



ISSUE BRIEF

Political Consensus and the Energy Transition

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Reducing the impact of climate change is a global challenge, requiring coordinated international action. While the United Nations (UN) negotiations in Paris in December 2015 successfully garnered commitment, cooperation, and ambition, it is the nation-state that remains the crucial actor in implementing carbon reductions, as well as legislating for and implementing progressive energy and environmental policy. This article presents an overview of the transitions towards a low-carbon economy in the United Kingdom (UK), United States, Germany, and Denmark, with a focus on the decarbonisation of electricity. Although the transition to low-carbon energy systems will require the transformation of other systems such as transport, heating, and cooling, decarbonising the electricity grid is widely considered a first priority, before progressively electrifying other sectors of the economy.

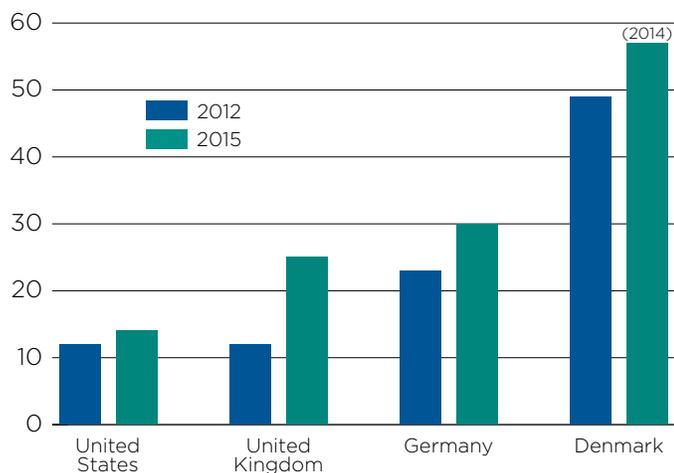
This discussion paper is based on the authors' professional experiences working in the UK, United States, and Germany, and builds on a recent Emerging Leaders in Environmental and Energy Policy Network (ELEEP) tour of Denmark and Germany, focusing on their energy transitions. It starts with the observation, made by several speakers on the tour, that there is wide political consensus in both Denmark and Germany in support of their proactive policies regarding renewable energy generation. It goes on to compare this with the political narratives and debates surrounding climate change and renewables in the UK and United States, focusing on price as a measure of political and public support of the energy transition. This paper challenges the notion that public opinion on climate change is the primary driver for constructive energy policy. Instead, it is a combination of the right pricing structures, political will, and enabling community ownership of renewables development.

Setting the context

Denmark and Germany are widely cited as global leaders in transitioning to a decarbonised electricity grid. Figure 1 illustrates this by showing the proportion of electricity generation from renewable sources in these countries.

The **Emerging Leaders in Energy and Environmental Policy (ELEEP) Network** is a joint project of the Atlantic Council's Millennium Leadership Program and the Ecologic Institute, an independent nonprofit think tank and applied research organization focused on environmental policy. The Millennium Leadership Program provides exceptional leaders aged thirty-five and under with unique opportunities to build a global network, engage directly with world leaders at flagship Atlantic Council events, develop key professional skills, and collaborate to have a global impact.

Figure 1. Percentage of domestically produced renewable electricity



Sources: US Energy Information Administration, Department of Energy and Climate Change, Energinet (Denmark 2012, 2014), Agora Energiewende (Germany 2012, 2015).

Of course, direct comparisons between countries can be misleading without context, as physical geography plays an important role. For example, Iceland and Norway generate close to 100 percent of their electricity from geothermal and hydropower respectively. Nonetheless, this chart provides a valuable overview from which to delve into national political and cultural contexts.

Denmark

According to many experts—including those who participated in the 2015 ELEEP Study Tour—Denmark’s energy transition can be traced back to the oil crisis of 1973 when the country’s dependence on foreign imports and price sensitivity came into sharp focus. In response, the government funded an ambitious research and development program for wind turbines, seeing an opportunity to capitalize on Denmark’s ample supply of wind, and to lead the development of an expanding renewables industry with strong economic potential. Further, Denmark developed a series of policies¹ to support the country’s already strong tradition of local action and community enterprise, providing subsidies for small wind farms, tax incentives for cooperatives, and guaranteeing loans taken by local associations. Decades of bottom-up action and top-down support have resulted in a highly democratized,

decentralized electricity sector, reducing reliance on imports and fossil fuels. On top of this, Danish wind turbine manufacturers have begun exporting their technologies around the world,² bringing in revenue and creating jobs in Denmark. This industry also supports other countries’ energy transitions by bringing down the cost of deployment. In July 2016 Dong Energy set a world record for the cost of offshore wind, winning a bid to build two farms off the Dutch coast for €72.70 per Megawatt hour (MWh).

Germany

Similar to Denmark, Germany has a strong public consensus about renewable energy. In Germany, concerns about the storage of nuclear waste led to a strong movement against nuclear energy in the late 1970s and early 1980s.³ Even before the disaster of Chernobyl, German civil society demanded an exit from nuclear energy plans⁴ and a shift towards renewable energies. Politically, this strong movement led to the formation of the Green Party in 1980. Since they won their first twenty-seven seats in the German Bundestag in 1983, the party has managed to remain a strong force in German politics, shaping energy policy up to the present day.

The current German energy legislation is the Renewable Energies Sources Act (Erneuerbare-Energien-Gesetz⁵), which represents one of the main pillars of German climate change policy and aims to facilitate the Energy Transition (“Energiewende”). Regular revisions of the act have incorporated the lessons drawn from the mistakes of the past and increased public acceptance of new energy policy by limiting surcharge increases through a bidding process and capacity-deployment corridor.⁶ This has

1 “Global Renewable Energy: Denmark,” IEA, accessed November 14, 2016, <http://www.iea.org/policiesandmeasures/renewableenergy/?country=Denmark>.

2 “World’s Largest Ever Offshore Wind Farm to Be Built by DONG Energy,” DONG Energy, February 3, 2016, accessed November 14, 2016, <http://www.dongenergy.co.uk/news/press-releases/articles/worlds-largest-ever-offshore-wind-farm-to-be-built-by-dong-energy>.

3 “Energy Transition: The German Energiewende,” Energy Transition, November 28, 2012, accessed November 14, 2016, http://energytransition.de/wp-content/themes/boell/pdf/en/German-Energy-Transition_en.pdf.

4 “Eine Kurze Geschichte der Deutschen Antiatomkraftbewegung,” BpB, November 10, 2011, accessed November 14, 2016, <http://www.bpb.de/apuz/59680/eine-kurze-geschichte-der-deutschen-antiatomkraftbewegung?p=all>.

5 “Gesetz Für Den Ausbau Erneuerbarer Energien,” Bundesministerium der Justiz und für Verbraucherschutz, accessed November 14, 2016, https://www.gesetze-im-internet.de/eeg_2014/index.html.

6 “Ausschreibungen Für Erneuerbare Energien,” Agora, June 2014, accessed November 14, 2016, <https://www.agora-energiewende>.

reduced the perception of the Energy Transition as a political agenda defined by imprudent eco-radicalism among conservative parts of the population, and anchored the project in the center of society.

Similarly, a stronger awareness of stakeholder worries among market participants and the painful lessons of the power of public resistance have led to more open stakeholder consultations⁷ that have reduced NIMBYism⁸ significantly. Yet, major challenges remain; in particular, the grid expansion will require tremendous investments⁹ and the involvement of many sceptical stakeholders.

United Kingdom

The UK has been slower than Denmark and Germany to introduce renewables, despite having an unrivalled wind resource both on and offshore. Whilst public opinion on renewable energy is overwhelmingly supportive,¹⁰ NIMBYism persists, and the 2016 Conservative government was voted in with a manifesto pledge to stop the construction of additional onshore wind turbines. The price of energy is a highly political issue, with green subsidies often (to a large extent falsely¹¹) cited as the driver of high prices both for domestic and industrial consumers. The UK is one of the only countries to officially measure fuel poverty,¹² therefore the issue of energy equity is a prominent political issue, and one occasionally interchanged with the environmental agenda. In response to spikes in energy

prices in late 2013 for example, Prime Minister David Cameron was famously quoted as saying “get rid of the green crap”¹³ by means of reducing prices.

The UK’s current electricity market policy is phasing out coal as a source of generation. It was the first nation to publicly declare a date for its removal from the grid—2025—and for several days in summer 2016 has achieved a coal-free grid over a twenty-four-hour period. In May 2016, solar power exceeded coal generation¹⁴ in the United Kingdom for the first time over the course of the month. The UK’s rapid growth in the installation of solar panels was stimulated by a generous Feed-In Tariff, which, although being heavily cut in 2015, has installed capacity over 10 gigawatts (GW),¹⁵ far exceeding expectations.

The UK’s recent vote to leave the European Union (EU), which came as a shock to many, raises a number of questions¹⁶ about the future of the UK’s energy policy, including its coal phase out, the fate of its Climate Change Act, and the construction of the Hinkley C nuclear power plant. Commentators fear that without the need to comply with EU-generated low carbon policy, the center-right conservative government will be free to pursue its own goals and diverge from the continent’s initiative. These concerns may be founded, considering that the current administration in their first year already legislated to block new onshore wind farms, reduced the solar feed-in tariff by 65 percent,¹⁷ and cut a flagship carbon capture and storage (CCS) demonstration project.¹⁸ Recent policy developments

de/fileadmin/downloads/publikationen/Hintergrund/Ausschreibungsmodelle/Agora_Ausschreibungen_fuer_Erneuerbare_Energien_web.pdf.

7 “Stromtrassen: Ein Monster Verschwindet,” *Süddeutsche Zeitung*, May 29, 2015, accessed November 14, 2016, <http://www.sueddeutsche.de/wirtschaft/stromtrassen-ein-monster-verschwindet-1.2499245>.

8 NIMBY: Not In My Backyard—A person who objects to the siting of something perceived as unpleasant or hazardous in their own neighborhood, especially while raising no such objections to similar developments elsewhere.

9 “Höchstspannung Tiefergelegt,” *ZEITmagazin*, October 29, 2015, accessed November 14, 2016, <http://www.zeit.de/2015/42/elektrizitaet-erdkabel-strommasten-raesfeld>.

10 “Public Attitudes Tracking Survey: Wave 17,” UK Government, April 28, 2016, accessed November 14, 2016, <https://www.gov.uk/government/statistics/public-attitudes-tracking-survey-wave-17>.

11 “Fact Check: The Steel Crisis and UK Electricity Prices,” Carbon Brief, October 22, 2015, accessed November 14, 2016, <https://www.carbonbrief.org/factcheck-the-steel-crisis-and-uk-electricity-prices>.

12 “Policies and Initiatives to Combat Fuel Poverty,” E Co., December 2, 2012, accessed November 14, 2016, <http://www.ecoltdgroup.com/wp-content/uploads/2011/07/BestPracticeOnFuelPovertyv1.pdf>.

13 Rowena Mason, “David Cameron at Centre of ‘get rid of all the green crap’ Storm,” *Guardian*, November 21, 2013, <https://www.theguardian.com/environment/2013/nov/21/david-cameron-green-crap-comments-storm>.

14 “Analysis: Solar Beats Coal over a Whole Month in UK for First Time,” Carbon Brief, July 06, 2016, accessed November 14, 2016, <https://www.carbonbrief.org/analysis-solar-beats-coal-over-a-whole-month-in-uk-for-first-time>.

15 “Solar Photovoltaics Deployment,” UK Government, May 29, 2014, accessed November 14, 2016, <https://www.gov.uk/government/statistics/solar-photovoltaics-deployment>.

16 “Brexit: 94 Unanswered Questions for Climate and Energy Policy,” Carbon Brief, June 29, 2016, accessed November 14, 2016, <https://www.carbonbrief.org/brexit-94-unanswered-questions-for-climate-and-energy-policy>.

17 Adam Vaughan, “UK Solar Power Installations Plummet After Government Cuts,” *Guardian*, April 8, 2016, <https://www.theguardian.com/environment/2016/apr/08/solar-installation-in-british-homes-falls-by-three-quarters-after-subsidy-cuts>.

18 Damian Carrington, “UK Cancels Pioneering £1bn Carbon Capture and Storage Competition,” *Guardian*, November 25, 2015, <https://www.theguardian.com/environment/2015/nov/25/uk-cancels-pioneering-1bn-carbon-capture-and-storage-competition>.

have aimed to support a new generation of gas-fired power stations and to facilitate the exploitation of shale gas reserves. The government-supported Committee on Climate Change has expressed concerns about the implications of these new measures for the UK's own climate change targets.¹⁹ Of course, the details of how energy policy pans out under the new Prime Minister Theresa May remains to be seen, but the abolition of the Department for Energy and Climate Change indicate for many a worrying trend.

United States

The United States lags behind Denmark, Germany, and the UK in the proportion of electricity generated from renewables, although each region within the country has the potential to meet electricity demand with 100 percent²⁰ renewable sources by 2050. The biggest transformation in the US electricity market since 2008 has been abundant, cheap natural gas from US shale-displacing coal. Renewable electricity generation is also accelerating this transition as it is most rapidly increasing²¹ in areas where the growth of gas generation is the slowest. Solar energy is responsible for the lion's share of renewable gains²² in the electricity sector, providing roughly 37 GW²³ to the electricity mix in 2015, up from about 5 GW in 2012. When price is considered however, the levelized cost of electricity (LCOE) for wind is about \$74, beating solar photovoltaics (PV) \$114.²⁴ The LCOE for natural gas power ranges from \$75-\$114.

President Barack Obama has been committed to building the US renewable energy portfolio, stating in his 2012 State of the Union speech that he "will not

walk away from the promise of clean energy."²⁵ The American Recovery and Reinvestment Act of 2009 spent more than \$70 billion on clean energy and transportation programs, with \$6 billion²⁶ towards loan guarantees for renewable energy and electric transmission technologies. Obama's 2013 Climate Action Plan set a goal to decrease carbon pollution by 3 billion tons by 2030.

With President Donald Trump, the future of US energy policy and encouragement of renewables is up in the air. President-elect Trump may cancel the Paris Climate Agreement as promised during the campaign and withdraw "all the job-destroying Obama executive actions including the Climate Action Plan."²⁷ Trump also vowed to "save the coal industry" in his first one hundred-days action plan.²⁸ However, Trump differs from small-government Republicans in that he supported ethanol subsidies which suggests he does not oppose subsidies writ large. Democratic candidate Hillary Clinton, on the other hand, would have likely continued along Obama's path with goals such as installing 500 million solar panels to increase solar power generation by a factor of eight.²⁹

The Role of Price

This section explores the relationship between the price paid for electricity by domestic and industrial users and the status of the energy transition in each of our four national cases.

Figure 2 illustrates the wide variety of prices paid by domestic and industrial consumers across International Energy Agency (IEA) member states. What is clear from this chart is that the advanced energy transitions

19 "Exploitation of Onshore Petroleum Requires Three Key Tests to Be Met, CCC Says," CCC, July 7, 2016, accessed November 14, 2016, <https://www.theccc.org.uk/2016/07/07/exploitation-of-onshore-petroleum-requires-three-key-tests-to-be-met-ccc-says/>.

20 "US Renewable Energy Potential," Rocky Mountain Institute, accessed November 14, 2016, http://www.rmi.org/RFGGraph-US_renewable_energy_potential.

21 "A Review of Sector and Regional Trends in U.S. Electricity Markets: Focus on Natural Gas," NREL, October 2015, accessed November 14, 2016, <http://www.nrel.gov/docs/fy16osti/64652.pdf>.

22 "Electricity Data Browser," EIA, accessed November 15, 2016, <http://www.eia.gov/electricity/data/browser/>.

23 "2006-2015 solar electric energy with 2014-2015 estimated distributed solar.png," Wikipedia, accessed November 15, 2016, https://en.wikipedia.org/wiki/File:2006-2015_Solar_Electric_Energy_with_2014-2015_Estimated_Distributed_Solar.png.

24 "Annual Energy Outlook," EIA, August 5, 2016, accessed November 15, 2016, https://www.eia.gov/forecasts/aeo/electricity_generation.cfm.

25 "Remarks by the President in State of the Union Address," White House, January 24, 2012, accessed November 15, 2016, <https://www.whitehouse.gov/the-press-office/2012/01/24/remarks-president-state-union-address>.

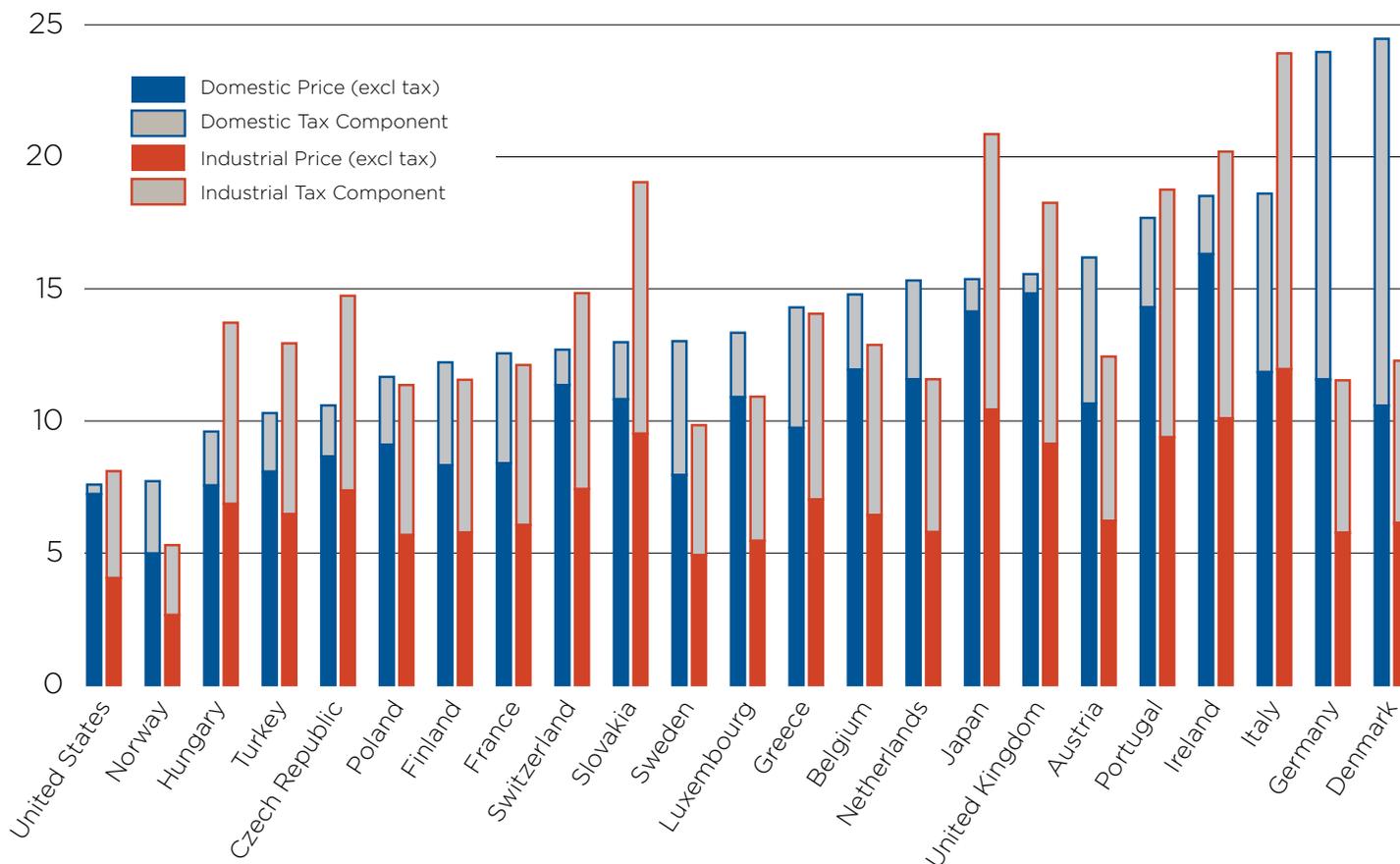
26 "111th Congress Public Law 5," GPO, accessed November 15, 2016, <https://www.gpo.gov/fdsys/pkg/PLAW-111publ5/html/PLAW-111publ5.htm>.

27 "An America First Energy Plan," DonaldJTrump.com, May 26, 2016, accessed November 15, 2016, <https://www.donaldjtrump.com/press-releases/an-america-first-energy-plan>.

28 "Donald J. Trump Delivers Groundbreaking Contract for the American Voter in Gettysburg," DonaldJTrump.com, October 22, 2016, accessed November 15, 2016, <https://www.donaldjtrump.com/press-releases/donald-j.-trump-delivers-groundbreaking-contract-for-the-american-vote1>.

29 "Where Clinton, Trump Stand on Energy, Climate Change," Real Clear Politics, July 8, 2016, accessed November 15, 2016, http://www.realclearpolitics.com/articles/2016/07/08/where_clinton_trump_stand_on_energy_climate_change_131129.html.

Figure 2. Average price of electricity for IEA members in 2014 (pence per kWh)



Source: IEA, 2016, Industrial and domestic electricity prices, with and without tax, 2014.

in Denmark and Germany have been supported by high levels of taxation imposed on domestic consumers, while industrial users benefit from internationally competitive pricing. In Denmark, with local ownership accounting for 86 percent of wind generation,³⁰ and high levels of energy efficiency in the domestic housing stock,³¹ the comparatively high unit cost for electricity (DKK/kWh) does not necessarily translate to high total energy bills for householders.

In Germany, the discrepancy between domestic and industrial prices has been the focus of much

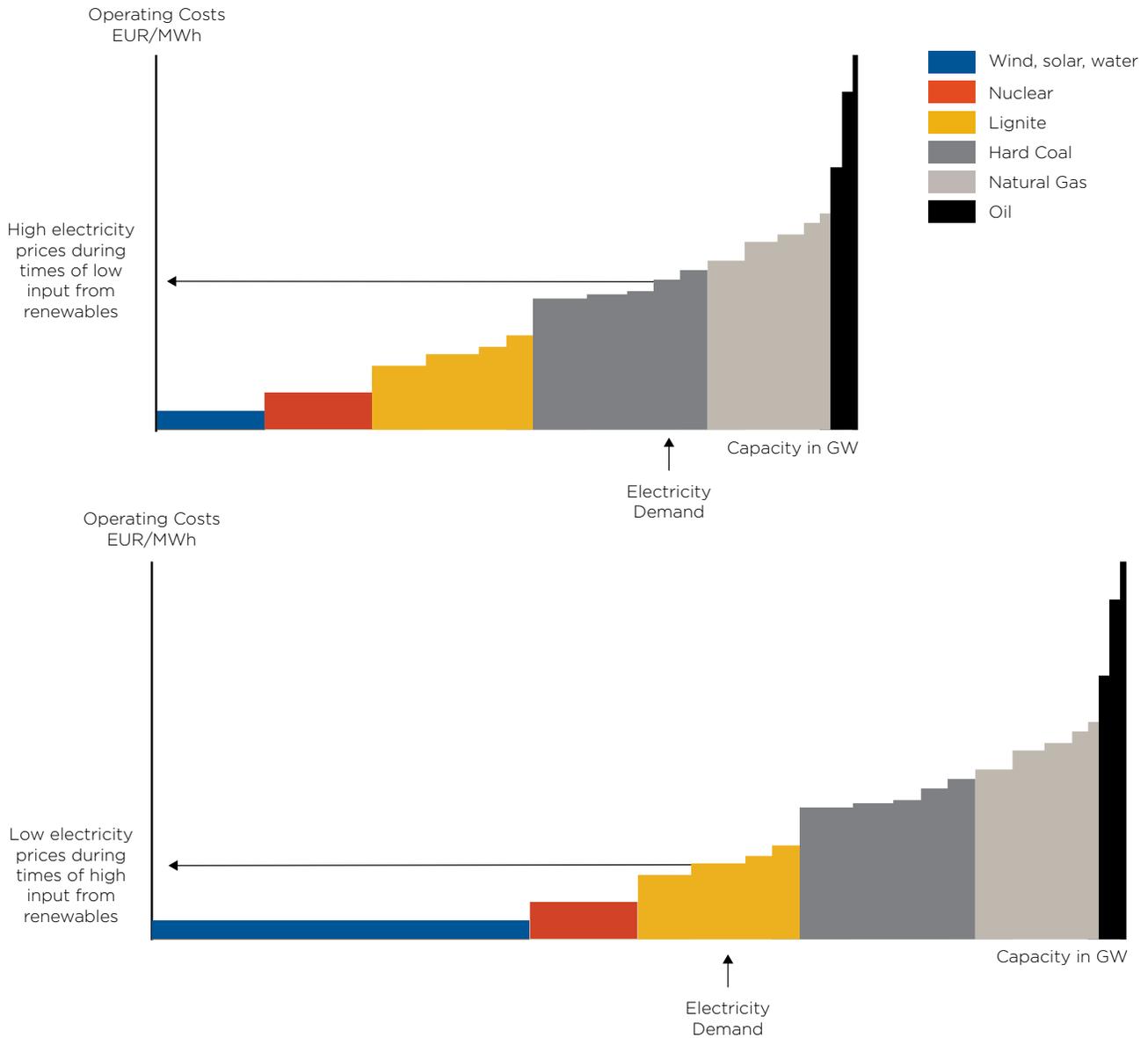
political debate, with the renewable energy surcharge considered by many to be too high, thereby disadvantaging poorer communities. This seems especially true for urban apartment dwellers, where participation in distributed generation is restricted by the limited access to rooftop space.

To support renewable energy installations, the German government paid a feed-in tariff for renewable energy projects through 2016 and have awarded contracts with a renewable energy premium over the electricity market price in a bidding process since then. The feed-in tariff and the premium are paid from a consumer-paid renewable energy surcharge of currently 6.35ct per kilowatt hour (kWh). As wholesale electricity prices are determined through exchanges and renewables get a guaranteed feed-in tariff, they drive down prices and push more expensive gas-powered plants down the merit order.

30 "9 Good Reasons for Local Ownership," Middelgrundens Vindmøllelaug, accessed November 15, 2016, <http://www.middelgrunden.dk/middelgrunden/sites/default/files/public/file/9GoodReasonsforLocalOwnership.pdf>.

31 "Energy Efficiency in Europe: Denmark," Energy Efficiency Watch, 2013, accessed November 15, 2016, http://www.energy-efficiency-watch.org/fileadmin/eew_documents/Documents/EEW2/Denmark.pdf.

Figure 3. Electricity price due to merit-order-effect



Source: Clean Energy Wire.

As a result, the financial support for renewable electricity shifted from the wholesale electricity prices to the consumer-paid surcharge. Exchange prices paid by large industrial consumers dropped drastically while domestic prices grew. This has caused discontent among the public and in 2014 the government published a revision to the Renewable Energy Sources Act. This revision imposed a bidding process and redefined capacity deployment corridors to increase focus on the

costs of renewable energy and flexibility when reacting to cost reductions in renewable technologies, thereby contributing to the drastic fall of Solar PV system costs by 60 percent between 2009 and 2011.³² The

³² "Ausschreibungen Für Erneuerbare Energien," Agora, June 2014, accessed November 15, 2016, https://www.agora-energiewende.de/fileadmin/downloads/publikationen/Hintergrund/Ausschreibungsmodelle/Agora_Ausschreibungen_fuer_Erneuerbare_Energien_web.pdf.

deployment corridors caused particular dissatisfaction among several green groups, as they perceived this regulation as a dangerous restriction of renewables and protectionism of fossil fuel groups. Yet, it was an important step to limit the staggering growth of the renewable energy surcharge that seriously threatened public support.

Energy price is a pertinent political issue in the UK, as affordability is one of the government's stated priorities alongside decarbonisation and security of supply. The issue of fuel poverty drives a political narrative focused on energy equity, including specific policies such as the Winter Fuel Payment for older consumers and the Cold Weather Payment. While this attention to affordability drives policy, it doesn't always lead to effective outcomes. The government's flagship Green Deal, for example, was designed entirely around a financial mechanism, allowing householders to pay for efficiency measures incrementally through lower energy bills, but proved very unpopular and was abandoned after only two years. Similarly, although the political supporters of Hinkley C cite the project as supporting the entire energy trilemma of energy security, energy equity, and sustainability,³³ the price guaranteed to French and Chinese investors of £92.50/MWh is over twice the current price of wholesale electricity. The former example indicates that price is not the only consideration for domestic consumers, whilst the latter appears to demonstrate the same for policy makers.

The United States is unusual in having such low electricity prices. Although influences on electricity prices are complex³⁴ and depend on taxes, cost, and proximity to fuels, EU residential electricity prices have traditionally been higher than US prices. Average EU electricity costs in 2013 were more than double US rates. In certain European countries the reason for higher prices is taxes, according to the EIA.³⁵ Abundant, low-cost US natural gas has also had a downward

pressure on electricity prices. Between 2008 and 2012, the US experienced a 60 percent decrease³⁶ in natural gas prices as the shale revolution took off. Despite the role the natural gas boom played in bringing electricity prices down as the fuel displaced costlier coal, the EIA predicts US residential electricity prices will rise roughly three percent in 2017.³⁷

The surprising role of attitudes

A reasonable hypothesis when considering the political consensus of support for the energy transitions in Denmark and Germany might be to assume that it is underpinned by a groundswell of public support, compelling politicians of all persuasions to vote in support of action on climate change. However, a number of international opinion polls on the subject of climate change demonstrate that public opinion is far more similar across the four countries discussed above than one might expect given their divergent political and policy discourses. This section also provides evidence showing that support for renewable energy is very high in these countries.

The 2008 Gallup poll (figure 4) demonstrates that awareness of climate change was already high in all four countries eight years ago, before global temperature records began to rise.³⁸ In Denmark, these results indicate that public awareness lagged slightly behind the other states considered here, whilst the perception of climate change as a personal threat is significantly lower. Could it be that Denmark's success in deploying wind power and securing energy independence has served to reassure the Danes about climate risks at home?

Whilst awareness of climate change in Germany is on par with the United States and UK, there is a higher degree of appreciation of its anthropogenic sources. However, 59 percent of the German public who attribute climate change to human activity is a rate still far behind that among scientists in the field,³⁹

33 "World Energy Trilemma," World Energy Council, 2016, accessed November 15, 2016, <https://www.worldenergy.org/work-programme/strategic-insight/assessment-of-energy-climate-change-policy/>.

34 "European Residential Electricity Prices Increasing Faster Than Prices in United States—Today in Energy," EIA, November 18, 2014, accessed November 15, 2016, <http://www.eia.gov/todayinenergy/detail.cfm?id=18851>.

35 "European Residential Electricity Prices Increasing Faster Than Prices in United States—Today in Energy," EIA, November 18, 2014, accessed November 15, 2016, <http://www.eia.gov/todayinenergy/detail.cfm?id=18851>.

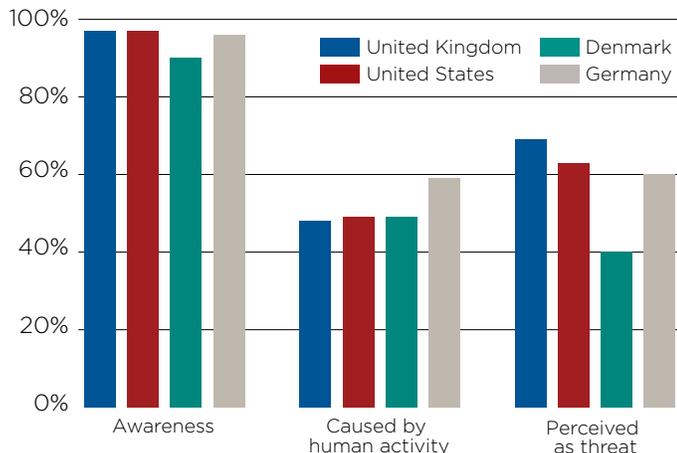
36 "How Do Natural Gas Prices Affect Electricity Consumers and the Environment?," RFF, July 18, 2014, accessed November 15, 2016, <http://www.rff.org/files/sharepoint/WorkImages/Download/RFF-DP-14-19.pdf>.

37 "Short-Term Energy Outlook," EIA, accessed November 15, 2016, <https://www.eia.gov/forecasts/steo/report/electricity.cfm>.

38 Michael Slezak, "Hottest Ever June Marks 14th Month of Record-Breaking Temperatures," *Guardian*, July 20, 2016, <https://www.theguardian.com/environment/2016/jul/20/june-2016-14th-consecutive-month-of-record-breaking-heat-says-us-agencies>.

39 "Scientific Consensus: Earth's Climate Is Warming," NASA, accessed November 15, 2016, <http://climate.nasa.gov/scientific-consensus/>.

Figure 4. Percentage of domestically produced renewable electricity



Source: Gallup Poll, 2008.

Awareness—Knowing “something” or a “great deal” about global warming when asked “How much do you know about global warming or climate change?”

Caused by human activity—Responding yes when asked, “Temperature rise is part of global warming or climate change. Do you think rising temperatures are [...] a result of human activities?” Note: the other answer option was “a result of natural causes,” but respondents were also allowed to indicate “both” (or “no opinion”). People voting “both” are not included in the numbers.

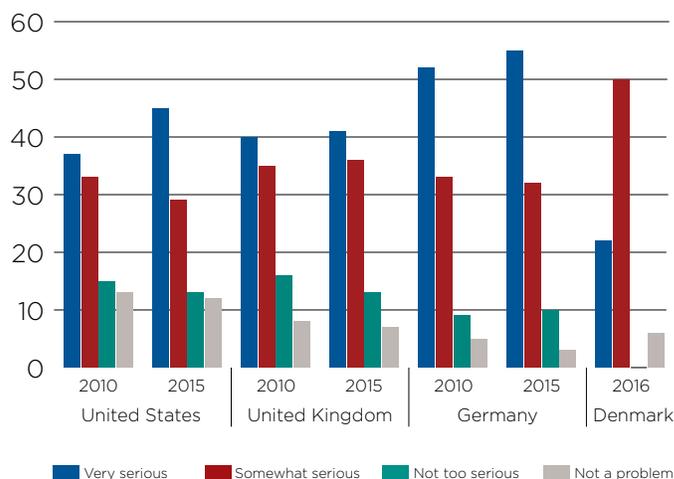
Perceived as threat—Responding that global warming is a serious personal threat

and behind parts of Africa and most South American countries. This shows that the scientific community still needs to work on educating the general public about the results of modern climate research.

A 2015 international survey conducted by Pew Research Center illustrates that Germans consider climate change to be a more serious problem than people in the United States and UK. Additionally, the rate of those in Germany who consider climate change “not a problem” has fallen to only 3 percent in 2015. In the United States, while the percentage of those considering climate change a “very serious problem” rose from 37 percent to 45 percent, 12 percent of Americans still do not consider it a problem at all.

In the case of the United States, these country-level statistics hide stark differences of opinion, split along political lines, as illustrated in the same survey:

Figure 5. In your view, is global climate change a very serious problem, somewhat serious, not too serious, or not a problem?



Source: Pew Research Centre, *Global Attitudes Survey*, 2015 (no data on Denmark).

Republicans are much less likely than Democrats to consider climate change a very serious problem, at a rate of 20 percent versus 68 percent. Although a global median of 51 percent and 60 percent of the population in Europe agree that climate change is harming people, only 42 percent of the US population believes this. However, it is important to note that while opinions on climate change differ along party lines, 50 percent of Republicans and 82 percent of Democrats support limiting greenhouse gas emissions.

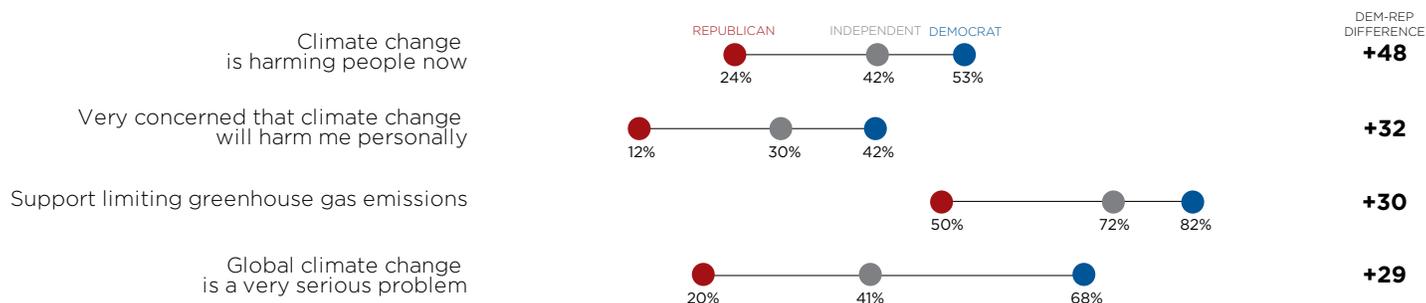
Support for renewables in all four countries is very high. As of 2013, over 70 percent of people in the United States⁴⁰ want greater emphasis on solar and wind energy, while eight in ten support tax incentives.⁴¹ In the UK, support for renewables is also high, at 81 percent,⁴² but that percentage of the population is split along socio-economic lines with lower support amongst lower earners and those aged over sixty-five.

40 “Americans Want More Emphasis on Solar, Wind, Natural Gas,” Gallup, March 27, 2013, accessed November 15, 2016, <http://www.gallup.com/poll/161519/americans-emphasis-solar-wind-natural-gas.aspx>.

41 “Large Majorities in US and Europe Endorse Focus on Renewable Energy,” WorldPublicOpinion.org, accessed November 15, 2016, <http://worldpublicopinion.net/large-majorities-in-us-and-europe-endorse-focus-on-renewable-energy-2/>

42 “DECC Public Attitudes Tracker - Wave 17,” UK Government, April 2016, accessed November 15, 2016, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/519488/PAT_Wave_17_Summary_of_key_findings.pdf.

Figure 6. Partisan differences on climate change in the United States



Source: Pew Research Centre, *Global Attitudes Survey*, 2015.

In Denmark, not only does 91 percent of the public support the expansion of wind power, 85 percent⁴³ would be happy for the development to take place in their local area. This compares favorably to the UK's figure of 56 percent,⁴⁴ despite the support for renewables in principle. One likely explanation for this difference is the high levels of community ownership of renewables in Denmark, where wind power is seen as an investment opportunity for residents. In Germany, support for renewable energy is also very high, driven by a high level of community ownership (figure 8).⁴⁵

In a representative survey⁴⁶ from 2015, only 6 percent of Germans said that the deployment of renewables is of minor or no importance, while 66 percent said it is extremely important. In the UK, although there is support for community energy projects,⁴⁷ a strong, supportive policy framework remains absent. At a roundtable meeting hosted by the UK's Institute for Public Policy Research discussing energy

policy following the EU referendum (July 2016), the consensus seemed to be that community energy, already weakened in the UK by recent policy changes, could be facing a bleak future under the newly created department for Business, Energy, and Industrial Strategy.

It is clear from the various opinion surveys cited above that support for renewables outstrips concern for climate change. One clear reason for this is that renewables represent an investment opportunity, whilst support for action on climate change has the potential for far-reaching consequences, impacting everyday consumption practices and even socio-cultural "ways of life." For example, in 2010, 91 percent⁴⁸ of people in the United States believed that "investing in renewable energy" was important for US global competitiveness. The framing of this issue as a macro-economic policy, and appealing to the prevalence of patriotic sentiment could explain this high level of support. By contrast, a Gallup Poll conducted during the economic downturn in 2011 found that only 48 percent of the US population supported "the conservation by consumers of existing energy sources [fossil resources],"⁴⁹ compared to increased extraction of fossil fuels.

The support garnered for renewable energy by framing the energy transition as an investment opportunity would appear to be one lesson we can learn from the range of opinion polls and attitude trackers cited above. Emphasizing the urgent and essential requirement for renewable energy as a response to dangerous climate change may still be warranted, but may not be as

43 "Public Opinion: The Support for Deployment of Windpower in Denmark Is Widespread," *Vindmølleindustrien*, accessed November 15, 2016, http://www.windpower.org/en/policy/public_opinion.html.

44 "DECC Public Attitudes Tracker - Wave 17," Department of Energy and Climate Change, April 2016, accessed November 15, 2016, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/519488/PAT_Wave_17_Summary_of_key_findings.pdf.

45 "Community Power for People's Ownership of Renewable Energy," Community Power, accessed November 15, 2016, <http://www.communitypower.eu/en/germany.html>.

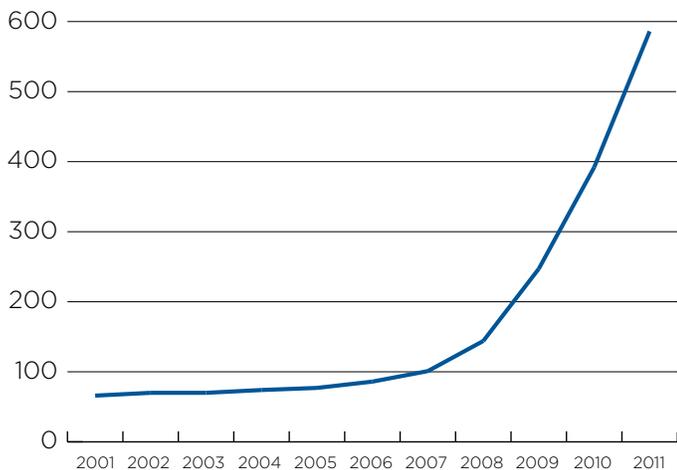
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47 "UK Poll Reveals 'overwhelming' Public Support for Community Renewables," *Edie*, September 8, 2015, accessed November 15, 2016, <http://www.edie.net/news/6/Poll-reveals-huge-public-support-for-community-energy-projects/>.

48 "Large Majorities in US and Europe Endorse Focus on Renewable Energy," *WorldPublicOpinion.org*.

49 *Ibid.*

Figure 7. Number of energy cooperatives in Germany, 2001-2011



Source: energytransition.de, 2015, <http://www.renewablesinternational.net/german-nimbyism-fact-and-fiction/150/505/68807/>

effective a narrative. This applies not only to public-policy makers, but to corporate stakeholders too. In Germany, companies actively involved in the energy transition are increasingly recognizing the importance of public support, especially where NIMBYism persists. On the ELEEP tour of the 50Hertz Regional Centre at Neuenhagen for example, fellows learned that this major Transition System Operator was becoming increasingly consumer focused, learning from past mistakes that plagued infrastructure investments with delays and unforeseen costs. Now, they employ campaigners to travel the country and engage communities in discussions about the benefits of the energy transition and the impact on the grid in order to garner support for expansion and upgrade projects.

This section has shown that attitudes towards climate change are broadly similar across the United States, UK, and Denmark, while the Germans are slightly more aware of the severity of the challenge and concerned for its implications. Support for renewable energy remains high across all four nations, although economic, political, and demographic factors influence attitudes. What is made clear by the situation in Denmark, and more recently Germany, is that these energy transitions have been driven from the bottom up by an engaged—and invested—public, albeit supported by strong government policy. By contrast, efforts in the UK and United States have been characterized by top-down regulation, targeted at utilities through policies such

as Energy Company Obligation (ECO)⁵⁰ and Public Utility Regulatory Policies Act (PURPA)⁵¹ respectively. It could be argued that by lacking strong policies in support of community energy, significantly weakening the feed-in tariff⁵² in the case of the UK, and failing to mandate⁵³ guaranteed net metering for all states in the United States, these nations fail to capitalize on the groundswell of support for renewables seen across numerous opinion polls.

Conclusion

This ambitious discussion paper has attempted to compare the state of public and political support for energy transitions in four countries. Unsurprisingly, the discussion—which has addressed the roles of historical context, pricing, and public opinion on influencing climate change and renewable energy policy—has portrayed a complex picture. While there are big differences in the status of the energy transitions undergone by each of the four countries, there are no simple answers as to what the United States and UK can learn from the more developed transitions in Denmark and Germany. Energy policy is deeply complex, involving national scale infrastructure, the interests of businesses, householders, and international relations. The transition to a more comprehensive and effective energy policy is therefore not a linear process to be replicated around the world.

Supportive public opinion about renewables and climate change provides no guarantee that a nation will implement policies to rapidly decarbonize its electricity supply. Effective energy policy must always account for the historical and political context of each nation. Germany's public consensus of opinion against nuclear energy is one unique factor, while Denmark's historical reliance on imports of fossil fuels, and the wide acceptance of high levels of taxation in both countries mean that the public has tolerated the high electricity prices which have enabled their

50 "Energy Company Obligation," Ofgem, accessed November 15, 2016, <https://www.ofgem.gov.uk/environmental-programmes/eco>.

51 "Public utility regulatory policies act," Wikipedia, accessed November 15, 2016, https://en.wikipedia.org/wiki/Public_Utility_Regulatory_Policies_Act.

52 Adam Vaughan, "UK Solar Power Installations Plummet After Government Cuts," *Guardian*, April 9, 2016, <https://www.theguardian.com/environment/2016/apr/08/solar-installation-in-british-homes-falls-by-three-quarters-after-subsidy-cuts>.

53 "Public Utility Regulatory Policies Act of 1978 (PURPA)," Department of Energy, accessed November 15, 2016, <http://energy.gov/oe/services/electricity-policy-coordination-and-implementation/other-regulatory-efforts/public>.

world-leading energy transitions. As this article has highlighted however, widespread energy efficiency measures and citizen investment in renewables mean that high unit prices paid by consumers for electricity (\$/kWh) do not necessarily translate into high monthly bills for householders, while industrial customers are protected through policy ensuring their international competitiveness. In Germany and Denmark, energy policy has been integrated into foreign policy objectives, with the Danish government actively promoting its green initiatives internationally to support its exporting renewable industries. On the ELEEP study tour for example, fellows attended meetings hosted by the State of Green—an organisation set up for just this purpose. In Germany, regular revisions of legislation such as the Renewable Energy Sources Act ensure that lessons are learned, and the renewable surcharge is kept under control. The United States and the UK are both undergoing periods of significant political change. President Donald Trump has stated his ambitions to “cancel”⁵⁴ the Paris climate agreement, and the UK is set to begin its negotiations to withdraw from the EU. The ramifications for energy and climate policy in these countries could be profound. Even if Trump does not follow through with his stated energy policy goals, and the UK continues to meet the targets set by its Climate Change Act, these political events will undoubtedly shape the future of the energy transitions in these countries.

Hopefully this discussion paper will stimulate debate in the ELEEP network and beyond. With such a broad scope, there have undeniably been omitted details relating to the political, historical, economic, and social contexts of the energy transitions of the United States, UK, Denmark, and Germany. For example, an inter-country analysis of the role of energy incumbents would be welcomed. With major corporations

providing jobs and tax receipts, how do the interests of ExxonMobil in the United States; Shell and BP in the UK; shipping giants in Denmark; and the automobile industry in Germany impact the energy transitions in these countries? There is value in drawing high level comparisons between these nations, and in showing the divergence of approaches alongside surprising similarities in public opinion.

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54 “Donald Trump Would ‘cancel’ Paris Climate Deal,” *BBC US Election 2016*, BBC News, May 27, 2016, <http://www.bbc.co.uk/news/election-us-2016-36401174>.



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