in particular household energy use and car use. She studies the effect of values, norms, moral considerations, and risk perceptions on environmental behaviour. Also, she studies the effectiveness and acceptability of environmental policies, and effects of environmental conditions and policies on individual quality of life. She has coordinated various multidisciplinary research projects on environmental sustainability and supervises many PhD projects on these topics. Steg is member of the Scientific Board of the Groningen Energy and Sustainability Program (GESP) at the University of Groningen, and scientific director of the Kurt Lewin Institute. Moreover, she is president of Division 4 'Environmental Psychology', and chair of the Task Force Communication of the International Association of Applied Psychology. She has organised several international conferences on sustainability issues, including the conferences 'Human Behaviour and Environmental Sustainability' and 'Towards a Comprehensive Model of Sustainable Corporate Performance'. Moreover, she initiated and organised the first Summer school on Theories in Environmental Psychology (First STEP). She published several books and review papers that ingrate key achievements in the field.

Abrahamse, W., & Steg, L. (2013). Social influence approaches to encourage resource conservation: A meta-analysis. Global Environmental Change, 23, 1773–1785

Abrahamse, W., Steg, L., Vlek, Ch., Rothengatter, T. (2005). A review of intervention studies aimed at household energy conservation. Journal of Environmental Psychology, 25, 273-291.

Bolderdijk, J.W., Gorsira, M., Keizer, K., & Steg, L. (2013). Values determine the (in)effectiveness of informational interventions in promoting pro-environmental behavior. PLOS ONE, 8 (12): e83911.

Bolderdijk, J.W., Steg, L., Geller, E.S., Lehman, P.K., & Postmes, T. (2012). Comparing the effectiveness of monetary versus moral motives in environmental campaigning. Nature Climate Change, 3, 413-416.

De Groot, J., & Steg, L. (2008). Value orientations to explain beliefs related to environmental significant behavior: How to measure egoistic, altruistic, and biospheric value orientations. Environment and Behavior, 40, 330-354.

De Groot, J.I.M., & Steg, L. (2010). Morality and nuclear energy: Perceptions of risks and benefits, personal norms and willingness to take action related to nuclear energy. Risk Analysis, 30, 1363-1373.

De Groot, J.I.M., Steg, L., & Poortinga, W. (2013). Values, perceived risks and benefits, and acceptability of nuclear energy. Risk Analysis, 33 (2), 307-317.

Huijts, N.M.A., Molin, E.J.E., & Steg, L. (2012). Psychological factors influencing sustainable energy technology acceptance A review-based comprehensive framework. Renewable & Sustainable Energy Reviews, 16, 525-531.

Keizer, K., Lindenberg, S., & Steg, L. (2008). The spreading of disorder. Science, 322, 1681-1685.

Keizer, K., Lindenberg, S., & Steg, L. (2013). The importance of demonstratively restoring order. PLOS ONE, 8(6), e65137. doi:10.1371/journal.pone.0065137.

Noppers, E., Keizer, K., Bolderdijk, J.W., & Steg, L. (2014). The adoption of sustainable innovations: driven by symbolic and environmental motives. Global Environmental Change, 25, 52-62.

Perlaviciute, G., & Steg, L. (in press). Contextual and psychological factors shaping evaluations and acceptability of energy alternatives: Integrated review and research agenda. Renewable & Sustainable Energy Reviews.

Steg, L., Bolderdijk, J.W., Keizer, K.E., & Perlaviciute, G. (2014). An integrated framework for encouraging pro-environmental behaviour: The role of values, situational factors and goals. Journal of Environmental Psychology, 38, 104-115.

Steg, L., Van den Berg, A.E., & De Groot, J.I.M. (Eds., 2012). Environmental psychology: An introduction. Oxford, UK: John Wiley & Sons.

Steg, L., & Vlek, C. (2009). Encouraging pro-environmental behaviour: An integrative review and research agenda. Journal of Environmental Psychology,29 , 309-317

Van der Werff, E., Steg, L., & Keizer, K.E. (2013). It is a moral issue: The relationship between environmental self-identity, obligation-based intrinsic motivation and pro-environmental behaviour. Global Environmental Change, 23, 1258-1265.

Curriculum vitae (continued)

Co-applicant 4 *(if applicable):*

Stephen Fisher is Associate Professor of political sociology at the University of Oxford, and fellow and tutor in politics at Trinity College, Oxford. His research interests have been in political behaviour, social attitudes and quantitative methods in the social sciences. He has taught survey research methods at the Masters level and supervised many Masters and Doctoral theses using cross-national survey data, including several with ESS data. Much of his own research has included analysis of various cross-national social surveys and he has co-authored review articles on the methodological issues arising in cross-national survey research (Heath et al 2005, Smith et al 2011). He was the Principal Investigator for the 2005 British wave of the Comparative Study of Electoral Systems survey, and a co-investigator on the 2010 Ethnic Minority British Election Study; working on questionnaire design for both. He was the founding director of the Oxford Spring School in Quantitative Methods for Social Research and is the founding convenor of the Political Studies Association Quantitative Methods Network.

Fisher, S.D., A.F. Heath, D. Sanders and M. Sobolewska (2014) 'Candidate Ethnicity and Vote Choice in Britain', *British Journal of Political Science*.

Marshall, J.L. and S.D. Fisher (2014) 'Compensation or Constraint? How different dimensions of economic globalization affect government spending and electoral turnout.' *British Journal of Political Science*.

Sanders, D., S.D. Fisher, A. Heath, M. Sobolewska (2014) 'The Calculus of Ethnic Minority Voting in Britain', *Political Studies.*

Heath, A.F, S.D. Fisher, G. Rosenblatt, D. Sanders, M. Sobolewska (2013) *The Political Integration of Ethnic Minorities in Britain.* Oxford: Oxford University Press.

Smith, S.N., S.D. Fisher and A. Heath (2011) 'Opportunities and challenges in the expansion of cross-national survey research', *International Journal of Social Research Methods*. 14(6), 485-502.

Curtice, J., S.D. Fisher and J. Kuha (2011) `Confounding the Commentators: How the 2010 exit poll got it (more or less) right', *Journal of Elections, Public Opinion and Parties.* 21(2), 211-235.

Fisher, S.D. and S.B. Hobolt (2010) Coalition government and electoral accountability, *Electoral Studies*.

Fisher, S.D., L. Lessard-Phillips, S. B. Hobolt, J. Curtice (2008) 'Disengaging voters: Do plurality systems discourage the less knowledgeable from voting?' *Electoral Studies* 27(1) 89-104.

Fisher, S.D. (2007) '(Change in) turnout and (change in) the left share of the vote', *Electoral Studies*. 26(3) 598-611.

Curtice, J. S.D. Fisher and L. Lessard-Phillips (2007) Proportional representation and the disappearing voter. In Park, A., Curtice, J., Thomson, K., Phillips, M. and Johnson, M. (eds.), *British Social Attitudes: the 23rd Report – Perspectives on a changing society*, London: Sage

Fisher, S. and A. Heath (2006) 'Decreasing desires for income inequality?' in P. Esther, M. Braun, and P. Mohler eds., *Globalization, Value Change, and Generations: A Cross-National and Intergenerational Perspective.* Brill, NL.

Heath, A, S. Fisher and S. Smith (2005) 'The Globalization of Public Opinion Research', *Annual Review of Political Science*, 8, 297-334.

Fisher, S.D. (2004) 'Definition and Measurement of Tactical Voting: the role of rational choice', *British Journal of Political Science,* 34, 152-166.

Curtice, J. and S. Fisher (2003) 'Prime ministerial persuasion: Thatcher and Blair' Chapter 11 of the *British Social Attitudes 20th Report.* London: Sage

Fisher, S.D. (2000) 'Class Contextual Effects on the Conservative Vote in 1983', *British Journal of Political Science*, 30, 347-60.

Module proposal – for NEW Modules

PART 1: Theory behind proposed module (max 6000 words)

Background

Climate change is arguably the greatest environmental threat the world is currently facing. Warming of the climate system is now considered unequivocal and poses serious risks to both natural and economic systems (Stern, 2006; IPCC, 2007, 2013). Preventing a 'dangerous' level of anthropogenic interference with the climate system has become a major international policy objective. All European countries have ratified the Kyoto Protocol and agreed to jointly fulfil their required emission reduction targets. Earlier this year, the European Commission presented its new ambitious 2030 framework, aiming for a reduction in greenhouse gas emissions by 40% below 1990 levels, together with a target for renewable energy of at least 27% and a renewed focus on energy-efficiency policies (European Commission, 2014).

These ambitious targets require fundamental shifts in the way energy is used and produced and can only be met with sustained and widespread public support. The public will have to accept new energy technologies and facilities in order to decarbonise the energy they are using (Spence & Pidgeon, 2009). Supply side changes in themselves are however not sufficient. Individuals and communities will also need to drastically change their behaviour in order to play their part in the transition to a low-carbon society (Steg & Vlek, 2009). Domestic energy use and personal transport account for around half the energy demand in most industrialised countries, while embodied energy in consumer goods and services accounts for most of the remainder (Druckman & Jackson, 2010).

Decisions about decarbonising future energy supplies cannot be separated from other energy policy considerations. Ensuring a reliable and secure supply of energy has become increasingly important in the light of a potential decline in global oil and gas production, as well as many coal-fired and nuclear power plants reaching the end of their operational lives (Pidgeon et al., 2008). These facilities need to be replaced by other (low-carbon) energy production technologies that can deliver reliable, secure, and affordable energy. The internationalisation of energy markets has increased dependency on foreign energy imports, making Europe more vulnerable to interruptions of supply (Umbach, 2010); while rising energy prices and a prolonged economic crisis across parts of Europe has led to widespread fuel poverty and concerns about the affordability of energy (Boardman, 2010).

Objectives of the Proposed New Module

The proposed new module for the *European Social Survey* (ESS) will address a critical component of the social transformation to a low-carbon Europe: a systematic and detailed comparison of *public attitudes to climate change, energy security and energy preferences*. The new module is specifically designed to fit within the core ESS questionnaire to create a unique and comprehensive dataset that directly contributes to a better understanding of the situated nature of environmental attitudes in this area, and that is amenable to a wide variety of analyses of interest to European academics and policy-makers working in energy and climate change. The proposed module is designed to achieve the following objectives:

Objective 1: Create a comprehensive theoretically-grounded cross-European dataset of public attitudes to climate change, energy security and energy preferences.

Existing research provides strong evidence of the necessity of making a theoretically-grounded systematic comparison across Europe. Clear diverging trends in perceptions of energy and climate change have emerged over the past decade. In Britain, levels of concern about climate change have gradually decreased since 2005 (Pidgeon, 2012), with climate

scepticism (or the doubt about the reality, cause or seriousness of climate change) reaching an all-time high in 2010 (Poortinga et al., 2011). In contrast, concern about climate change and support for renewables have remained high in Germany, with very little climate scepticism (Engels et al., 2013). Other countries have seen reduced public support for renewables and other low-carbon energy sources, despite high levels of climate awareness (Eurobarometer, 2014). High-profile events, such as the Fukushima disaster, have produced widely different public and policy responses. While the acceptability of nuclear power has risen in Britain in the wake of Fukushima (Poortinga et al., 2013), public opposition intensified in Germany leading to the policy decision to phase out nuclear power by 2022 (e.g. Pfister & Böhm, 2012). Furthermore, surveys have shown that carbon capture and storage (CCS) as a climate mitigation strategy is still unknown to a majority of Europeans, and that attitudes to unconventional fossil fuels, such as shale gas, are changing in certain countries (Poumadere et al., 2011; O'Hara et al., 2013). However, while attitudes to climate change and energy technologies have been well documented in individual European countries (and mostly only in the larger countries), and there have been a number of international opinion polls, no systematic or theory-based comparisons have been made at the European level. The International Social Survey Programme (ISSP) environment module dealt with generic environmental attitudes and preferences for environmental protection, and only included two energy-related items. This will be addressed by the proposed research.

The new module in conjunction with core parts of the ESS will create a unique dataset that will contribute to a better understanding of the situated nature of environmental attitudes in this area. The dataset allows a variety of analyses of interest to European academics and policy-makers working in energy and climate change. A detailed description and justification of the content of the module is provided below.

Objective 2: Develop an understanding of how national-level socio-political, economic and environmental factors shape public attitudes to energy and climate change across Europe.

It is not possible to understand national climate and energy perceptions without taking the wider socio-political context into account. European countries have widely diverging energy infrastructures, policies and challenges; and the public are exposed to different political and media landscapes. This may impact on how people feel and think about climate change, energy security and different energy technologies. For example, in Germany, the high-profile *Engergiewende* has helped to make great strides in the development of renewable energy sources. Its response to the Fukushima disaster has been explained by a history of well-organised public resistance to nuclear energy, intense media reporting, and trust in its own ability to develop sufficient renewable energy (Wittneben, 2012). Furthermore, low levels of climate scepticism have been linked to a lack of political representation for such views (Engels et al., 2013). In contrast, the UK media has provided a greater platform for sceptical voices (Painter, 2011), which is thought to be one of the reasons for continuing public uncertainty about the reality of climate change (Poortinga et al., 2011). Increased British support for nuclear power follows a shift in the framing of nuclear power as a necessary contributor to climate change mitigation, comprising 'elite cues' from policy-makers as well as from prominent environmentalists (Pidgeon et al., 2008; Poortinga et al., 2013). In France, where most electricity is derived from nuclear energy, the public place much greater confidence in nuclear operators as compared to other European nations (Poumadere et al., 2011). However, currently a steep transition away from nuclear is in place, with diminishing public support for the technology (ibid). In a recent international survey of six countries, engineering alternatives – including nuclear power – emerged as the least popular climate change mitigation policy options (Bostrom et al., 2012).

Norway assumes a particularly interesting and ambivalent position with more than 99% of its electricity coming from hydropower whilst being one of the largest oil and gas producers in the world. Those with economic links to the fossil-fuel sector have been found to be less likely to view climate change as a problem than the population at large (Tvinnereim & Austgulen, 2013), showing the importance of economic dependency for public attitudes to energy technologies. The importance of socio-political context is further underscored by the fact that climate change directly competes for public attention with other day-to-day concerns, such as the state of the economy (Scruggs & Benegal, 2012). Finally, research indicates that climate conditions and extreme weather events (e.g. floods, storms, heatwaves) can influence perceptions of climate change (Reser et al., 2014). Survey data collected through the proposed module can be compared with national weather datasets (e.g. UK Met Office) to explore the relative influence of local environmental conditions on perceptions.

This proposal constitutes the first ever systematic comparison of public attitudes to energy and climate change between European countries with different climate policies, energy infrastructures, economic circumstances, media landscapes, political parties and representations, populations and climatic conditions holding different sets of socio-cultural values. This allows us to develop a better understanding of how such socio-political factors shape public attitudes to energy and climate change across Europe. Below we describe in more detail which national indicators could be used for such analyses (see *National Socio-Political Context: Further Theory and Analyses*).

Objective 3: Examine the role of socio-political values and other individual-level factors in European attitudes to energy and climate change.

There are a number of theoretical approaches that can help to better understand individual climate risk perceptions. Human values play a central role in engagement with climate change (Corner et al., 2014; Steg & De Groot, 2012), with a cluster of 'self-transcendence' values predicting positive engagement with climate change and energy issues (Poortinga et al., 2012; Steg & De Groot, 2012). This is mirrored in the long-standing cultural theory of risk and its modern equivalent the theory of cultural cognition which have been repeatedly used to predict climate change scepticism and energy preferences (Douglas & Wildavski, 1982; Kahan et al., 2010, 2011; Steg & Sievers, 2000). Typically, individuals with a preference for an 'individualistic' organisation of society tend to be particularly sceptical about the risks of climate change, as climate mitigation policies involving the regulation of industry and individual action may threaten their identities and 'worldview' (Kahan et al., 2011). Research conducted in the US and Australia has repeatedly shown that beliefs about climate change are increasingly polarised along party political lines (McCright & Dunlap, 2011; Leviston et al., 2011). Although such strong polarisation has not been observed in Europe, Taylor (2012) found some partisanship effects, while Whitmarsh (2011) and Poortinga et al. (2011) showed that climate scepticism is concentrated in certain socio-demographic and politically conservative and disengaged groups.

Human values and political engagement have been routinely assessed as part of the ESS (e.g. Davidov et al., 2008). However, there has been no previous attempt to systematically link these to energy and climate change perceptions at the European level. Furthermore, the role of these factors may differ across different European countries. For example, there are indications that climate scepticism is largely an Anglo-American phenomenon and is less common in many other European countries. It can be expected that polarisation is the greatest in countries where there is a political home for such views through continued media attention and political representation (Painter, 2011; Engels et al., 2013), as well as those with a greater economic dependency on fossil fuels (e.g. Tvinnereim & Austgulen, 2013).

Objective 4: Examine the relative importance of both individual-motivational factors and national circumstances in public preferences for different energy-supply technologies and demand reduction

An impressive body of work has accumulated over the past two decades regarding individual motivational factors underlying preferences for energy-supply technologies and demand-side behaviours, typically using standard social or environmental psychology models, such as the theory of planned behaviour (TPB; Ajzen, 1991) or the Value-Belief-Norm (VBN) model (Stern, 2000; Kaiser et al., 2005; Steg et al., 2005). An underlying but as yet untested assumption is that 'universal' conceptual models can be used irrespective of context. While their structures may be generalisable cross-culturally, it is likely that model factors' relative importance differs depending on specific national conditions (also see Objective 3). This proposal uses Stern's VBN model (2000) as a general framework to design the new module, based on the premise that human values, together with beliefs regarding climate change and feelings of personal responsibility drive personal preferences for energy-supply technologies and energy demand reduction (see Figure 1).
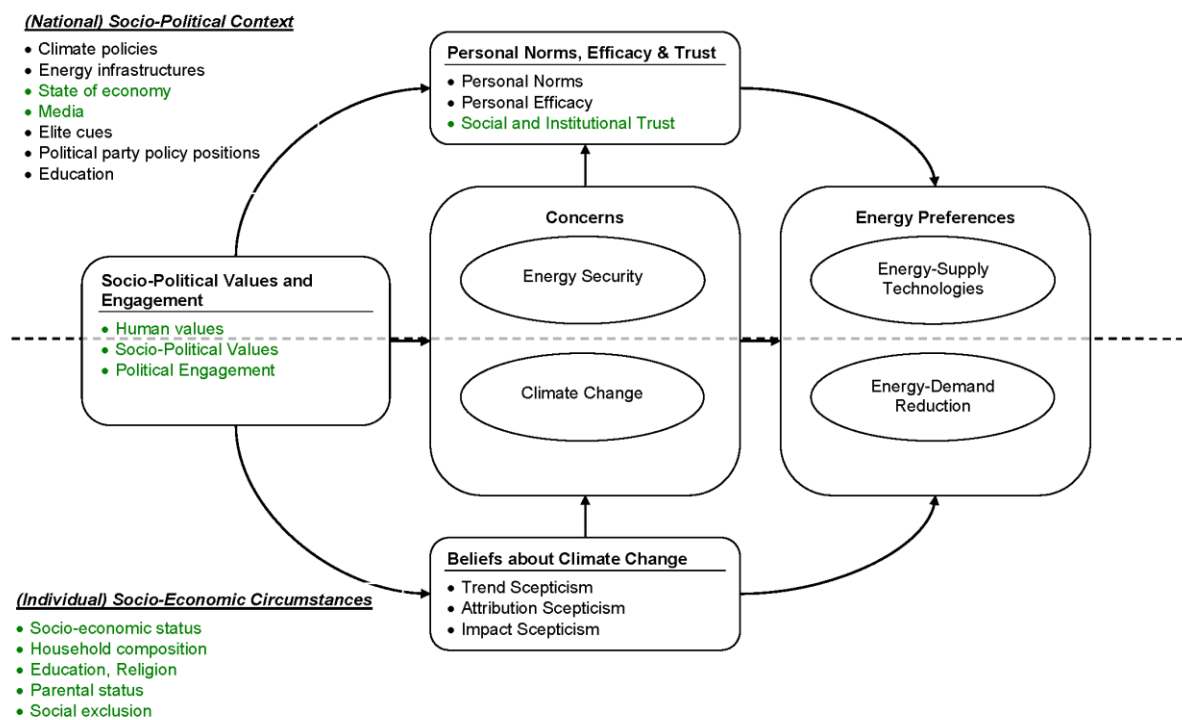

Figure 1: Conceptual framework of the proposal (new elements are in black, core ESS elements in green)

We hypothesise that (1) socio-political values and engagement shape beliefs and concerns about climate change and energy security, and preferences for associated technologies and policies; (2) personal values and concerns will only translate into action if individuals feel obliged (personal norms) and able (personal efficacy) to act (Steg & De Groot, 2010; Steg et al., 2005; Krosnick et al., 2006); and (3) social and institutional trust are critical for collective action (Lubell, 2002; Malka et al., 2009; White & Gatersleben, 2010). Even if individuals are concerned about climate change and feel personally responsible, they may not act if they think

others will not play their part. A similar collaborative relationship has to be nurtured between individuals and national governments/institutions. The public considers individual action to be futile if governments appear to absolve their duty to meet the collective interests of society. Trust in governments (and other responsible institutions) to design effective climate change and energy policies is therefore a prerequisite for public support for individual action (Lorenzoni & Pidgeon, 2006).

The proposed module not only allows us to test the above hypotheses, it can also be used to examine the validity (or equivalence) of the conceptual model across different European countries, and the relative importance of individual-motivational and socio-political factors in public preferences for different energy-supply technologies and demand reduction. The research team has extensive experience conducting such analyses (i.e., structural equation modelling and multi-level modelling).

Justification for the Elements of the Proposed Module

As can be seen in Figure 1, the conceptual framework comprises five components, covering the broad areas of (1) *socio-political values and engagement*, (2) *beliefs about climate change*; (3) *concerns about climate change and energy security*; (4) *personal norms, efficacy and trust; and* (5) *energy preferences* (i.e. preferences for energy-supply technologies and energy demand reduction), which are likely to be influenced by personal circumstances (in terms of socio-economic status, household composition, social exclusion, etc). It combines items from the proposed new module (in black) with core elements of the ESS questionnaire (in green), allowing us to cover all components with a reduced 30-item module.

The dataset will be complemented with a set of contextual variables that allow us to develop a better understanding of how national-level socio-political factors shape public attitudes to energy and climate change across Europe. Below we describe and justify the elements of the proposed new module. The discussion is structured according to the different categories of model variables.

Climate Change

Since the emergence of climate change as a major global environmental challenge, public awareness and knowledge of the issue has been rising steadily (Upham et al., 2009). However, despite strengthening scientific evidence and scientific consensus about the reality of anthropogenic climate change (IPCC, 2007, 2013), scientist and lay understandings of climate change have failed to converge (Weber & Stern, 2011). It has been suggested that the attributes of climate change make it inherently difficult to understand and psychologically distant (Spence et al., 2012). Others have argued that the general public can only experience current local seasonal events and weather but not climate as a long-term average (Weber, 2010). Indeed, research has shown that belief in climate change is influenced by local weather conditions and temperatures (e.g. Joireman et al., 2010; Howe et al., 2013; Reser et al., 2014). An alternative explanation is the 'finite pool of worry' hypothesis, which suggests that concerns about the economy may have replaced those about environmental issues (Weber, 2010). The public's primary source of information on climate change is however still the media (Boykoff, 2011). Given the widely communicated challenges to mainstream scientific views on climate change, many science and policy voices have raised concerns about the impact these contrarian messages may have on public beliefs in climate change and support for action to tackle it (Whitmarsh 2011). It is therefore essential that an accurate assessment is made of public beliefs about climate change in conjunction with socio-political factors that may shape such beliefs, including media coverage and elite cues.

While it has been argued that climate scepticism has risen sharply in the latter half of the past decade, the findings may have been biased by the use of generic and imprecise indicators. Poortinga et al. (2011) have shown that when people can express views on the reality, cause and seriousness of climate change at the same time (cf., Rahmstorf, 2004), a more nuanced picture emerges, with very few people expressing doubts about the reality of climate change. In this study we will build upon this research to construct – for the first time – a detailed picture of public beliefs and concerns about climate change across Europe.

The literature further shows that climate change has become increasingly politicised and polarised over the past decade, in particular in the US (Krosnick et al., 2000; McCright & Dunlap, 2011 Weber & Stern, 2011). Although – as mentioned before – such strong polarisation has not been observed in Europe, it is clear that those with right-of-centre political views and traditional values are more likely to be sceptical about the reality and severity of climate change (Whitmarsh, 2011; Poortinga et al., 2011), and younger individuals from higher socio-economic backgrounds with self-transcendent and environmental values are less likely to be sceptical (also see Inglehart 1977, 1995; Inglehart & Baker, 2000). The findings that climate change beliefs are driven fundamentally by values and ideology is consistent with the VBN model (Stern, 2000) and has been confirmed in a series of studies by Steg and colleagues (e.g. De Groot & Steg, 2009; Steg & De Groot, 2010; Jackovcevic & Steg, 2012). However, political disengagement appears to be the most important factor underlying climate scepticism (cf., Poortinga et al., 2011). The inclusion of the module in Round 8 of the ESS allows an in-depth investigation of how socio-political values and engagement – as covered by the ESS core survey – shape different climate change beliefs and concerns.

The ESS core also covers socio-demographic variables not yet mentioned that have been identified as relevant factors for climate change attitudes in the US and could well be so for Europe too. These include education (Hamilton 2011), gender (Bord et al., 1998; O'Connor et al., 1999; McCright 2010), and religion (Eckberg & Blocker 1996; Kanagy & Willits 1993). Also *parental status* might change the extent to which people are concerned about the effects of climate change on future generations and so total current concern.

Energy Security

The issue of energy security has become a major theme in current energy debates and policy for a number of reasons; yet whereas public perceptions of climate change have become increasingly documented, surprisingly little is known about what the public thinks about energy security and how it may affect support for environmental policies and behaviour (Corner et al., 2011; Reiner 2006).

Energy security is a highly complex and multi-faceted construct with different overlapping meanings, including unimpeded access or no planned interruptions to sources of energy, not relying on a limited number of energy sources, not being tied to a particular geographic region for energy sources, abundant energy resources, an energy supply which can withstand external shocks, and/or some form of energy self-sufficiency (Chester, 2010). Yet typically, definitions of energy security encapsulate the idea of avoiding sudden changes in the availability of energy relative to demand and refer to a resilient system with low risks of interruptions to the supply of energy (Winzer, 2011). The complex polysemic nature of energy security makes it difficult to operationalise in quantitative social surveys in order to capture public views on it. Demski and colleagues (2014) developed an energy security scale based on the different explicit and inferred definition from Chester (2010), covering the *reliability* of the energy system to have sufficient reserves to meet demand, the *affordability* of energy (i.e. preventing price increases and fluctuations), *dependency on energy imports*, the *vulnerability to interruptions* of the energy supply system (e.g. through natural hazards, terrorist attacks etc.), and a *dependency on fossil fuels*.

The main question here is how emerging concerns about different aspects of energy security compete with other concerns relevant to environmental and energy policy, and how they shape public views on energy-supply technologies and demand reduction. Although most of the general public may not have developed firm opinions on energy security issues yet (Demski et al., 2014), the finding that the British public is more concerned about energy security (and in particular affordability) than about climate change (ibid; Spence et al., 2010) suggests that energy security may become a more important driver of public attitudes towards different forms of energy production and use. The specific impacts are however not yet known, and are likely to depend on the specific notions around which energy security is framed. Public views on energy security are – just as views on climate change – embedded in socio-political values and identification: whereas concerns about climate change emerge from altruistic, self-transcending values, concerns about energy security appear to stem from a more traditional worldview (Poortinga et al., 2012).

This section of the module allows us to make a first ever cross-European comparison of energy security concerns, systematically examine their origins in socio-political values and engagement, explore to what extent they are shaped by the state of existing energy infrastructures, and determine how they influence preferences for energy production and demand reduction.

Personal Norms, Efficacy, and Trust

When studying the relationships of climate change and energy security concerns on the one hand and energy preferences on the other, it is important to understand the pathways through which they are linked. The conceptual model has identified a number of factors that will be further explored. According to the VBN model (Stern, 2000) pro-environmental personal (moral) norms take centre stage in linking climate change concerns to energy preferences. There is widespread evidence that personal norms (i.e. a sense of personal obligation) are essential for turning concerns into action (e.g. Steg & De Groot 2010), are major correlates of support for energy policies and energy-related actions (e.g. Steg et al., 2005; Steg & De Groot, 2010), and may explain the association between the willingness to accept demand-side and supply-side measures to reduce carbon emissions (Poortinga et al., 2012).

Given that climate change is a collective problem that can only be solved through collective action, beliefs about the effectiveness of actions and trust are critically important for the willingness to engage in pro-environmental behaviour. According to the collective action model (Lubell, 2002), engagement in environmental activism is determined by personal, collective, and institutional efficacy beliefs, that is, beliefs that individual actions make a difference (*personal efficacy*), other people will cooperate in the collective endeavour (*collective efficacy*), and the government is capable and responsive (*institutional efficacy*). The importance of personal efficacy beliefs for pro-environmental behaviour has been well established (Meinhold & Malkus, 2005; Hanss & Böhm, 2010; Steg & De Groot, 2010). Collective and institutional efficacy have however received less empirical attention, although there are suggestions that they are even more important than personal efficacy (Hanss & Böhm, 2010; Homburg & Stolberg, 2006).

Social and institutional trust can be taken to form the basis of collective and institutional efficacy, respectively. People are unlikely to act if they don't trust others to cooperate or the government to design effective policies (Lorenzoni & Pidgeon, 2006). Various studies have confirmed the role of social and institutional trust in environmental policy (Poortinga & Pidgeon, 2003; Barr et al., 2005; Lubell, 2002; Tjernström & Tietenberg, 2008). In addition, O'Connor and colleagues (1999) found that support for governmental policies on climate change was higher in Bulgaria than in the US due to Bulgarians having more trust in government institutions, whilst voluntary actions were more accepted in the US (also see Konisky et al.,

2008). This then suggests that environmental behaviour and policy preferences are not only a matter of personal values but also of social and institutional context. This warrants the rationale of the proposed module to examine how individual-motivational factors drive personal preferences for energy-supply technologies and demand reduction, and how these relationships may vary according to different (national) socio-political contexts.

Energy Preferences

For the survey to be relevant to policy-makers of energy and climate change across Europe, it is necessary to get a clear understanding of how the public thinks about different strategies to reduce energy-use and carbon emissions. A substantial body of research has shown that the general public has widely varying preferences for different types of energy-supply technologies and energy-demand reduction (see e.g. Whitmarsh et al., 2011 for a review). Given the limited size of the module, it is well beyond the scope of the survey to cover all possible policy and behavioural responses. We will therefore attempt to identify a selective number of items that are reliable indicators of public preferences for different low-carbon supply-side and demand-side measures.

In terms of *supply-side measures*, different technologies can be used to decarbonise energy generation, including unconventional fossil fuel alternatives (with or without carbon sequestration), nuclear power, and various renewable energy sources – although the effectiveness and costs of the different technologies are highly contested (Sims et al., 2003). Previous quantitative and qualitative research has shown that the public have widely varying perceptions and preferences for energy generation technologies (Poortinga et al., 2006; Perlaviciute & Steg, 2014), with preferences for the different policy alternatives being rooted in different ways of causal thinking about climate change (Bostrom et al., 2012), values (Perlaviciute & Steg, 2014) and concerns about energy security potentially affecting support for renewables and energy demand reduction (Lockwood, 2011; Poortinga et al., 2012).

In terms of *demand-side measures*, Gardner and Stern (2002) distinguish *energy efficiency* on the one hand (i.e. investments that lower energy use without sacrificing normal and desired activities or energy services) and *energy curtailment* on the other (i.e. cutting down on normal and desired activities or energy services). There are strong theoretical and empirical bases for such a distinction. Energy efficiency and curtailment measures have different conservation potentials and psychological properties (Gardner & Stern 2002; Poortinga et al., 2003; Steg et al., 2006); and are influenced by different psychological and contextual factors (Poortinga et al., 2003; 2004; Barr et al., 2005; Whitmarsh & O'Neill, 2010). Whereas many energy-efficiency measures require an upfront financial investment (e.g. home insulation), curtailment measures often involve changes in people's day-to-day behaviour that need to be maintained in order to continue saving energy (e.g. turning off a light when leaving a room). Whitmarsh and O'Neill (2010) found that energy-efficiency and energy conservation are seen as separate categories of behaviour, and tend to be understood from different theoretical perspectives. Even if the public consider energy curtailment as virtuous, they tend to have more positive attitudes towards energy-efficiency (Poortinga et al., 2003; Whitmarsh & O'Neill, 2010).

As argued in this proposal, public preferences for energy-supply technologies and demand reduction are shaped by a wide range of individual-motivational and socio-political factors (also see Whitmarsh et al., 2011 for a review). The proposed new module together with core elements of the ESS questionnaire allow us to explore how energy preferences are formed by socio-political values and engagement, beliefs and concerns about climate change and energy security, and personal norms, efficacy beliefs and trust (see Figure 1). This is the first time that all elements are brought together in a coherent theory-driven model to study preferences for demand-side and supply side measures across Europe, allowing a systematic comparison between European countries with different socio-political contexts. The resulting dataset can

be combined with different contextual variables to develop a better understanding of the situated nature of environmental attitudes, by testing specific hypotheses as discussed below.

National Socio-Political Context: Further Theory and Analyses

Since the general theories behind many of the ideas above involve national-level explanatory factors for attitudes to energy and climate change, it is necessary to develop a set of national indicators to test the relationships – some of which are already collected as part of the ESS macro data. For instance, economic indicators (including GDP, economic growth, and unemployment) are needed to test the notion that during economic hard times concerns about the environment are crowded out and preferences for cheap and secure energy become more pressing. People may be more likely to express climate sceptical beliefs in recessions for fear of the costs of mitigation (Saad, 2009; Kahn & Kotchen, 2010; Weber 2010). Higher levels of adult literacy and academic tertiary education in a country might generate a culture of belief in and concern about climate change that explains cross-national differences beyond individual-level associations between education and attitudes. The ESS media claims data will be useful for assessing the effects of media content on attitudes in this area. While the ESS codebook already covers claims made by environmental groups, we anticipate it will be possible to add codes for environmental content of the claims.

There are also contextual data from other sources that may be linked to the ESS data, especially those regarding energy consumption. National levels of carbon emissions per capita linked to our proposed ESS data would enable researchers to test claims that high carbon emitting countries report lower climate change concern, downplaying the problem to avoid acknowledging responsibility for the costs of climate-change mitigation (Dunlap & Mertig, 1995, Sandvik, 2008). Current carbon emissions per capita might also affect energy preferences, with preferences for greater use of low-carbon energy sources more muted where emissions are (already) relatively low. The profile of national energy usage should be associated with energy preferences: preferences may tend towards the status quo unless current usage is particularly controversial. The percentage of energy usage that is derived from foreign sources is most relevant to energy security. Those heavily dependent on energy imports, such as many Eastern and some Western European countries, may have publics more concerned about energy security, which may affect the link between climate change attitudes and energy preferences. There might be other such cross-level interaction effects as contextual factors may change the strength of the relationship between different types of attitudes. Levels of environmental concern expressed in election manifestos for political parties (Spoon et al., 2013) will be useful for testing the extent to which citizens' attitudes in this area respond to those of the parties they identify with. More generally, such Comparative Manifesto Project data (see https://manifesto-project.wzb.eu) can be used to create national averages as a measure of elite political opinion. The presence of such political representations may help explain national differences in public opinion, even including those who do not identify with any party. No such analyses have ever been done before.

Team behind the Module

The team brings together a group of scholars from three ESS countries who have extensive experience of studying attitudes to energy and climate change in the European context, managing national and international projects on the topic, survey design, quantitative methods (including structural equation modelling and multilevel modelling), and cross-cultural comparative research.

Four of the investigators share an academic background in environmental psychology and are specialists on different aspects of the module content, specifically: climate change perception (Whitmarsh, Böhm), social and institutional trust (Poortinga, Böhm), personal norms (Steg, Böhm), efficacy beliefs (Böhm, Steg), perceptions of energy-supply technologies (Böhm, Poortinga, Steg), and energy demand behaviours (Steg, Whitmarsh, Poortinga). Fisher is specialised in political sociology and brings expertise in the design and comparative analysis of international social attitudes surveys to the team. His interest and experience in political attitudes and behaviour will prove valuable for examining the politicised nature of public attitudes to energy and climate change. While each member can claim significant expertise individually, greatly enhanced value is provided by the international and cross-disciplinary collaboration. The team is confident that they will work effectively together to design the module as suggested, and to use the ESS data productively to write a range of high quality publications. In addition, all team members have a large international network and will make relevant colleagues aware of the module so that the data will be used optimally.

Each member of the team will lead a publication on a different aspect of the proposed module. Poortinga will make a cross-European comparison of climate sceptical beliefs and concerns about energy security; Whitmarsh will examine how socio-political values and engagement shape different climate change beliefs and concerns; Steg will make a cross-national comparison of the predictive power of the proposed conceptual model; Böhm will examine how climate change beliefs and concerns differentially motivate support for individual (demand-side) and political (supply-side) measures; and Fisher will analyse how socio-demographic factors at the individual level and economic circumstances at the national level influence attitudes to both climate change and energy. While the research team will initially focus on these publications, the dataset will be amenable to a wide variety of analyses of interest to academics and policy-makers of energy and climate change across Europe, in particular regarding the cross-national variation in environmental attitudes.

Although not as co-applicants, we will involve two prominent US academics to advise on the design of the module. *Robert O'Connor* is Programme Director at the National Science Foundation (NSF) with responsibilities in decision, risk and management sciences as well as interdisciplinary research in hazards and disasters, and has published extensively on climate change perceptions and environmental attitudes in general (e.g. Bord et al., 1998, 1999; O'Connor et al., 1999). *Ann Bostrom* is Professor of public affairs at Evans School of Public Affairs at the University of Washington. She is a leading scholar in environmental decision making and risk perception, and developed the influential mental models approach to environmental risk communication (Bostrom et al., 1994). She recently led one of the few comparative international studies on climate change perceptions and policy support (Bostrom et al., 2012). This will ensure that the North-American literature on energy and climate change will be considered in the design of the proposed ESS module

The team can further rely on members of the *Understanding Risk Group* at Cardiff University (http://www.understanding-risk.org), a leading interdisciplinary research group specialised in the psychology of climate change, public attitudes towards and acceptability of energy supply systems, and risk perceptions, communication and public engagement; as well as of the *Environmental Psychology Research Group* at Groningen University, the Groningen Energy and Sustainability Network (http://www.rug.nl/research/energy) and Energy Academy Europe (http://www.energyacademy.org) in which Steg participates. In addition, the team can benefit from three interdisciplinary research groups at the University of Bergen that focus on psychological, social science, and linguistic perspectives on climate change perception, communication, media and governance (http://www.uib.no/en/project/lingclim).

We will further exploit international links with academics in the US (Bostrom & O'Connor; see e.g. Bostrom et al., 2012), Japan (Midori Aoyagi; see e.g. Poortinga et al., 2013), and Argentina (Adriana Jakovcevic; see e.g. Jakovcevic & Steg, 2013) for advise and possible replications in their countries of residence, enabling further cross-cultural comparisons. Böhm is part of an interdisciplinary initiative that runs a national survey panel on climate change perceptions in Norway, opening up opportunities for further repeats at the national level.

Word count: 5,793

PART 2: Reasons for covering an existing ESS topic but not repeating the earlier module (max 1000 words)

> **PART 2** should only be completed if the application for a new module is on the same topic as an earlier ESS module but offers a different approach or intends to repeat fewer than 66% of the items in an identical format. (If 66% or more of the items will be identical then the repeat module application form should be used.) The reasons for adopting the new approach OR for not using existing items should be outlined. Applicants are ideally expected to refer to analyses of data from the previous module on this topic to support their arguments.

N/A

PART 3: Proposed module design for 30 items (max 3000 words)

Proposed measures for the new module

The aim of the proposed module is to develop a detailed understanding of *public perceptions of climate change, energy security, and energy preferences in Europe*. The design of the module is based on the conceptual model presented in Figure 1, and will cover the areas of (1) *beliefs about climate change*, (2) *concerns about climate change and energy security*, (3) *personal norms, efficacy, and trust,* and (4) *energy preferences*. The conceptual model is designed to fit easily within ESS, integrating the new module with core elements of the survey to create a unique and comprehensive dataset that directly contributes to a better understanding of the situated nature of environmental attitudes in this area. Currently, the proposed module has 31 items. This will be reduced to a maximum of 30 items in collaboration with the ESS Core Scientific Team (CST). Given their considerable expertise, we look forward to the advice of the CST and National Coordinators (NCs) on all aspects of the module. Below we have indicated where we think CST and NCs input is particularly valuable. The elements in the proposed new module are:

1. Beliefs about Climate Change

Trend scepticism

Attribution scepticism

Impact scepticism

2. Concerns

Concern about climate change

Concern about energy security

Concern about energy affordability

3. Personal Norms, Efficacy, and Trust

Pro-environmental personal norms

Pro-environmental personal efficacy

Social and institutional trust

4. Energy Preferences

Preferences for low-carbon energy technologies:

Fossil fuels with carbon capture and storage (CCS)

Shale gas

Nuclear power

Renewables

Preferences for energy-demand measures:

Energy-efficiency measures

Curtailment measures

The design of the module is based on the assumption that a minimum of two indicators are needed to measure an underlying construct. Although we would like to use multiple items for each construct, the rotating modules are now restricted to a maximum of 30 items. The integration of the new module with core parts of the ESS allows us to cover all aspects of the conceptual model in the available space (see Figure 1).

Part of the module has already been developed and tested for reliability and validity in previous research. Some of the questions are therefore not expected to change substantially, while other parts still need further development. Below we describe in detail how we intend to measure the different constructs of the conceptual model. We indicate how many items are allocated to each section; although this allocation may change throughout the design process of the module. Where questions have been fielded before, we describe them in detail and their origin.

We will review all questions for their applicability across the ESS countries. We will also consider what linkage (through question repetition) is possible with other major national and cross-national social surveys, including the British Social Attitudes, (BSA), German ALLBUS, the International Social Survey Programme (ISSP), the US General Social Survey (GSS), and the Norwegian Citizen Panel (Ivarsflaten et al., 2014). This is an area where advice from the CST and NCs would be particularly valuable

Note that the constructs of *human and socio-political values* (section H; B12; B20-B23; B30-B33), *media use* (B1-A7), *political engagement* (B1; B13-B19), *social exclusion* (C2-C4; C16; C25), *social trust* (A8-A10), and *institutional trust*, (B4-B10), which are also part of the conceptual model, are covered by the ESS core survey and are therefore not described in detail here (codes are derived from the Round 5 Questionnaire).

1. Beliefs about Climate Change (6 items)
This section will use the *trend*, *attribution*, and *impact scepticism* framework of Rahmstorf (2004) to make a detailed assessment of public beliefs about climate change in Europe (see Table 1). Poortinga and colleagues (2011) have shown that this framework is useful to describe public beliefs about climate change in detail. While the items formed a coherent climate scepticism scale (Cronbach's α=0.72), there was a clear gradation in the prevalence of the different types of climate scepticism. That is, impact scepticism was far more common than trend or attribution scepticism. The same study showed that '*uncertainty about the effects of climate change*' was only weakly correlated with the other indicators of climate scepticism. We therefore propose to review the final item in Table 1 to better reflect public scepticism about the impacts of climate change. Whitmarsh (2011) developed a comprehensive climate scepticism scale that included scepticism about media representations of climate change and scepticism about scientific consensus; the 2011 British Social Attitudes survey included a question that covered both trend and attribution scepticism; and several items are included in the Norwegian Citizen Panel (Ivarsflaten et al., 2014). These resources will be used to complete this section of the module.

2. Concerns about Climate Change and Energy Security

Climate Change (3 items)

The applicants have developed a number of questions and scales measuring concern about and the perceived risks of climate change (e.g. Böhm & Pfister, 2001; Böhm, 2003; Poortinga et al., 2006; Whitmarsh, 2009a; Spence et al., 2010; Abrahamse & Steg, 2011; Bostrom et al.,

2012; Langley et al., 2012; Rosentrater et al., 2013). These questions reflect different aspects of concern about climate change, including cognitive and affective components (Spence et al., 2010; Sundblad et al., 2007), different aspects of perceived psychological distance of climate change (Spence et al., 2012), personal and social/societal risk perceptions (Bord et al., 1999), consequentialist and ethical evaluations (Böhm, 2003), and the domains of impact (Roser-Renoef & Nesbit, 2008; Bostrom et al., 2012). As Roser-Renouf and Nisbet (2008) have shown, there is a myriad of constructs and research instruments that are important for understanding climate-relevant attitudes and behaviours. It would be impractical to cover all these different aspects in the module. We will take this opportunity to develop a short three-item climate risk perception/concern scale that can easily be included in future research.

Two options for this section that are currently being considered are to: (1) include a concern question (e.g. "*How concerned, if at all, are you about climate change…*"; Spence et al., 2010) alongside two items reflecting personal and social risk perceptions (ibid); or (2) use three items to reflect concerns about the impacts of climate change to themselves, humankind and the environment (e.g. "*How serious a threat is climate change to [you personally/ human kind/ plants and animals]*"; Bostrom et al., 2012). This will be decided in collaboration with the CST.

Table 1. Beliefs about climate change

Construct	Item	Scale
Trend Scepticism	As far as you know, do you personally think the world's climate is changing, or not?	Yes; No; Don't know.
	I am uncertain that climate change is really happening	Strongly agree; Tend to agree; Neither agree nor disagree; Tend to disagree; Strongly disagree; Don't know.
Attribution Scepticism	Thinking about the causes of climate change, which, if any, of the following best describes your opinion?	Climate change is entirely caused by natural processes; Climate change is mainly caused by natural processes; Climate change is partly caused by natural processes and partly caused by human activity; Climate change is mainly caused by human activity; Climate change is entirely caused by human activity; I think there is no such thing as climate change; Don't know/No opinion.
	Most scientists agree that humans are causing climate change	Strongly agree; Tend to agree; Neither agree nor disagree; Tend to disagree; Strongly disagree; Don't know.
Impact Scepticism	The seriousness of the impacts of climate change is exaggerated	Strongly agree; Tend to agree; Neither agree nor disagree; Tend to disagree; Strongly disagree; Don't know.
	It is uncertain what the effects of climate change will be	Strongly agree; Tend to agree; Neither agree nor disagree; Tend to disagree; Strongly disagree; Don't know.

Energy Security (6 items)

We aim to include items reflecting different aspects of public concerns about energy security (see Table 2). Demski et al (2014) developed ten items following a literature review and a pilot study to capture the broad range of meanings associated with 'energy security' (see Chester,

2010). That is, items were developed to capture public views on the *reliability* of the energy system to have sufficient reserves to meet demand, the *affordability* of energy (i.e. preventing price increases and fluctuations), *dependency on energy imports*, the *vulnerability to interruptions* of the energy supply system (e.g. through natural hazards, terrorist attacks etc.), and an (over) *dependence on fossil fuels*. Demski et al. (2014) found that ten items formed a highly reliable scale (Cronbach's α=0.87). Six of the original ten items were subsequently tested in a nationally representative British sample (Spence et al., 2010). This reduced scale remained internally consistent, if slightly less so than the original scale (Cronbach's α=0.79).

Public perceptions of energy security have not been studied extensively before. It is possible that the energy security items cannot be readily translated into different languages. This section of the module therefore may need further development and cognitive testing. We will work closely with the CST and NCs to develop energy security items that can be applied cross-culturally.

Table 2. Concern about energy security

Construct	Item	Scale
Concern about Energy Security	How concerned, if at all, are you that in the future… (1) electricity will become unaffordable (2) electricity will be rationed (3) [your nation/country] will become too dependent on energy from other countries (4) terrorist attacks will cause interruptions to electricity supplies; (5) supplies of fossil fuels (e.g. coal and gas) will run out; (6) there will be power cuts.	Very concerned; Fairly concerned; Not very concerned; Not at all concerned; Don't know

3. Personal Norms, Efficacy, and Trust (4 items)

The design of this section is based on elements of the *VBN model* (Stern, 2000) and the *collective action model* (Lubell, 2002). This section of the proposed new module will include measures of *personal norms* and *personal efficacy* (the trust questions are covered in the core ESS survey). Pro-environmental personal norms are part of the VBN model and the applicants have designed various indicators of this construct (Steg et al., 2005; 2011; De Groot & Steg, 2010; Steg & De Groot, 2010; Poortinga et al., 2012). Here we will design indicators of personal (moral) norms in relation to the two issues of climate change and energy security (e.g. ''*I feel personally obliged to save as much energy as possible*'' or "*I feel morally obliged to save energy, regardless of what others do*").

Lubell (2002) argues that in the context of collective action the willingness to act is determined by *personal, collective, and institutional efficacy*. We will include two indicators of pro-environmental personal efficacy. To successfully achieve the desired outcome, individuals must possess the necessary skills as well as a belief that they are capable of controlling the specific situational factors (Bandura, 1989). Usually a distinction is made between a person's belief in their own ability to perform a task (belief-efficacy) and their expectation that a specific behaviour will result in desirable outcome (outcome efficacy or outcome expectancy). In this module personal efficacy specifically refers to a person's expectation that individual actions can make a difference. We will use items from the sustainable development self-efficacy scale developed by Hanss and Böhm (2010) and the ISSP environment module to assess pro-environmental personal efficacy (e.g. "*I can personally help to reduce climate change by changing my behaviour*" or "*It is just too difficult for someone like me to do much about the environment*").

Although it would be preferable to include domain-specific trust (e.g. Krosnick & MacInnis, 2012), that is not possible in a 30-item module. We will therefore use the existing ESS items on social and institutional trust as indicators of collective and institutional efficacy, respectively.

4. Energy Preferences

In the final section of the proposed module we will develop a limited number of items to reliably capture public preferences for supply-side and demand-side measures to reduce carbon emissions. The applicants have already developed and used a large number of items in previous research. We propose to select items from the available pool of questions, and to adapt them specifically for the proposed module. The sources from which we will draw these questions are provided below. As for the other sections of the module, we envisage using two items for each construct.

Energy Supply Technologies (8 items)

Several of the applicants have developed a multitude of indicators of public preferences for different energy generation technologies (e.g. Steg et al., 2005; Poortinga et al., 2006; De Groot & Steg, 2010; Spence et al., 2010; Bostrom et al., 2012; Rosentrater et al., 2013; Poortinga et al., 2012). In this module we will try to capture public preferences for different low-carbon energy generation technologies. Different energy generation technologies can be used to 'decarbonise' electricity supply, including fossil fuel alternatives (with or without carbon sequestration), nuclear power, and various renewable energy sources (Sims et al., 2003). Shale gas will be included as an example of a particularly controversial, but potentially lower-carbon, fossil fuel alternative that is being exploited or considered in many European countries (O'Hara et al., 2013). Preferences will be measured using the questions "*To what extent do you agree or disagree that the following energy sources will make a substantial contribution to reliable and secure supplies of electricity in [INSERT COUNTRY] in the future?*" and "*How favourable or unfavourable are your overall opinions or impressions of the following energy sources for producing electricity currently*" (see Poortinga et al., 2006).

Energy Demand Reduction (4 items)

The applicants have conducted a large number of studies examining the factors predicting the willingness to engage in climate change and energy-relevant environmental behaviours (e.g. Poortinga et al., 2004; De Groot & Steg, 2008; Whitmarsh, 2009a; Hans & Böhm, 2010; Spence et al., 2010; Whitmarsh & O'Neill, 2010; Abrahamse & Steg, 2011; Langley et al., 2012). Individual energy use is made up of an almost infinite number of behaviours and practices, making it virtually impossible to capture all aspects of individuals' demand for energy. In part, because the ESS is a survey of individuals and not households, and individual energy consumption is so tightly bound to household consumption, the module does not aim to measure all possible energy-demand (reduction) behaviours, but to capture preferences for energy-efficiency and curtailment behaviours in general. As argued in this proposal, there are strong theoretical and empirical grounds to distinguish between *energy efficiency* and *curtailment behaviours* (Gardner & Stern, 2002; Barr et al., 2005; Whitmarsh & O'Neill, 2010). The applicants have developed a number of items to measure public willingness to engage in these two approaches to demand reduction (e.g. "*I am prepared to greatly reduce my energy use by changing my behaviour*", "*I am prepared to buy energy-efficient appliances*"). In this module we will distil two items to reliably measure the two constructs.

Word count: 2,431

PART 4: Methodological or Practical difficulties (max 2000 words)

PART 4 should be completed by **all applicants for new modules.** In this section applicants should reflect on any methodological or practical difficulties they envisage in developing their ideas into a robust instrument to be fielded in many disparate countries across Europe, and how they propose to tackle those difficulties and achieve equivalence. If few or no difficulties are envisaged, there may be little to say but this should still be noted and justified. Teams should comment on how methodological issues would be handled, reflect on whether they would be addressed during the developmental and / or main stages and discuss how they might contribute to the substantive field and / or survey research in general.

Researchers involved in in cross-national comparative research have always been aware of issues regarding the measurement, comparability and validity of their data. In particular the equivalence of survey items needs to be considered when conducting cross-national research, as items and/or the social constructs that are being measured may mean different things in different languages or contexts (e.g. Johnson, 1998).

We do not expect difficulties translating the majority of the items into different languages. Most energy technologies are generally well known across Europe; and previous cross-cultural studies have successfully fielded similar items across a large number of countries (e.g. Bostrom et al., 2012; Keizer, 2014; Van der Werff et al., 2011). However, special attention should be given to the energy security section. Very little research has been conducted on the topic. The suggested items have been developed in the UK, and there may be difficulties translating them into different languages. The energy security items may therefore need cognitive testing before including them in the survey. Was mentioned above, the advice of the CST and NCs will be especially useful in the development of an energy security section that can be applied cross-culturally.

Care should also be given to the use of 'climate change' or 'global warming'. Although the terms are often used interchangeably, they technically refer to different things and may evoke different mental images (Lorenzoni et al., 2006; Whitmarsh, 2009b). A complicating fact here is that countries use the terms in different ways. For example, while the term 'global warming' is more common in the US, 'climate change' is more frequently used in the UK (ibid). Such differences should be accounted for. The applicants have previously fielded questions that included both terms in their questions (e.g. "How concerned, if at all, are you about climate change, sometimes referred to as 'global warming'?"). It will be considered to adopt a similar approach in the design of the proposed module. The experience of the ISSP module on the environment will be useful here and also on more basic issues such as the comparability of notions of 'concern' after translation into different languages.

The answering of the questions of this proposed module is likely to be subject to subtle framing effects as a result of question ordering. Demski and colleagues (2014) found that participants expressed higher levels of concern about energy security if questions were answered before those about climate change; and lower levels of concern if the energy security questions were positioned after those about climate change. In contrast, no order effects were found for concerns about climate change. This may represent a framing effect whereby people have already formed stable views on climate change but not yet on energy security.

Corner et al. (2011) have shown that public attitudes to nuclear power are sensitive to framings as a solution of climate change. It is therefore likely that preferences for the different energy supply technologies (nuclear power in particular) are affected by a framing effect if they are positioned after the questions about climate change. Similarly, the willingness to adopt energy-efficiency and curtailment measures may be increased if they follow the climate change and/or

energy security questions. It is therefore proposed to either rotate the four sections of the proposed module (if possible) or to position the items on energy preferences prior to those on climate change and energy security, and to ask the questions about energy security before those about climate change.

Finally, as noted, the module is designed based on the assumption that a minimum of two indicators are needed to measure an underlying construct. While it is preferable that multiple items are used, that would substantially lengthen the module. Special care should be taken with the design and selection of items. We will work closely with the CST and NCs to overcome these challenges.

Word count: 635

References

Abrahamse, W., & Steg, L. (2011). Factors related to household energy use and intention to reduce it: The role of psychological and socio-demographic variables. Human Ecology Review, 18, 30-40.

Ajzen, I. (1991). The theory of planned behavior. Organizational Behavior and Human Decision Processes, 50, 179-211.

Barr, S., Gilg, A. W., Ford, N. (2005). The household energy gap: examining the divide between habitual- and purchase-related conservation behaviours. Energy Policy, 33, 1425-1444.

Boardman, B. (2010). Fixing fuel poverty: challenges and solutions. London: Earthscan.

Böhm, G. (2003). Emotional reactions to environmental risks: Consequentialist versus ethical evaluation. Journal of Environmental Psychology, 23, 199-212.

Böhm, G., & Pfister, H.-R. (2001). Mental representation of global environmental risks. Research in Social Problems and Public Policy, 9, 1-30.

Bord, R. J., & O'Connor, R.E. (1997). The gender gap in environmental attitudes: the case of perceived vulnerability to risk: research on the environment. Social Science Quarterly, 78, 830-840.

Bord, R.J., Fisher, A., & O'Connor, R.E. (1998). Public perceptions of global warming: United States and international perspectives. Climate Research, 11, 75-84.

Bord, R.J., O'Connor, R.E., & Fisher, A. (1999). In what sense does the public need to understand global climate change? Public Understanding of Science 19, 461-471.

Bostrom, A., Morgan, M. G., Fischhoff, B., & Read, D. (1994). What do people know about global climate change? 1. Mental models. Risk Analysis, 14, 959-970.

Bostrom, A., O'Connor, R. E., Böhm, B., Hanss, D., Bodi, O., Ekström, F., Halder, P., Jeschke, S., Mack, B., Qu, M., Rosentrater, L., Sandve, A., & Sælensminde, I. (2012). Causal thinking and support for climate change policies: International survey findings. Global and Environmental Change, 22, 210-222.

Boykoff, M. T. (2011). Who speaks for the climate? Making sense of media reporting on climate change. Cambridge University Press.Cambridge: CUP.

Chester, L. (2010). Conceptualising energy security and making explicit its polysemic nature. Energy Policy, 38, 887-895.

Corner, A., Markowitz, E., & Pidgeon, N. (2014). Public engagement with climate change: the role of human values. Wiley Interdisciplinary Reviews: Climate Change.

Corner, A., Spence, A., Venables, D., Poortinga, W., & Pidgeon, N. (2011). Nuclear power, climate change and energy security: exploring British public attitudes. Energy Policy, 39, 4823-4833.

Davidov, E., Schmidt, P., & Schwartz, S. H. (2008). Bringing values back in the adequacy of the European Social Survey to measure values in 20 countries. Public opinion quarterly, 72, 420-445.

De Groot, J.I, & Steg, L. (2008). Value orientations to explain beliefs related to environmental significant behavior: How to measure egoistic, altruistic, and biospheric value orientations. Environment and Behavior, 40, 330-354.

De Groot, J.I., & Steg, L. (2009). Mean or green? Values, morality and environmental significant behavior. Conservation Letters, 2, 61-66.

Demski, C.C., Poortinga, W., & Pidgeon, N.F. (2014). Exploring public perceptions of energy security risks in the UK. Energy Policy, 66, 369-378.

Douglas, M., & Wildavsky, A. (1982). Risk and culture: An essay on the selection of technological and environmental dangers. Berkeley: University of California Press.

Druckman, A., & Jackson, T. (2010). An Exploration into the Carbon Footprint of UK Households. University of Surrey, Guildford.

Dunlap, R.E., & Mertig, A.G. (1995). Global Concern for the Environment: Is Affluence a Prerequisite? Journal of Social Issues, 51, 121-137.

Eckberg, D.L., & Blocker, T.J. (1996). Christianity, Environmentalism, and the Theoretical Problem of Fundamentalism. Journal for the Scientific Study of Religion, 35, 343-355.

Engels, A., Hüther, O., Schäfer, M.S., & Held, H. (2013). Public climate-change skepticism, energy preferences and political participation. Global Environmental Change, 23, 1018-1027.

Eurobarometer (2014). Climate Change (Special Eurobarometer 409) Brussels: Directorate-General Communication, European Commission

European Commission (2014). 2030 framework for climate and energy policies. Brussels: European Commission. Available at: http://ec.europa.eu/energy/2030_en.htm

Gardner, G., & Stern, P. (2002). Environmental problems and human behavior. Allyn & Bacon, Boston: MA.

Hamilton, L.C. (2011). Education, politics and opinions about climate change evidence for interaction effects. Climatic Change, 104, 231-242.

Hanss, D., & Böhm, G. (2010). Can I make a difference? The role of general and domain-specific self-efficacy in sustainable consumption decisions. Umweltpsychologie, 14, 46-74.

Homburg, A., & Stolberg, A. (2006). Explaining pro-environmental behavior with a cognitive theory of stress. Journal of Environmental Psychology, 26, 1-14.

Howe, P., Markowitz, E., Lee, T.M., Ko, C.Y., & Leiserowitz, A. (2013) Global perceptions of local temperature change. Nature Climate Change Nature Climate Change, 3, 352-356.

Inglehart, R. (1977). The Silent Revolution: Changing Values and Political Styles among Western Publics. Princeton, NJ: Princeton University Press.

Inglehart, R. (1995). Public support for environmental protection: Objective problems and subjective values in 43 societies. Political Science and Politics, 15, 57-71.

Inglehart, R., & Baker, W.E. (2000). Modernization, Cultural Change, and the Persistence of Traditional Values. American Sociological Review, 65, 19-51.

IPCC (2007) Climate Change 2007: Synthesis Report. Geneva: Intergovernmental Panel on Climate Change.

IPCC (2013). Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change

Ivarsflaten, E., Andersson, M., Arnesen, S., Böhm, G., Elgesem, D., Gåsdal, O., Strømsnes, K., Tvinnereim, E., & Aars, J. (2014) Norsk Medborgerpanel [Norwegian Citizen Panel] Round 1: Data file. Bergen: Ideas2Evidence.

Jakovcevic, A., & Steg, L. (2013). Sustainable transportation in Argentina: Values, beliefs, norms and car use reduction. Transportation Research-F, 20, 70-79.

Johnson, T. P. (1998). Approaches to equivalence in cross-cultural and cross-national survey research. In J.A. Harkness (Ed.), Cross-cultural survey equivalence (pp. 1–40). Mannheim, Germany: ZUMA.

Joireman, J., Truelove, H.B., & Duell, B. (2010). Effect of outdoor temperature, heat primes and anchoring on belief in global warming. Journal of Environmental Psychology, 30, 358-367.

Kahan, D. M., Braman, D., Cohen, G. L., Gastil, J., & Slovic, P. (2010). Who fears the HPV vaccine, who doesn't, and why? An experimental study of the mechanisms of cultural cognition. Law and Human Behavior, 34, 501.

Kahan, D. M., Jenkins-Smith, H., & Braman, D. (2011). Cultural cognition of scientific consensus. Journal of Risk Research, 14, 147-174.

Kahn, M.E., & Kotchen, M.J. (2010). Environmental concern and the business cycle: the chilling effect of recession. Cambridge, MA: NBER Working paper 16241.

Kaiser, F. G., Hübner, G., & Bogner, F. X. (2005). Contrasting the theory of planned behavior with the value-belief-norm model in explaining conservation behaviour. Journal of Applied Social Psychology, 35, 2150-2170

Kanagy, C.L., &. Willits, F.K. (1993). A 'greening' of religion? Some evidence from a Pennsylvania sample. Social Science Quarterly, 74, 674-683

Konisky, D.M., Milyo, J., Richardson, L.E. (2008). Environmental Policy Attitudes: Issues, Geographical Scale, and Political Trust. Social Science Quarterly, 89, 1066-1085.

Krosnick, J.A., Holbrook, A.L., Lowe, L., & Visser, P.S. (2006). The origins and consequences of democratic citizens' policy agendas: A study of popular concern about global warming. Climatic Change, 77, 7-43.

Krosnick, J., Holbrook, A., & Visser, P. (2000). The impact of the fall 1997 debate about global warming on American public opinion. Public Understanding of Science, 9, 239-260.

Krosnick, J.A., & MacInnis, B. (2012), Trends in American public opinion on global warming policies between 2010 and 2012. Working Paper. Stanford: Stanford University

Langley, E., Gardiner, C., Fiore, G., with Darnton, A., & Poortinga, W. (2012). Sustainability Segmentation Study. Report prepared for the Department of Environment, Sustainability and Housing of the Welsh Government. London: Ipsos-MORI.

Leviston, Z., Leitch, A., Greenhill, M., Leonard, R., & Walker, I. (2011). Australians' views of climate change. Canberra: CSIRO

Lockwood, M. (2011). Does the framing of climate policies make a difference to public support? Evidence from marginal constituencies in the UK. Climate Policy, 12, 197-1112.

Lorenzoni, I., & Pidgeon, N. (2006). Public views on climate change: European and USA perspectives. Climatic Change, 77, 73-95.

Lorenzoni, I., Doria, M., Leiserowitz, A., Poortinga, W., & Pidgeon, N.F. (2006). Cross-national comparisons of image associations with 'global warming' and 'climate change' among laypeople in the United States of America and Great Britain. Journal of Risk Research, 9, 265-281.

Lubell, M. (2002). Environmental activism as collective action. Environment and Behavior, 34, 431-454.

Malka, A., Krosnick, J.A., & Langer, G. (2009). The association of knowledge with concern about global warming: trusted information sources shape public thinking. Risk Analysis, 29, 633-647.

McCright, A. M., & Dunlap, R. E. (2011). The politicization of climate change: Political polarization in the American public's views of global warming. The Sociological Quarterly, 52, 155-194.

McCright, A.M. (2010). The effects of gender on climate change knowledge and concern in the American public. Population & Environment, 32, 66-87.

Meinhold J.L., & Malkus A.J. (2005). Adolescent environmental behaviors: Can knowledge, attitudes, and self-efficacy make a difference? Environment and Behavior, 37, 511-532.

O'Connor, R.E., Bord, R.J., Fisher, A. (1999). Risk Perceptions, General Environmental Beliefs, and Willingness to Address Climate Change. Risk Analysis, 19, 461-471.

O'Hara, S., Humphrey, M., Jaspal, R., Nerlich, B., & Poberezhskaya, M. (2013). Public perception of shale gas extraction in the UK: How people's views are changing. Nottingham: University of Nottingham.

Painter, J. (2011). Poles Apart. Oxford: Reuters Institute for the Study of Journalism.

Perlaviciute, G., & Steg, L. (2014). Contextual and psychological factors shaping evaluations and acceptability of energy alternatives: Integrated review and research agenda. Renewable & Sustainable Energy Reviews, 35, 361-381.

Pfister, H.-R., & Böhm, G. (2012). Emotion und Moral bei der Risikowahrnehmung. Spektrum der Wissenschaft Spezial "Wie entscheiden wir? Im Widerstreit von Vernunft und Bauchgefühl". Spektrum der Wissenschaft Spezial 1/2012, 66-73.

Pidgeon, N.F. (2012). Public understanding of, and attitudes to, climate change: UK and international perspectives and policy. Climate Policy, 12, S85-S106.

Pidgeon, N.F., Lorenzoni, I., & Poortinga, W. (2008). Climate change or nuclear power – no thanks! A quantitative study of public perceptions and risk framing in Britain. Global Environmental Change, 18, 69-85.

Poortinga W., Pidgeon, N.F., & Lorenzoni, I. (2006). Public Perceptions of Nuclear Power, Climate Change and Energy Options in Britain: Summary Findings of a Survey Conducted during October and November 2005. Technical Report (Understanding Risk Working Paper 06-02). Norwich: Centre for Environmental Risk.

Poortinga, W., & Pidgeon, N.F. (2003). Exploring the dimensionality of trust in risk regulation. Risk Analysis, 23, 961-972.

Poortinga, W., Aoyagi, M., & Pidgeon, N. F. (2013). Public perceptions of climate change and energy futures before and after the Fukushima accident: A comparison between Britain and Japan. Energy Policy, 62, 1204-1211.

Poortinga, W., Spence, A., Demski, C., & Pidgeon, N. F. (2012). Individual-motivational factors in the acceptability of demand-side and supply-side measures to reduce carbon emissions. Energy Policy, 48, 812-819.

Poortinga, W., Spence, A., Whitmarsh, L., Capstick, S., & Pidgeon, N.F. (2011). Uncertain climate: an investigation of public scepticism about anthropogenic climate change. Global Environmental Change, 21, 1015-1024.

Poortinga, W., Steg, L., & Vlek, C. (2004). Values, environmental concern and environmentally significant behaviour: a study into household energy use. Environment and Behavior, 36, 70-93.

Poortinga, W., Steg, L., Vlek, C., & Wiersma, G. (2003) Household preferences for energy-saving measures. A Conjoint Analysis. Journal of Economic Psychology, 24, 49-64.

Poumadère, M., Bertoldo, R., & Samadi, J. (2011). Public perceptions and governance of controversial technologies to tackle climate change: nuclear power, carbon capture and storage, wind, and geoengineering. Wiley Interdisciplinary Reviews: Climate Change, 2, 712-727.

Rahmstorf, S. (2004). The Climate Sceptics. Potsdam: Potsdam Institute for Climate Impact Research. Available at: http://www.pik-potsdam.de/~stefan/Publications/Other/rahmstorf_climate_sceptics_2004.pdf.

Reiner, D.M. (2006). EPRG public opinion survey on energy security: policy preferences and personal behaviour. Available at: http://www.eprg.group.cam.ac.uk/wp-content/uploads/2008/11/eprg0706.pdf.

Reser, J.P., Bradley, G.L., & Ellul , M.C. (2014). Encountering climate change: 'Seeing' is more than believing. WIREs Climate Change, in press.

Rosentrater, L. D., Sælensminde, I., Ekström, F., Böhm, G., Bostrom, A., Hanss, D., & O'Connor, R. E. (2013). Efficacy Trade-Offs in Individuals' Support for Climate Change Policies. Environment and Behavior, 45, 935-970.

Roser-Renouf, C., & Nisbet, M. C. (2008). The measurement of key behavioural science constructs in climate change research. International Journal of Sustainability Communication, 3, 37-95.

Saad, L. (2009). Increased Number Think Global Warming Is "Exaggerated". Gallup: http://www.gallup.com/poll/116590/increased-number-think-global-warming-exaggerated.aspx.

Sandvik, H. (2008). Public concern over global warming correlates negatively with national wealth. Climatic Change, 90, 333-341.

Schwartz, S.H. (1992). Universals in the content and structure of values: Theoretical advances and empirical tests in 20 countries. Advances in experimental social psychology, 25(1), 1-65.

Scruggs, L., & Benegal, S. (2012). Declining public concern about climate change: can we blame the great recession? Global Environmental Change 22, 505–515.

Sims, R.E.H., Rogner, H.-H., Gregory, K. (2003). Carbon emission and mitigation cost comparison between fossil fuel, nuclear and renewable resources for electricity generation, Energy Policy, 31, 1315-1326.

Spence, A., & Pidgeon, N. (2009). Psychology, Climate Change & Sustainable Behaviour. Environment: Science and Policy for Sustainable Development, 51, 8-18.

Spence, A., Poortinga, W., & Pidgeon, N. (2012). The psychological distance of climate change. Risk Analysis, 32, 957-972.

Spence, A., Venables, D., Pidgeon, N., Poortinga, W. and Demski, C. (2010). Public Perceptions of Climate Change and Energy Futures in Britain: Summary Findings of a Survey Conducted in January-March 2010. Technical Report (Understanding Risk Working Paper 10-01). Cardiff: School of Psychology

Spoon, J-J, Hobolt, S.B., & De Vries, C.E. (2013). Going green: Explaining issue competition on the environment. European Journal of Political Research, 53, 363-380.

Steg, L., & De Groot, J.I.M. (2010). Explaining prosocial intentions: Testing causal relationships in the norm activation model. British Journal of Social Psychology, 49, 725-743.

Steg, L., & De Groot, J.I.M. (2012). Environmental values. In S. Clayton (Ed.), The Oxford Handbook of Environmental and Conservation Psychology. New York: Oxford University Press.

Steg, L., & Sievers, I. (2000). Cultural theory and individual perceptions of environmental risks. Environment and Behavior, 32, 248-267.

Steg, L., & Vlek, C. (2009). Encouraging pro-environmental behaviour: An integrative review and research agenda. Journal of Environmental Psychology, 29, 309-317.

Steg, L., De Groot, J.I.M., Drijerink, L., Abrahamse, W., & Siero, F. (2011). General antecedents of environmental behavior: Relationships between values, worldviews, environmental concern, and environmental behavior. Society and Natural Resources, 24, 349-367.

Steg, L., Dreijerink, L., & Abrahamse, W. (2005). Factors influencing the acceptability of energy policies: A test of VBN Theory. Journal of Environmental Psychology, 25, 415-425.

Steg, L., Dreijerink, L., & Abrahamse, W. (2006). Why are energy policies acceptable and effective? Environment and Behavior, 38, 92-111.

Stern, N. (2006). The Economics of Climate Change. London: HM Treasury.

Stern, P.C. (2000). Towards a coherent theory of environmentally significant behavior. Journal of Social Issues, 56(3), 407-424.

Sundblad, E.-L., Biel, A., & Gärling, T. (2007). Cognitive and affective risk judgements related to climate change. Journal of Environmental Psychology, 27, 97-106.

Taylor, E. (2012). Environment: Concern about climate change: a paler shade of green? In Alison Park et al. (Eds.) British Social Attitudes 28. London: Sage, pp. 91-110.

Tjernström, E., & Tietenberg, T. (2008). Do differences in attitudes explain differences in national climate change policies? Ecological Economics, 65, 315-324.

Tvinnereim, E., & Austgulen, A. (2013). Fossil fuel employment and public opinion about climate change. Review of Policy Research, under review.

Umbach, F. (2010). Global energy security and the implications for the EU. Energy Policy, 38, 1229-1240.

Upham, P., Whitmarsh, L., Poortinga, W., Purdam, K., & Devine-Wright, P. (2009). Public attitudes to environmental change: a selective review of theory and practice. Report for ESRC/LWEC. Manchester: University of Manchester.

Van der Werff, E., Altenburg, C., Peters, V., Vavra, J., & Fischer, A. (2011). Public perceptions of energy use and climate change; factors influencing energy consumption. GILDED WP3 report. Groningen: University of Groningen, Department of Psychology

Van der Werff, E., Steg, L., & Keizer, K.E. (2013). It is a moral issue: The relationship between environmental self-identity, obligation-based intrinsic motivation and pro-environmental behaviour. Global Environmental Change, 23, 1258-1265

Weber, E. U., & Stern, P. C. (2011). Public understanding of climate change in the United States. American Psychologist, 66, 315-328.

Weber, E.U. (2010). What shapes perceptions of climate change? Wiley Interdisciplinary Reviews: Climate Change, 1, 332–342.

White, E., & Gatersleben, B. (2010). Trust in government across 7 European countries: examining the relationship with values and behavioural antecedents. Guildford, UK: University of Surrey. See http://www.barenergy.eu/uploads/media/D23_UK.pdf.

Whitmarsh, L. (2009a). Behavioural responses to climate change: Asymmetry of intentions and impacts. Journal of Environmental Psychology, 29, 13-23.

Whitmarsh, L. (2009b). What's in a name? Commonalities and differences in public understanding of "climate change" and "global warming". Public Understanding of Science, 18, 401-420.

Whitmarsh, L. (2011). Scepticism and uncertainty about climate change: dimensions, determinants and change over time. Global Environmental Change, 21, 690-700.

Whitmarsh, L., & O'Neill, S. (2010). Green identity, green living? The role of pro-environmental self-identity in determining consistency across diverse pro-environmental behaviours. Journal of Environmental Psychology, 30, 305-314.

Whitmarsh, L., Upham, P., Poortinga, W., McLachlan, C., Darnton, A., Devine-Wright, P., Demski, C., & Sherry-Brennan, F. (2011). Public attitudes, understanding, and engagement in relation to low-carbon energy: a selective review of academic and non-academic literatures. Report for the RCUK Energy Programme.

Winzer, C. (2011). Conceptualizing energy security. EPRG Working Paper. Cambridge: Electricity Policy Research Group, University of Cambridge.

Wittneben, B. B. (2012). The impact of the Fukushima nuclear accident on European energy policy. Environmental Science & Policy, 15, 1-3.