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### **Germany's Renewable Energy Shift: Addressing Climate Change**

**Abstract:** This essay considers how the state can be used to successfully initiate and support an energy shift from nuclear energy to renewable energy as Germany's Renewable Energy Act from 2000 and its previous Electricity Feed-in-Law (199) demonstrate. These nationwide policies have led Germany to have reduced level of greenhouse gas emissions, to have a higher level of energy security than the U.S. and to have a higher level of employment in the renewable energy industry. Germany is a leader globally in this industry and provides a model for other nations in this regard.

**Keywords:** Renewable energy, Germany, nuclear energy, feed-in-tariffs  
wind energy, solar energy

When Germany announced on May 30, 2011 that it would shut down its nuclear power plants by the end of 2022, arguing that the shift would have not only environmental but also economic benefits, critics charged that the goal was impossible. Germany, they argued, would need to import greater amounts of nuclear energy from France, of natural gas from Russia and of coal from Poland. Germany's four leading energy firms — E.ON,<sup>1</sup> RWE,<sup>2</sup> EnBW<sup>3</sup> and Vattenfall<sup>4</sup> — warned that Germany would face winter blackouts.<sup>5</sup> At the time, one company, Siemens took a

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<sup>1</sup> E.On is the largest energy provider in Germany and one of the world's largest electric utility service providers. It has subsidiaries in the U.K., in Sweden and in Russia.

<sup>2</sup> RWE is the second-largest energy provider in Germany.

<sup>3</sup> Energie Baden-Württemberg (EnBW) is the third-largest energy producer in Germany, after E.ON and RWE.

<sup>4</sup> Vattenfall is the fourth-largest energy provider in Germany. Vattenfall is a Swedish company with a German subsidiary of the same.

<sup>5</sup> For just a few examples of this position, spanning a range of media, c.f. Daniel Wetzel, "Stromkonzerne nennen Zeitpunkt für Blackout," *Die Welt*, 22 May, 2011. <<http://www.welt.de/wirtschaft/energie/article13387670/Stromkonzerne-nennen-Zeitpunkt-fuer-Blackout.html>>; "Atomausstieg: RWE Chef warnt vor Industrieschwund in Deutschland," *Spiegel*, 10 June, 2011. <<http://www.spiegel.de/wirtschaft/unternehmen/atomausstieg-rwe-chef-warnt-vor-industrieschwund-in-deutschland-a-767817.html>>; Marlies Uken, "Winter in Deutschland: Im

different tack, announcing in September 2011 that it would phase out work related to nuclear energy and focus specifically on renewables, such as solar and wind. It was, as discussed in greater detail below, the economically and environmentally viable direction to take.<sup>6</sup>

The reasons for Germany's decision to phase out nuclear energy are numerous. The fall prior, Chancellor Angela Merkel (Christian Democratic Union, CDU) had announced that she would *extend* the life of Germany's nuclear power plants by twelve years on average. But she revised that position in March 2011 as a result of the Fukushima Daiichi disaster in Japan and in late March 2011 direct protest actions throughout Germany accompanied elections in two German states. The Saturday prior to her decision, over 100,000 attended demonstrations held in at least 20 cities nationwide to protest against nuclear energy. In Berlin alone, over 20,000 persons demonstrated. So her decision came as a result of a variety of factors.

In this article, I consider, first, Germany's decision to phase out nuclear power. Then, in a second section, I discuss Germany's shift to renewable energy, which illustrates how state policy can, when activated, address climate change, providing environmental and economic benefits. In a third and final section, I contrast the policies of Germany and the U.S. on nuclear and renewable energy, arguing that Germany models policy that successfully reduces carbon dioxide (CO<sub>2</sub>) emissions and thereby helps to avoid irreversible and catastrophic climate change.<sup>7</sup>

In what follows, I illustrate, first, how each of the four energy companies mentioned, when faced with the nuclear shutdown and a proposed shift to renewable energies brought about by the Germany government, initially denounced renewable energy as unreliable yet ultimately wound up shifting to it, as it was the only economically viable—that is, profitable—option. Second, I look at

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Stromnetz wird es eng," *Die Zeit*, 20 December, 2011. <<http://www.zeit.de/wirtschaft/2011-12/stromnetz-atomausstieg>.>

<sup>6</sup> "Siemens to Quit Nuclear Industry," *BBC News*, 18 September, 2011.

<sup>7</sup> For more on the rhetoric of "catastrophism," see also Sasha Lilley, et al, *Catastrophism: The Apocalyptic Politics of Collapse and Rebirth* (Oakland: PM Press 2012).

how Germany's energy policy made this shift possible. And third, I turn to the U.S. and present its current policy on nuclear and renewable energy, explore the current status of each industry, and consider how state policy in the U.S., too, following the German model, could be implemented to economic and environmental benefits. It should be noted that energy and electricity sources are two different entities: energy is generated by natural sources, such as solar, wind, water, coal, oil, etc. In the U.S about 40% of energy is used to generate electricity. A third of natural gas, for example, is used to generate electricity and the other two thirds are used in other capacities in industry and transportation.<sup>8</sup> The International Energy Agency, 2010, stated that globally electricity constitutes only about eighteen percent of global energy use.

### **I. Germany's Energy Companies: From Nuclear Energy to Fossil Fuel or Renewables?**

By July 2012, after Merkel's announcement, RWE, the second largest energy provider in Germany, had shifted its course, stating that for financial reasons, it decided to divest from nuclear energy, both internationally and domestically.<sup>9</sup> Internationally, RWE phased out its planned work on new nuclear reactors, for example in the U.K.<sup>10</sup> RWE's Chief Executive Officer Peter Terium admitted, "it was a mistake to have rejected solar energy for such a long time" (*Die Zeit*, October 25, 2012).<sup>11</sup> This trend of losses for nuclear energy and a shift to renewable energy for RWE has

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<sup>8</sup> For a helpful elaboration on the distinction between energy and electricity that includes a useful chart, see "Energy vs. Electricity and WE Why Care," *NGNP Alliance*, 25 February 2013. <http://blog.ngnpalliance.org/energy-vs-electricity-and-why-we-care/>

<sup>9</sup> Boerse.de, which tracks German stocks, reported on January 29, 2016 that the value of RWE stock had dropped 75 percent over the past decade. "E.ON und RWE: Dividenden-Ausblick," *boerse.de*, 29 January, 2016. <<http://www.boerse.de/top-news/EON-und-RWE-Dividenden-Saison-2016-wartet/7634603>>

<sup>10</sup> "UK Energy Plans in 'Tatters' after NPower and E.ON Nuclear Plant Withdrawal," *The Telegraph*, 29 March, 2012. <<http://www.telegraph.co.uk/news/earth/energy/nuclearpower/9173253/UK-energy-plans-in-tatters-after-Npower-and-E.-ON-nuclear-plant-withdrawal.html>>

<sup>11</sup> "RWE stoppt Bau neuer Atomkraftwerke," *Die Zeit*, 25 October, 2012. <<http://www.zeit.de/wirtschaft/unternehmen/2012-10/rwe-atomkraftwerke-baustopp>>

continued. On January 26, 2016, RWE announced that its losses in 2013 and 2014 would severely impact German cities, such as Essen, Mülheim and Duisberg, in Germany's most populated state, North-Rhine Westphalia, in which it is based. RWE CEO Terium announced that he would seek to reboot the company through a new daughter company, named Newco, launched in April 2016, which will focus on renewable energy. About 60,000 RWE employees will transfer to Newco. The older fossil fuels—gas, coal and nuclear energy—will remain with the much shrunken RWE.<sup>12</sup> RWE continues to pull out of planned nuclear energy projects, for example in the U.K., marking also an about face on this issue. On February 17, 2016, the *Financial Times* reported that RWE's share value has continued to fall for 2015, due to competition from renewables (*Financial Times*, February 27, 2016).<sup>13</sup>

RWE's rival, E.ON, Germany's largest energy provider, is "pushing through a similar split" but with one key and telling difference (*Financial Times*, February 27, 2016).<sup>14</sup> On April 27, 2015, E.ON announced that effective January 1, 2016, it would split into two companies.<sup>15</sup> One, still named E.ON, would move to Essen, North-Rhine Westphalia; and focus on and devote the majority, that is, over two thirds or 40,000, of its employees to renewable energy. A new company, named Uniper, would split off, remain in Düsseldorf, stay focused on nuclear and coal power plants, and keep under a third or 15,000 of the employees. Tellingly, E.ON, as mentioned, Germany's

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Translation my own. Additionally, RWE has also been reducing the number of its brown coal power plants.

<sup>12</sup> "Kursverluste bei RWE fressen das Kapitel der Städte auf," *WAZ*, 26 January, 2016. <<http://www.derwesten.de/wirtschaft/kursverluste-bei-rwe-fressen-das-kapital-der-staedte-auf-id11499182.html>>

<sup>13</sup> Guy Chazan, "RWE Shares Falls 13 percent As It Scraps Its 2015 Dividends," *Financial Times*, 27 February, 2016.

<sup>14</sup> Guy Chazan, "RWE Shares Falls 13 percent As It Scraps Its 2015 Dividends," *Financial Times*, 27 February, 2016.

<sup>15</sup> "E.ON Kraftgewerkschaft wird 'Uniper' heißen," *Handelsblatt*, 27 April, 2015. <<http://www.handelsblatt.com/unternehmen/industrie/energiekonzern-eon-kraftwerksgeschaefte-wird-uniper-heissen/11696584.html>>

largest energy provider would be *rebranded* as a renewable energy company, rather than have the new company, Uniper, focus on renewable energy. On January 26, 2016, media outlets reported that E.ON had hired solar specialists who formerly worked for Phoenix Solar, one of Germany's largest solar photovoltaic companies. This shift can be read as a direct response to an issue E.ON and RWE share: on January 26, 2016, Boerse.de, which covers German stocks, reported that the value of E.ON stock, like that of RWE, had dropped, by about 60 percent in value over the past decade.<sup>16</sup>

EnBW, Germany's third largest energy producer, after RWE and E.ON, faces a similar fate. According to *Bloomberg Business*, it had to "write down the value of some of its generators for the second time in two years" (*Bloomberg Business*, February 2, 2016).<sup>17</sup> "EnBW" the article continued, "earlier announced a 700 million euro (\$764 million) write-down on its fossil fuel plants, citing a slump in power prices to the lowest level in more than a decade" (*Bloomberg Business*, February 2, 2016).<sup>18</sup> When Chancellor Merkel announced the nuclear shutdown, EnBW had already been working for one year with Siemens to install Germany's first commercial offshore wind farm in the North Sea. After the nuclear shutdown, it began work on a second commercial offshore windfarm in the North Sea. Mostly recently, EnBW signed a contract with Siemens for wind turbines for its project "Hohe See."<sup>19</sup>

Lastly, Vattenfall, Germany's fourth largest energy producer, a subsidiary of a Swedish company of the same name, has also shifted from fossil fuels to renewable energy. In October 2014,

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<sup>16</sup> "E.ON und RWE: Dividenden Ausblick," *boerse.de*, 29 January, 2016. <<http://www.boerse.de/top-news/EON-und-RWE-Dividenden-Saison-2016-wartet/7634603>>

<sup>17</sup> "RWE May Join EnBW, EON in Plant Writedowns as Prices Slump," *Bloomberg Business*, 2 February, 2016. <<http://www.bloomberg.com/news/articles/2016-02-02/rwe-may-join-enbw-con-in-power-plant-writedowns-as-prices-slump>>

<sup>18</sup> "RWE May Join EnBW, EON in Plant Writedowns as Prices Slump," *Bloomberg Business*, 2 February, 2016. <<http://www.bloomberg.com/news/articles/2016-02-02/rwe-may-join-enbw-con-in-power-plant-writedowns-as-prices-slump>>

<sup>19</sup> "EnBW, Siemens Sign Offshore Wind Turbine Delivery Contract," *Reuters*, 22 February, 2016. <<http://af.reuters.com/article/energyOilNews/idAFFWN16101T>>

Vattenfall announced that it would seek to sell its lignite power plants and mines in former East Germany. According to the *Financial Times*, "[Vattenfall] was seeking to sell the German lignite business to switch to renewable energy and reduce its CO2 emissions" (*Financial Times*, September 22, 2015).<sup>20</sup> The article outlined that this shift resulted partially from pressure of the Green Party, dominant in Vattenfall's home country Sweden. According to *Reuters*, "Vattenfall has put its German lignite assets for sale following large writedowns and a radical shift in the country's energy policy, with renewables pushing many conventional power plants out of the market" (*Reuters*, December 18, 2015).<sup>21</sup> *Deutsche Welle* stated that the sale and "Sweden's state-owned utilities company looks set on making fossil fuel a thing of the past" (*Deutsche Welle*, September 22, 2015).<sup>22</sup> Among the unusual purchasers of the coal plants that emerged, intent on helping to make fossil fuels a thing of the past, was Greenpeace.<sup>23</sup>

In sum, then, the profits of the four major energy-producing companies, who stated that the nuclear phase-out would lead to rolling blackouts, have bottomed out, forcing them, even if they were dragging their heels, to shift to renewable energy. But has Germany shifted its sources of energy to dirty fossil fuels, as the companies also threatened? Studies confirm that that has not been the case either. According to the German Federal Ministry of Economic Affairs and Energy, Germany's energy sources in 2015, the most recent year for which figures were available at the time this article was written, break down as follows: 33.8 percent petroleum; 21.0 percent natural gas; 12.7 percent anthracite or bituminous coal; 12.6 percent renewable energy; 11.9 percent lignite, also

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<sup>20</sup> Jeevan Vasagar and Richard Milne, "Vattenfall Invites Bids for German Lignite," *Financial Times*, 22 September, 2015. <<http://www.ft.com/cms/s/0/33ea5a4a-610e-11e5-97e9-7f0bf5e7177b.html>>

<sup>21</sup> "Vattenfall Eyes Deal on German Lignite Assets Sale," *Reuters*, 18 December, 2015. <<http://www.reuters.com/article/vattenfall-germany-lignite-idUSL8N1471W020151218>>

<sup>22</sup> "Vattenfall Opens Bidding on Lignite Business," *Deutsche Welle*, 22 September, 2015. <<http://www.dw.com/en/vattenfall-opens-bidding-on-lignite-business/a-18729496>>

<sup>23</sup> "Greenpeace Plans Bid for Vattenfall's German Coal Business," *Deutsche Welle*, 6 October, 2015. <<http://www.dw.com/en/greenpeace-plans-bid-for-vattenfalls-german-coal-business/a-18763586>>

referred to as brown coal; and 8.1 percent nuclear energy. The use of nuclear energy has decreased from a high of approximately 12 percent for the decade from 1996 to 2006, to a new low of 7.5 percent. The use of fossil fuels has decreased as well from a peak of 40 percent for petroleum in 1993 to its current low of 33.6 percent average since 2010. As the use of nuclear energy and fossil fuels has decreased, the use of renewable energy has inversely increased. While it now provides 12.6 percent of Germany's energy needs, it was a mere 0.13 percent in 1990. The growth of renewable energy used to generate electricity, specifically, is even more impressive: renewables provided 3.4 percent of Germany's electricity in 1990; increased to 4.7 percent in 1995; to 6.2 percent in 2000; to 10.2 percent in 2005; to 17.0 percent in 2010; to 27.4 percent in 2014.<sup>24</sup>

But it was not only the 2011 decision to shut down its nuclear energy industry that led to the power shift to renewable energy in Germany. Well a decade prior, Germany had drafted and ratified the *Erneuerbare Energien Gesetz* (EEG, Renewable Energy Act): Germany's plan that laid out detailed targets for renewables as part of a broader *Energiewende* or energy transition. This legislation has led Germany to be a leader worldwide in the very successful state-sponsored implementation of a renewable energy shift.

## II. Germany's Renewable Energy Act

Before the 2011 announcement of the nuclear phase out, Germany had already unveiled four iterations of its renewable energy plan, outlining its energy policy for the period up to 2050. Germany ratified the first draft on March 29, 2000; it took effect on April 1, 2000.<sup>25</sup> Germany's

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<sup>24</sup> German Federal Ministry of Economic Affairs and Energy, "Development of Renewable Energy Sources in Germany, 2014," December 2015. <[http://www.erneuerbare-energien.de/EE/Redaktion/DE/Downloads/development-of-renewable-energy-sources-in-germany-2014.pdf?\\_\\_blob=publicationFile&v=6](http://www.erneuerbare-energien.de/EE/Redaktion/DE/Downloads/development-of-renewable-energy-sources-in-germany-2014.pdf?__blob=publicationFile&v=6)>

<sup>25</sup> German Federal Ministry for Justice and Consumer Rights, *Bundesgesetzblatt*, Part 1, Number 13, 31 March, 2000.

Renewable Energy Act seeks to achieve four basic goals: 1. to develop sustainable energy sources; 2. to internalize long-term external effects or costs; 3. to protect or conserve fossil fuel energy sources; and 4. to fund research and development of technologies to produce electricity from renewable sources.

Germany's Renewably Energy Act dates back to an earlier law that set Germany on a different course from the rest of the world and determined its place as a leader in the production and use of renewable energy. Germany ratified the *Gesetz über die Einspeisung von Strom aus erneuerbaren Energien in das öffentliche Netz* (The Act on the Sale of Electricity to the Grid), more commonly referred to as the *Stromeinspeisungsgesetz* (Electricity Feed-in-Law), on December 7, 1990 and it took effect on January 1, 1991. For a brief point about the date and then more will follow on the feed-in-law.<sup>26</sup>

1990 is a crucial date for Germany and for discussions of CO2 emissions reductions globally, for example, at the international UN climate negotiations. For Germany, 1990 was one short year after the fall of the Berlin Wall and the year of reunification. Globally, 1990 serves as the baseline year for measuring CO2 emissions reductions precisely because the industry of much of former Eastern Europe and the Soviet Union had previously been coal reliant and thus heavily CO2 emitting.<sup>27</sup>

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<[http://www.bgb1.de/xaver/bgb1/start.xav?startbk=Bundesanzeiger\\_BGB1&jumpTo=bgb1100s0305.pdf](http://www.bgb1.de/xaver/bgb1/start.xav?startbk=Bundesanzeiger_BGB1&jumpTo=bgb1100s0305.pdf)>

<sup>26</sup> In the U.S. excess energy generated on the roofs of private homes is sold back to the utility and referred to as driving the electric meter backwards.

<sup>27</sup> The beginning of the industrial revolution is typically dated back to between the late 18th and early 19th century and to an improvement on the steam engine, through the Watt steam engine, which permitted work to be carried out wherever and whenever steam—produced through heated water, or burning coal or wood—was available. Raymond Williams, for example, in his entry on "industry" in *Keywords: A Vocabulary of Culture and Society*, writes, "The idea of a new social order based on major industrial change was clear as early as Blake in the early 1790s and Wordsworth at the turn of the [19th] century." Raymond Williams, "Industry," *Keywords: A Vocabulary of Culture and Society* (New York: Oxford UP, 1976), 165-167. Here, 166.



The EU, using 1990 as a baseline, has offered a 20 percent reduction of its CO2 emissions by 2020 as part of its so-called 2020 plan.<sup>28</sup> The U.S. has offered a 17 percent reduction. It sounds close to the EU's offer, except that the U.S., by contrast, uses 2004 as its baseline year, thereby distorting the amount of its CO2 reductions. Using a 1990 baseline, the offer of the U.S. equals a paltry 3-4 percent reduction.

By ratifying the Electricity Feed-in-Law in 1990, Germany established public policy on the issue early on, compared, say, with the U.S., which over 25 years later still has no such nation-wide law and not many such state laws.<sup>29</sup> The early ratification means that Germany's renewable energy industry has received federal recognition and financial support, by having a federally mandated guaranteed buyer of the electricity generated by customers for over twenty-five years.

Through the Electricity Feed-in-Law, Germany provided financial incentives and feed-in-tariffs in order to support wind, bioenergy, and hydropower early on. The Electricity Feed-in-Law consists of five paragraphs drafted by Wolfgang Daniels (The Greens) and Matthias Engelsberger (Christian Social Union, CSU, Bavaria's sister party of the Christian Democratic Union or CDU party). It was submitted solely by the CDU / CSU, a stipulation of the CDU party, then ruling under Chancellor Helmut Kohl in a coalition with the libertarian FDP (Free Democratic Party).

The law contains five key components. First, the law governs the receipt of and payment for electricity that is produced through water, wind, sun, landfill gas, sewer gas (also referred to as

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<sup>28</sup> The 2020 plan, drafted in 2007 and implemented in 2009, also calls for 20 percent of the EU's energy to be derived from renewable energy and for a 20 percent improvement on energy efficiency by 2020. Source: European Commission.

<[http://ec.europa.eu/clima/policies/strategies/2020/index\\_en.htm](http://ec.europa.eu/clima/policies/strategies/2020/index_en.htm)>

<sup>29</sup> The American Legislative Exchange Council (ALEC), funded by the Koch Brothers, has also been actively working to push back against and to derail any proposed state laws, establishing, for example, renewable energy standards (RES). But ALEC in turn has suffered push back from the wind and solar industry. C.f. Tina Gerhardt, "Wind and Solar Groups Flee ALEC," *The Progressive*, 1 February, 2013. <<http://www.progressive.org/news/2013/02/180802/wind-and-solar-groups-flee-alec>>

biogas) and biomass, and that is transferred to the public electricity or utility companies. Second, this law not only regulates the sale of electricity sold back to the grid but *obligates* utility companies to receive and reimburse for electricity produced, a so-called feed-in-tariff, in that energy fed in is paid, that is, given a tariff. Under the feed-in-tariff utility companies would pay individuals who produced energy for it. And the federal legislation obligates utility companies to do so. Third, the law regulated the amount of the compensation, although it changed every year. The amount of remuneration was based on the "mean specific revenues for all electricity sold via the public electricity grid in the previous year."<sup>30</sup> Wind and solar were to be compensated with 90 percent of the previous year's rate. Between 65 percent and 75 percent per kilowatt of the previous year's mean rate was paid for electricity derived from water (hydro), landfill and sewer gas (biomass), and biogas. Fourth, the law included a hardship clause, which stated that it would not obligate utility companies to see this compensation through if it proved to be financially untenable. The fifth section stated that the law would take effect on January 1, 1991. The plan targeted both large and small power plants.

The precursor of E.ON, PreussenElektra, challenged the feed-in-tariff, taking it to the EU's top court and arguing that it was a subsidy unfairly benefitting the renewable energy industry. The European Court of Justice ruled that the feed-in-tariff program did not constitute state aid:

statutory provisions of a Member State which, first, require private electricity supply undertakings to purchase electricity produced in their area of supply from renewable energy sources at minimum prices higher than the real economic value of that type of electricity, and, second, distribute the financial burden resulting from that obligation between those electricity supply undertakings and upstream private electricity network operators do not constitute State aid.<sup>31</sup>

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<sup>30</sup> Source: International Energy Agency (IEA).

<<http://www.iea.org/policiesandmeasures/pams/germany/>>

<sup>31</sup> PreussenElektra AG v Schleswig AG, in the presence of Windpark Reußenköge III GmbH and Land Schleswig-Holstein, Case C-379/98 (European Court of Justice, March 13, 2001). "Reference for a preliminary ruling: Landgericht Kiel - Germany. Electricity - renewable sources of energy - National legislation requiring electricity supply undertakings to purchase electricity at minimum prices and apportioning the resulting costs between those undertakings and upstream network

Furthermore, the court's decision stated that Germany was in compliance with EU pledges to reduce greenhouse gas emissions (ghg's) and also struck down the lawsuit on these grounds:

In the current state of Community law concerning the electricity market, statutory provisions of a Member State which, first, require private electricity supply undertakings to purchase electricity produced in their area of supply from renewable energy sources at minimum prices higher than the real economic value of that type of electricity, and, second, distribute the financial burden resulting from that obligation between those electricity supply undertakings and upstream private electricity network operators are not incompatible with Article 30 of the EC Treaty (now, after amendment, Article 28 EC), such provisions being useful for protecting the environment in so far as the use of renewable energy sources which they are intended to promote contributes to the reduction in emissions of greenhouse gases which are amongst the main causes of climate change which the European Community and its Member States have pledged to combat.<sup>32</sup>

This ruling, it was hoped, would quash subsequent legal challenges to the Feed-in-Tariff law. In 1998, just prior to the 2000 update to the law, Germany liberalized the energy market in that entities that generated and that distributed power had to be separate. Additionally, between 1999 and 2003, an eco-tax charged a few extra cents per kilowatt-hour of electricity generated by fossil fuels, reducing overall consumption.

In 2000 the law was amended and replaced by the *Erneuerbare Energien Gesetz* (EEG, Renewable Energy Sources Act) mentioned at the outset of this section. Authored by Hans-Josef Fell (The Alliance 90 / The Greens) and Hermann Scheer (SPD), the goal of the 2000 iteration was "in the interest of climate and environmental protection, to sustainably develop an energy source and to increase the amount of renewable energy in electricity production in order to support the goals of the EU and of Germany to at least double the amount of electricity produced by renewable sources by 2010."<sup>33</sup> It sought to meet the demands of the Kyoto Protocol, signed in 1992, in which

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operators - State aid - Compatibility with the free movement of goods." <<http://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:61998CJ0379&from=EN>>

<sup>32</sup> *ibid.*

<sup>33</sup> German Federal Ministry for Justice and Consumer Rights (Bundesministerium für Justiz und Verbraucherschutz). *Bundesgesetzblatt*, Part 1, Number 13, 31 March, 2000.

Germany agreed to reduce its ghg emissions by 21 percent. It was the first time a German law stated outright that renewable energy was the priority. The 2000 EEG also overhauled the previous 1991 system of feed-in-tariff system, which was based on the retail rate (see above). Rates paid would now be linked to the cost of investment. The new law established a payment structure consisting of five levels for various sources, ranging from water, to landfill gases, to biogas, to biomass, to geothermal, to wind and to solar. The prices put forward were for new facilities (so from 2000 on) and to be valid for twenty years.<sup>34</sup>

The 2000 EEG also included the "100,000 roofs" initiative, which funded the installation of photovoltaic units on rooftops by granting private individuals, freelancers or independent contractors, and small businesses access to reduced interest loans. The program was based on the earlier "1000 roofs" project, initiated after the fall of the wall and in existence from 1990 to 1992. Between 1992 and 1999, the initiatives for solar power were largely uncoordinated on the national level. Lacking nation-wide backing, the installation rate fell into disarray. The "100,000 roofs" program was a nation-wide, state-subsidized program intended to foster solar anew. It was overhauled in the 2004 update to the Renewable Energy Act (EEG 2004).

The EEG 2004 set targets for renewable energy, enshrining them in law for the first time and establishing 1. how much, or what percentage of, energy was to be derived from renewable sources and 2. by when, that is, by which year. It put forth that 12.5 percent of energy was to be derived from renewable energy by 2010 and 20 percent by 2020. These targets have featured in the subsequent updates to the EEG (in 2009, 2012 and 2014). Germany has consistently beaten the targets set and moved forward by setting the bar higher. This fact shows what can be achieved by

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<[http://www.bgb1.de/xaver/bgb1/start.xav?startbk=Bundesanzeiger\\_BGB1&jumpTo=bgb1100s0305.pdf](http://www.bgb1.de/xaver/bgb1/start.xav?startbk=Bundesanzeiger_BGB1&jumpTo=bgb1100s0305.pdf)> Translation the author's.

<sup>34</sup> Additionally, in 2000, the Schroeder government, in agreement with nuclear power plant operators and owners, decided to phase out nuclear energy by 2022.

having in place a state-wide system devoted to supporting renewable energy, politically and financially. Leveling the playing field is a crucial factor in Germany's energy transition. Energy analysts and economists underscore that Germany's upfront investments in renewable energy have paid off, in that Germany no longer has to pay the exorbitant costs associated with environmental and health degradation that result from fossil fuels and still faced by other nations stuck in an earlier epoch, such as the United States. Furthermore, not having to pay these costs stabilizes Germany's economy and having a reliable domestic source of energy stabilizes Germany's energy security.

The EEG 2004 maintained the five different aspects of the previous 2000 EEG but changed them slightly to accord with new EU guidelines implemented in 2001. The first section preserved the obligation to connect, purchase and compensate for electricity generated by renewable sources. The second section preserved the obligation of large energy providers to accept energy from those providers who have small or medium-sized networks. The third section stipulated that the network transmitters then had to balance out the accepted electricity amount and payments among themselves. The fourth section obligated distributors to shift energy to electricity traders or merchants, who provided it in their region to consumers. And the fifth section discussed shifting costs to consumers. In two decisions in 2003, Germany's Federal Court made it clear that the EEG accorded with the German constitution and thus does not allow for challenges on the grounds of it being unconstitutional.

The law was revised in 2009 by the then ruling coalition of the CDU (Christian Democratic Union) and the SPD (Social Democratic Party of Germany) brought into power when Angela Merkel (CDU) was elected chancellor in 2005. The Greens no longer formed part of the ruling coalition. The EEG 2009 ballooned from the scant two pages with which it started in 1990 to fifty-one pages. The priorities of the CDU and the SPD, which focused on bringing the EEG into alignment with the market, inform the 2009 revisions. This market-oriented approach played out in

two key changes to the Renewable Energy Act. First, the feed-in-tariffs paid were reduced. Second, suppliers were encouraged instead to sell their electricity derived from renewable sources directly on the market. The rationale given was that this would ostensibly avoid bottlenecks in the supply line. These two shifts reduced the income guaranteed to small-scale producers of renewable energy and placed them in the position of competing on the open market, obviously not a level playing field, and incurring the costs of doing so.<sup>35</sup>

2009 was also a key year for renewable energy in Europe, in that the Europe 2020 plan superseded the Lisbon Strategy or Agenda, also referred to as the Lisbon Treaty. The Europe 2020 plan, which covered 2010-2020, made energy a shared goal of the newly expanded EU and its member states. Launched in 2010, the Europe 2020 plan established targets for five areas to be achieved by 2020.<sup>36</sup> One of the areas was climate and energy. It included 3 specific targets. First, the EU aimed to reduce greenhouse gas emissions by 20 percent relative to 1990 levels by 2020. The EU offered to reduce ghgs by 30 percent, if other developed countries made similar commitments. Second, the EU aimed to increase the percentage of renewable sources used to produce energy to 20 percent. Third, the EU sought to increase energy efficiency by 20 percent.

The points of this EU transition were intended to provide greater energy security for the EU and for Germany, as each reduced its dependence on fossil fuels. The EU put forth that it would work with businesses, trade unions, NGOs and consumer organizations to achieve these targets. The EU argued that this energy transition would reduce exposing EU businesses to energy price shocks. The EU also argued that it would create an estimated 600,000 jobs in the renewable energy

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<sup>35</sup> In 2010, Merkel modified Schroeder's agreement with nuclear power plants somewhat, extending the life of Germany's seventeen remaining nuclear power plants by eight to fourteen years, so to between 2018 and 2024.

<sup>36</sup> The information in this paragraph and the subsequent paragraph is based on the targets put forward at the EU's 2020 site. <[http://ec.europa.eu/europe2020/europe-2020-in-a-nutshell/priorities/sustainable-growth/index\\_en.htm](http://ec.europa.eu/europe2020/europe-2020-in-a-nutshell/priorities/sustainable-growth/index_en.htm)>

industry and 400,000 jobs to meet the energy efficiency goal. The energy shift, the EU argued, would also help to prevent climate change related disasters and the expenses incurred in responding to them and their potential disruption to business. In other words, taking measures to avert climate change would make the EU's economy more resilient.

In Germany, specifically, renewable energy manufacturing, particularly the wind sector, experienced similar job increases. According to Germany's Ministry of Environment, in 2009, "approximately 300,500 jobs have been created in the renewable energy sector over the past years. About 87,000 people are currently employed in the wind energy sector alone."<sup>37</sup> By 2013, that number had leaped up to 372,000 jobs in the renewable energy sector, but if one takes into account the number of related jobs in policy, research and development, legislation, grid expansion, training and education, the number might be as high as 1.5 million jobs.<sup>38</sup> Since most of this solar and wind energy is generated domestically, the move to renewable energy also boosts Germany's energy security.

On August 30, 2011, Germany's Minister of Environment, Norbert Röttgen, announced that renewable sources were already meeting more than 20 percent of Germany's electricity needs. It was the highest ratio of electricity produced by renewable sources in Germany thus far.

In 2012, the EEG was again renewed. This time, Germany increased the targets put forward for renewable energy. By 2020, 35 percent of electricity was to be derived from renewable sources. By 2030, it was to be at least 50 percent. By 2040, it was to be at least 65 percent and by 2050, it was

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<sup>37</sup> Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, 2009. <[http://www.germany.info/contentblob/2674836/Daten/748503/BMU\\_Gross\\_employment\\_from\\_RE\\_in\\_Germany\\_2009\\_DD.pdf](http://www.germany.info/contentblob/2674836/Daten/748503/BMU_Gross_employment_from_RE_in_Germany_2009_DD.pdf)>

<sup>38</sup> Paul Hockenos, "Where the Energiewende Creates Jobs," Clean Energy Wire, 20 March, 2015. <<https://www.cleanenergywire.org/factsheets/where-energiewende-creates-jobs>>

to be at least 80 percent.<sup>39</sup> Particular attention was placed in the EEG 2012 on the integration of the market, distribution and system. This focus intended to optimize the interplay between renewable and fossil fuel energy sources, both in its use and in its storage. Bioenergy was also revisited, specifically how it was processed and stored. Additionally, the revised law stipulated that at least 20 percent of fluctuating renewable energies (wind, solar) were introduced.

The results did not take long to manifest. In May 2012, Germany set a new *world* record for the amount of energy generated by solar energy. In one day, it derived 50 percent of its energy from solar. In November of 2012, Germany's energy exports reached new record levels. And these results manifested in electricity as well. By 2013, Germany derived 25 percent of its electricity from renewable sources.<sup>40</sup>

In 2012, as part of the EEG, Germany implemented new guidelines for photovoltaic energy. In the EEG amendment on Photovoltaik 2012, Germany established guidelines for four sizes of photovoltaic generators, measured by kilowatts produced. Section two stated that new guidelines would no longer reimburse for photovoltaic installations larger than 10 MW. According to section three, the amount paid out for photovoltaic installations already established, connected and generating energy was to be reduced by 15 percent.<sup>41</sup> As a result of these shifts, Germany's boom in rooftop and onshore solar ended and its installation rates declined sharply. If connectivity in China improves, it will overtake Germany, which has been the global leader in solar energy for years, well ahead of China, Japan and the United States.

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<sup>39</sup> "Germany," International Energy Agency.  
<<http://www.iea.org/policiesandmeasures/pams/germany/name-25107-en.php>>

<sup>40</sup> Neighboring Denmark set a world record in 2015 for the amount of electricity generated by wind: 42%.

<sup>41</sup> "Die wichtigsten Änderungen der EEG-Novelle zur Photovoltaik 2012," Eneuerbare Energien, 28 June, 2012. <[http://www.erneuerbare-energien.de/EE/Redaktion/DE/Downloads/die\\_wichtigsten\\_aenderungen\\_der\\_eeg\\_novelle\\_zur\\_photovoltaik\\_2012.pdf?\\_\\_blob=publicationFile&v=1](http://www.erneuerbare-energien.de/EE/Redaktion/DE/Downloads/die_wichtigsten_aenderungen_der_eeg_novelle_zur_photovoltaik_2012.pdf?__blob=publicationFile&v=1)>



Subsequent revisions to Germany's EEG took effect, most recently, in 2014.<sup>42</sup> The EEG Reform 2014 explicitly stated that the cost of electricity is a clear component of making energy competitive. Thus, this iteration of the EEG sought to do a better job of reducing and distributing the costs of supporting and promoting renewable energy. Additionally, it sought to continue and to steer the expansion of renewable energy. It sought to bring renewable energy into the market more, by requiring that new photovoltaic farms were put out for bids rather than subsidized by guaranteed funds. Additionally, the reform sought to connect the EEG plan with European frameworks. And it intended to set up a schedule for 2014 to revisit aspects of the EEG reform and ensure proper implementation. The 2014 reform intended to re-evaluate the EEG overall.

And in 2014, the German government set the benchmarks even higher: by 2025, Germany should aim to generate 40-45 percent of its electricity through renewable sources; and by 2035, it should be 55-60 percent. By 2050, Germany hopes to meet 80 percent of its electricity needs through renewable sources.<sup>43</sup>

On 25 July, 2015, the rewards of Germany's transition to renewables set a new record: through a combination of sun in the south of Germany and wind of its northern shores, and installed photovoltaic and wind turbines in both respectively, Germany met 78 percent of the day's electricity needs with renewable sources. The previous record was 74 percent and set the year prior, in May of 2014.<sup>44</sup>

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<sup>42</sup> For the most recent revisions, see the website of the German Federal Ministry of the Economy. Text available in German only. <<http://www.bmwi.de/BMWi/Redaktion/PDF/G/gesetz-fuer-den-ausbau-erneuerbarer-energien,property=pdf,bereich=bmwi2012,sprache=de,rwb=true.pdf>>

<sup>43</sup> Dr. Matthias Lang and Annette Lang, "Overview Renewable Energy Sources Act," Germany Energy Blog, 2014. <[http://www.germanenergyblog.de/?page\\_id=283](http://www.germanenergyblog.de/?page_id=283)>

<sup>44</sup> Ari Phillips, "Germany Just Got 78 Percent of Its Electricity from Renewable Sources," *Think Progress*, 29 July, 2015. <<http://thinkprogress.org/climate/2015/07/29/3685555/germany-sets-new-renewable-energy-record/>>

According to a June 2015 report commissioned by the *Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit* (the Federal Ministry for Environment, Natural Protection and the Safety of Nuclear Reactors) and conducted by the *Frauenhofer ISI* and *Ecofys*, Germany currently gets 26 percent of its electricity from renewable energy.<sup>45</sup> The study compared electricity production in seven countries: China, France, Germany, the Netherlands, the United Kingdom and in the United States, the production in Pennsylvania and Texas. That, in the case of the United States, electricity production not of the nation on a whole but of two specific states was compared with six other countries is itself indicative of how uniform, by nation, policy is in other countries, in contrast to the U.S., where it is shaped much more intensely by state policy.

It is no small feat that Germany remains well ahead of its targets, given that it is a manufacturing powerhouse. In 2015, Germany was the world's fourth largest economy and third largest exporter. And it starkly contradicts the blackout scenarios predicted early on by skeptics and cited at the outset of this article. In fact, Germany has the most reliable power supply in Europe and far fewer electricity interruptions than the United States, which has ten times as many.<sup>46</sup>

In an editorial, Germany's Minister of Environment Röttgen argued that the government's political and financial commitment to renewable energy had already paid off but that further

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<sup>45</sup> Katrina Grave, Felix von Blücher, Dr. Barbara Breitschopf, Dr. Martin Pudlik, "Strommärkte im internationalen Vergleich," Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit, June, 2015.

<<http://www.bmwi.de/BMWi/Redaktion/PDF/Publikationen/Studien/strommaerkte-im-internationalen-vergleich,property=pdf,bereich=bmwi2012,sprache=de,rwb=true.pdf>>

<sup>46</sup> In 2011, Germany had an average of 15.31 minutes of interruption. It was a new record for the country for stability. In 2007, Germany had 19.25 minutes of interruption. In 2007, the U.S., by contrast had 240 minutes of interruption, "putting it at the back of the ranking in the chart." "German Grid Reaches Record Reliability in 2011," 9 May, 2012.

<<http://www.renewablesinternational.net/german-grid-reaches-record-reliability-in-2011/150/537/56183/>>

investments were necessary.<sup>47</sup> Germany's use of renewables grew from 5 percent in 1999 to 17 percent in 2010 to 26 percent in 2013. Wind energy contributed the most to this growth. Germany's 2013 rate of 26 percent of renewables breaks down as follows: 9 percent wind power; 9 percent biomass; 5 percent solar photovoltaic; and 3 percent hydroelectricity.<sup>48</sup>

Why does what happens in Germany matter? According to a 2014 report conducted by the Solar Energy Industries Association (SEIA):

Germany is unique among OECD countries in having managed to significantly increase the share of renewables in its electricity mix – by now a power generation share of some 25 percent has been reached. [...] After the *market introduction* phase, Germany is entering the *market penetration* phase of its renewables deployment, shifting from a primary goal of supporting the early technological development with an emphasis on affecting cost reductions through scaling and learning to a phase of developing complementary technologies and market mechanisms that make a future electricity system powered essentially by renewable technologies alone feasible. Aggressive greenhouse gas reduction targets are widespread, including in the United States. Germany's experience therefore likely provides an opportunity to "look ahead" and see how electricity systems and the rules governing them will have to adapt when penetration rates of various renewable energy sources reach levels similar to those in Germany today and beyond.<sup>49</sup>

Germany exemplifies how the state *can* bring about an energy transition. That is, it could be read as an instance of positive use of the state to address climate change. Early on, Germany's policy-makers played a dominant role in the evolution of feed-in-tariffs for renewable energy. Feed-in-tariffs are an effective policy instrument by which renewable energy is promoted. Additionally, the consistent support of the government for renewable energy in Germany brought down the cost of rooftop solar installation, so that it became increasingly competitive with fossil fuels, achieving grid parity.

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<sup>47</sup> Norbert Röttgen, "A Green Future for Europe's Biggest Economy: What Germany Must Learn from Chernobyl and Fukushima," *Spiegel*, 27 April, 2011. <<http://www.spiegel.de/international/germany/a-green-future-for-europe-s-biggest-economy-what-germany-must-learn-from-chernobyl-and-fukushima-a-759228.html>>

<sup>48</sup> International Energy Agency, "Germany Energy Overview 2014," June 2014. <<http://www.iea.org/media/countries/slt/GermanyOnepagerJune2014.pdf>>

<sup>49</sup> The Brattle Group, "Solar Energy Support in Germany: A Closer Look," Solar Energy Industries Association, July 2014. <<http://www.seia.org/research-resources/solar-energy-support-germany-closer-look>>

### III. U.S.'s Lacking Federal Renewable Energy Policy

In the United States, by contrast, renewable energy still faces an uphill battle to maintain its current level of government investment. Wind energy in the U.S., unlike in Germany, relies on tax credits. The tax credit is a notoriously fickle way to fund renewable energy. The Production Tax Credit, which subsidizes wind energy, needs to be renewed annually. Corporate investors in renewables consistently cite the U.S. tax structure as a reason why they invest more in other countries, such as Brazil, China and Germany, where they enjoy more state financial support. Internationally, renewable energy has witnessed double-digit growth, according to the 2011 Global Status Report.<sup>50</sup>

A day before Röttgen's announcement of Germany's growth in 2011, a bipartisan group of 24 U.S. governors sent a letter to President Obama, calling on his administration to boost investment in wind energy. They demanded that tax credits due to expire in 2012 be extended by seven years. They also called for a rethink about funding structures of renewable energies.

While national legislative gridlock looms, states are circumventing it by increasingly including Renewable Energy Standards (RES) and Renewable Portfolio Standards (RPS) in their state-wide energy plans. These standards stipulate that a certain percentage of energy must be derived from renewable sources. According to the Renewable Energy Policy Network for the 21st Century (REN 21), 144 (of 193) nations worldwide had renewable energy targets in 2014.<sup>51</sup> According to the

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<sup>50</sup> Of course, not all are convinced. Lincoln L. Davies, for example, has done work on Germany's feed-in-tariff model, arguing that the pricing for renewable energy also offers uncertainty. Lincoln L. Davies and Kirsten Allen, "Feed-in-Tariffs in Turmoil," *West Virginia Law Review* 116 (2014): 937-1007, especially section II, "Germany," pp. 942-966.

<sup>51</sup> "Renewables 2014 Global Status Report," Renewable Energy Policy Network for the 21st Century, p. 4.  
<[http://www.ren21.net/Portals/0/documents/Resources/GSR/2014/GSR2014\\_KeyFindings\\_low%20res.pdf](http://www.ren21.net/Portals/0/documents/Resources/GSR/2014/GSR2014_KeyFindings_low%20res.pdf)>

International Renewable Energy Agency, 164 had renewable energy targets in 2015 and they have quadrupled since 2005.<sup>52</sup>

According to the American Wind Energy Association (AWEA), in the U.S., as a result of the Production Tax Credit, the amount of new wind energy capacity installed in the US in 2011 is 72 percent higher than the amount installed in the same period one year earlier. But keeping that rate of installation high rests on reliable investment. As Peter Kelley, Vice-President of Public Affairs at AWEA put it once in an interview: "Having reliable funding available is key to ensuring continued growth of renewable energy."<sup>53</sup>

The effects of the Production Tax Credit, fickle as the policy is, have been in evidence. According to the Global Wind Energy Report published in February 2016, China has both installed the largest amount of new capacity (48.4 percent of the market) and the largest amount of cumulative capacity (33.6 percent of the market), followed by the U.S.: 13.6 percent new and 17.2 percent cumulatively; Germany: 9.5 percent new and 10.4 percent cumulatively; Brazil, 4.4 percent new; and India: 4.2 percent new and 5.8 percent cumulative. Wind energy is only forecast to grow in future years, calculated either in terms of market growth, or in terms of electricity generated.

If the U.S. wanted to see a successful transition to renewable energy, it could make the wind production tax credit permanent. Moreover, it could include it in a national policy on renewable energy. For a while, it seemed that given the gridlock at the national level on energy policy, work at the state level could circumvent it. The progress in the U.S. could, despite setbacks at both the federal and the state level, nonetheless be read as a sign of renewable energy's success in the U.S.:

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<sup>52</sup> "Renewable Energy Target Setting," International Renewable Energy Agency, June 10, 2015. <<http://www.irena.org/menu/index.aspx?mnu=Subcat&PriMenuID=36&CatID=141&SubcatID=602>>

<sup>53</sup> Tina Gerhardt, "Germany's Renewable Energy Path to a Nuke-Free Future," *Earth Island Journal*, 14 September, 2011. <[http://www.earthisland.org/journal/index.php/elist/eListRead/germanys\\_renewable\\_path\\_to\\_a\\_nuke-free\\_future/](http://www.earthisland.org/journal/index.php/elist/eListRead/germanys_renewable_path_to_a_nuke-free_future/)>

that is, even with the chips so stacked against it, no national legislation setting up targets, no federal subsidies on a par with Germany, renewable energy continues to succeed and even threaten fossil fuel industries' growth and profits. One can only imagine how the situation would look if renewable energy were supported by the state in the U.S.<sup>54</sup>

#### **IV. Conclusion**

Germany's renewable energy shift, brought about by a consistent, long-term state support for renewable energy, demonstrates what can be achieved when the state makes a commitment to leveling the playing field. Despite fear mongering by the nuclear energy industry and the fossil fuel industry, Germany's energy shift did not lead to rolling blackouts. In fact, it has one of the most stable energy grids worldwide and in the EU. The U.S. pales in comparison, its rankings on par with so-called third world countries.

The success of Germany's strategy lies in its coordination at the national level. It also rests on the feed-in-tariff model, which created a decentralized model whereby individuals could benefit from the photovoltaic panels installed by feeding excess energy back into the grid and be paid for it. Additionally, it mandated a level playing field by mandating the market participate in the distributed energy generation. Other countries can take a page from the German model, by shifting to renewable energy. This form of energy creates more jobs and also leads to energy independence and thus stability. By averting the environmental degradation brought about by fossil fuels, Germany also avoids the economic costs affiliated with them. Overall, Germany's renewable energy transition, although not without its shortcomings, provides a model for other nations.

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<sup>54</sup> Additionally, real progress has been made on the distributed solar side but now there is a retrenchment of state level net energy metering policies that allowed homeowners and solar companies to take advantage of the federal Investment Tax Credit.

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## References

- "Atomausstieg: RWE Chef warnt vor Industrieschwund in Deutschland." *Spiegel*, June 10, 2011.
- The Brattle Group. "Solar Energy Support in Germany: A Closer Look." Solar Energy Industries Association, July 2014.
- Chazan, Guy. "RWE Shares Falls 13 percent As It Scraps Its 2015 Dividends." *Financial Times*, February 27, 2016.
- "EnBW, Siemens Sign Offshore Wind Turbine Delivery Contract." *Reuters*, February 22, 2016.
- "E.ON Kraftgewerkschaft wird 'Uniper' heißen." *Handelsblatt*, April 27, 2015.
- "E.ON und RWE: Dividenden Ausblick." *boerse.de*, January 29, 2016.
- Gerhardt, Tina. "Germany's Renewable Energy Path to a Nuke-Free Future." *Earth Island Journal*. September 14, 2011.
- Gerhardt, Tina. "Wind and Solar Groups Flee ALEC." *The Progressive*. February 1, 2013.
- German Federal Ministry of Economic Affairs and Energy. "Development of Renewable Energy Sources in Germany, 2014," December 2015.
- German Federal Ministry for Justice and Consumer Rights. *Bundesgesetzblatt*, Teil 1, Nr. 13, March 31, 2000.
- "German Grid Reaches Record Reliability in 2011." May 9, 2012.
- Grave, Katrina, Felix von Blücher, Dr. Barbara Breitschopf, Dr. Martin Pudlik, "Strommärkte im internationalen Vergleich." Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit, June, 2015.
- "Greenpeace Plans Bid for Vattenfall's German Coal Business." *Deutsche Welle*, October 6, 2015.
- Hockenos, Paul. "Where the Energiewende Creates Jobs." *Clean Energy Wire*, March 20, 2015.
- "Kursverluste bei RWE fressen das Kapitel der Städte auf." *WAZ*, January 26, 2016.
- Lang, Dr. Matthias and Annette Lang. "Overview Renewable Energy Sources Act." *Germany Energy Blog*, 2014.
- Lilley, Sasha, et al, 2012. *Catastrophism: The Apocalyptic Politics of Collapse and Rebirth*. Oakland: PM Press.



- Phillips, Ari. "Germany Just Got 78 Percent of Its Electricity from Renewable Sources." *Think Progress*, July 29, 2015.
- PreussenElektra AG v Schleswig AG, in the presence of Windpark Reußenköge III GmbH and Land Schleswig-Holstein, Case C-379/98 (European Court of Justice, March 13, 2001).
- "Renewable Energy Target Setting." International Renewable Energy Agency, June 10, 2015.
- "Renewables 2014 Global Status Report." Renewable Energy Policy Network for the 21st Century, 4.
- Röttgen, Norbert. "A Green Future for Europe's Biggest Economy: What Germany Must Learn from Chernobyl and Fukushima." *Spiegel*, April 27, 2011.
- "RWE stoppt Bau neuer Atomkraftwerke." *Die Zeit*, October 25, 2012.
- "RWE May Join EnBW, EON in Plant Writedowns as Prices Slump." *Bloomberg Business*, February 2, 2016.
- "Siemens to Quit Nuclear Industry." *BBC News*, September 18, 2011.
- "UK Energy Plans in 'Tatters' after NPower and E.ON Nuclear Plant Withdrawal." *The Telegraph*, March 29, 2012.
- Uken, Marlies. "Winter in Deutschland: Im Stromnetz wird es eng." *Die Zeit*, December 20, 2011.
- Vasagar, Jeevan and Richard Milne, "Vattenfall Invites Bids for German Lignite." *Financial Times*, September 22, 2015.
- "Vattenfall Eyes Deal on German Lignite Assets Sale." *Reuters*, December 18, 2015.
- "Vattenfall Opens Bidding on Lignite Business." *Deutsche Welle*, September 22, 2015.
- Wetzel, Daniel. "Stromkonzerne nennen Zeitpunkt für Blackout." *Die Welt*, May 22, 2011.
- "Die wichtigsten Änderungen der EEG-Novelle zur Photovoltaik 2012." Eneuerbare Energien, June 28, 2012.
- Williams, Raymond. 1976. "Industry." *Keywords: A Vocabulary of Culture and Society*. Oxford: Oxford UP. 165-167.