

# AN ANALYSIS OF A SHIFTING ENERGY PARADIGM

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## I. INTRODUCTION

Energy generation sources have changed over the history of the United States due to the development of new sources and evolution in energy consumption. In the late eighteenth century, the typical energy source relied on wood and water power until the mid- to late-nineteenth century.<sup>1</sup> As the Industrial Revolution made way through the United States, petroleum products became the primary source of energy and have remained the dominant means of energy production.<sup>2</sup> However, as technology advances, the United States is undergoing another energy shift, in which reliance on fossil-fuel-based energy production is diminishing, opening a market that thrives on renewable energy.<sup>3</sup> Although energy policy is influenced by more factors than the production and utilization of energy generation, there is an inevitable paradigm shift from fossil fuel reliance to renewable energy. This paper aims to address the implications of a shifting energy paradigm regarding its impact on employment distribution, energy production, and the environment with an analysis of energy policies under the Obama and Trump administrations.

## II. BACKGROUND OF U.S. ENERGY POLICY

There is an energy trilemma between energy economics, affordability, and assured energy security.<sup>4</sup> Energy policy and usage have played a significant role in policymaking throughout U.S. history. Since World War II, energy production of many resources, but

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<sup>1</sup> See *Energy Sources Have Changed Throughout the History of the United States*, U.S. ENERGY INFO. ADMIN. (July 3, 2013), <https://www.eia.gov/todayinenergy/detail.php?id=11951>.

<sup>2</sup> *Id.*

<sup>3</sup> See generally *Annual Energy Outlook of 2018*, U.S. ENERGY INFO. ADMIN., (Feb. 6, 2018), <https://www.eia.gov/outlooks/aeo/pdf/AEO2018.pdf>. (Provides modeled projections of domestic energy markets through 2050).

<sup>4</sup> See William J. Nuttall, et al., *Energy and the Military: Convergence of Security, Economic, and Environmental Decision-Making*, ENERGY POLICY RESEARCH GROUP, UNIVERSITY OF CAMBRIDGE, 2 (Nov. 2017).

specifically oil, and the resulting security concerns have come to have a great source of influence on foreign-policy and politics.<sup>5</sup> For example, in 1945, President Roosevelt declared Saudi oil vital to U.S. security and began to provide financial support towards securing oil capacity.<sup>6</sup> Today, the influence that energy has is evident with the relationship between the US and OPEC countries. The blur between energy and foreign-policy has dictated funding for research and development, as well as the securement of energy sources. This makes an energy shift to renewables extremely difficult and complicated.

Energy policy within the United States is generally dictated by the federal government.<sup>7</sup> While the Department of Energy (“DOE”) and Federal Energy Regulatory Commission (“FERC”) set the national policy for energy regulation, the military has taken a leadership role in research and development of energy technologies.<sup>8</sup> Non-military drivers of energy research and development consists of primarily privately-owned energy sectors who interact with public policy to promote economic competitiveness via affordability, and to achieve environmental goals in areas such as climate change, air pollution, and water quality.<sup>9</sup>

On a state level, states are given federal incentives for renewable energy development. These are seen through tax credits, deductions, and exemptions, as well as grants and financing opportunities.<sup>10</sup> Non-federal incentives include carbon pricing mechanisms, emission reduction potentials, renewable energy portfolio standards, and net metering.<sup>11</sup> Furthermore, jurisdictions

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<sup>5</sup> *Id.*

<sup>6</sup> *See Oil Dependence and U.S. Foreign Policy*, COUNCIL ON FOREIGN RELATIONS, <https://www.cfr.org/timeline/oil-dependence-and-us-foreign-policy> (last visited Jan. 04, 2019).

<sup>7</sup> *See The Clean Power Plan*, UNION OF CONCERNED SCIENTISTS, (Nov. 1, 2018), <https://www.ucsusa.org/our-work/global-warming/reduce-emissions/what-is-the-clean-power-plan#.W9xsDHPKjOQ>.

<sup>8</sup> *See Nuttall, supra* note 4, at 2.

<sup>9</sup> *Id.*

<sup>10</sup> *See Oil Dependence and U.S. Foreign Policy, supra* note 6.

<sup>11</sup> Jeremiah I. Williamson & Matthias L. Sayer, *Federalism in Renewable Energy Policy*, 27 NAT. RES. & ENV'T 19, 19-23 (2012).

are encouraged to work in conjunction with one another through multi-state or regional compacts to reduce costs such as technological costs to developing more efficient and clean energy.<sup>12</sup> However, states possess a unique mix of electricity-generation resources and incentives tend to vary by state. For example, states such as North Carolina implemented aggressive personal and business income energy tax credits, whereas Massachusetts deployed a sales tax policy.<sup>13</sup> For sake of relevance, this analysis will focus on federal policies and regulations.

### **III. IMPLICATIONS OF SHIFTING ENERGY PRODUCTION FROM FOSSIL FUELS TO RENEWABLES**

#### **A. Direct and Indirect Comparisons of Fossil Fuel and Renewable Energy Spending**

The fossil fuel industry heavily relies on subsidies. \$20.5 billion is spent annually on direct subsidies for fossil fuel production, not including an additional \$14.5 billion in consumption subsidies.<sup>14</sup> In direct comparison, renewable energy subsidies are a fraction of the subsidies received by the fossil fuel industry. The primary support for renewables are non-permanent investment and production tax credits that account for approximately \$1.1 million, which is still minute compared to the \$7.4 billion permanent fossil fuel tax breaks.<sup>15</sup> This does not include the approximate \$5.3 trillion spent on indirect subsidies to the fossil fuel industry that go towards military spending, such a protecting oil shipping routes, and mitigating adverse health impacts.<sup>16</sup>

There are indirect energy spending comparisons between fossil fuels and renewable energy, as well. During the early twentieth century, the world shifted toward oil as the main

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<sup>12</sup> *Id.*

<sup>13</sup> *Id.*

<sup>14</sup> David Roberts, *Friendly Policies Keep US Oil and Coal Afloat Far More Than We Thought*, VOX (July 26, 2018), <https://www.vox.com/energy-and-environment/2017/10/6/16428458/us-energy-coal-oil-subsidies>.

<sup>15</sup> *Id.*

<sup>16</sup> *Id.*

energy source, creating a race to energy security and geopolitical positioning.<sup>17</sup> This became an important factor in U.S. foreign policy and U.S. military strategy and remains so today through the positioning of military resources to secure oil supplies and to maintain the stability of world oil markets.<sup>18</sup>

Negative health externalities caused by fossil fuel production put a great economic burden on public health, adding up to more than \$100 billion per year.<sup>19</sup> Statistics show that poor, minority groups have a greater predisposition to being exposed to the health risks and costs of fossil fuel production such as fine particle pollution.<sup>20</sup> Non-profits, such as the National Academy of Sciences, have attempted to assign a monetary value to the adverse health effects correlated to the burning of fossil fuels.<sup>21</sup>

Although those studies have become outdated, research has now shifted to focus on reduction models that demonstrate the difference that clean energy policies can make. For example, the Environmental Protection Agency (“EPA”) developed a screening and mapping tool (“COBRA”) that assesses health and economic benefits of clean energy.<sup>22</sup> COBRA provides an updated assessment that calculates the value of clean energy policies, and state and local governments can use the tool to assess emission estimates, air quality, and air pollution sources.<sup>23</sup>

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<sup>17</sup> See Nuttall, *supra* note 4, at 8.

<sup>18</sup> *Id.*

<sup>19</sup> *Id.*

<sup>20</sup> Conrad Schneider & Jonathan Banks, *The Toll From Coal: An Updated Assessment of Death and Disease from America's Deadliest Energy Source*, CLEAN AIR TASK FORCE, 4 (2010).

<sup>21</sup> *Hidden Costs of Fossil Fuels*, UNION OF CONCERNED SCIENTISTS, (Aug. 30, 2016), <https://www.ucsusa.org/clean-energy/coal-and-other-fossil-fuels/hidden-cost-of-fossils#.W9haZBNKjOQ>.

<sup>22</sup> *Energy Resources for State and Local Governments*, EPA, (May 2018), <https://www.epa.gov/statelocalenergy/co-benefits-risk-assessment-cobra-health-impacts-screening-and-mapping-tool>.

<sup>23</sup> *Id.*

## B. Energy Production

Total energy production is predicted to increase by approximately thirty-one percent from 2017 through 2050.<sup>24</sup> Energy production growth is dependent on the development of technology, available resources, and market conditions.<sup>25</sup> Under current projections, natural gas will make up the largest share in total energy production while renewable energy will account for the largest growth in percentage.<sup>26</sup> However, despite stable production projections from 2006 to 2016, net coal generation has declined by approximately fifty percent, while generation from natural gas increased by thirty-three percent and solar by over five-thousand percent.<sup>27</sup>

There is no argument that electric generation mix in the United States is changing, driven by the transition of coal-fired power plants to natural gas and the increase in low carbon sources of energy.<sup>28</sup> However, under the latest U.S. Energy Information Administration (“EIA”) modeling, the majority of U.S. electrical generation will continue to come from fossil fuels, including coal and natural gas, which will provide fifty-three percent of total U.S. generation through 2040.<sup>29</sup>

## C. Employment

The relevant energy employment discussed here encompasses research, development, production, construction, manufacturing, transmission, and distribution. Fuel source shifts in electric generation mirror the energy sector’s changing employment profile, resulting in a pattern showing that as the share of natural gas, solar, and wind workers increase, coal mining and other

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<sup>24</sup> See *Annual Energy Outlook of 2018*, *supra* note 3, at 18.

<sup>25</sup> *Id.*

<sup>26</sup> *Id.*

<sup>27</sup> *2017 Energy and Employment Report*, DEP’T OF ENERGY, 21 (Jan. 3, 2017), [https://www.energy.gov/sites/prod/files/2017/01/f34/2017%20US%20Energy%20and%20Jobs%20Report\\_0.pdf](https://www.energy.gov/sites/prod/files/2017/01/f34/2017%20US%20Energy%20and%20Jobs%20Report_0.pdf).

<sup>28</sup> *Id.*

<sup>29</sup> *Id.*

related employment is declining.<sup>30</sup> Employment within the fossil fuels sector declined by eight percent in the last year, with losses being largely driven by declines in oil, gas, and coal employment.<sup>31</sup> The Bureau of Labor Statistics reported that coal mining and support employment declined by thirty-nine percent from March 2009 to March 2016, with a twenty-four percent decline in the last year alone.<sup>32</sup> Although natural gas is categorized with fossil fuels, its production is predicted to account for nearly thirty-nine percent of U.S. energy production by 2050.<sup>33</sup> However, despite the increase in natural gas employment, current trends predict that fossil fuel employment as a whole will continue to decline by an additional two percent over the next twelve months.<sup>34</sup>

In terms of renewables, solar development has been the most successful, and solar industry workers currently account for the largest share of workers in the electric power generation sector.<sup>35</sup> The solar industry currently employs almost 374,000 workers. Employment demands are dominated by labor in power generation facilities and construction to increase existing solar generation capacity.<sup>36</sup>

#### **IV. ENERGY POLICY UNDER THE OBAMA ADMINISTRATION**

Policies such as the Clean Power Plan (“CPP”) placed regulations on pre-existing fossil fuel plants. Being the first of its kind, the CPP was unveiled in 2015 and aimed to limit carbon pollution from power plants.<sup>37</sup> The CPP offered incentives for states to cut emissions and to determine feasible state emissions reduction targets. Options set forth included: (1) “investing in

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<sup>30</sup> *Id.*

<sup>31</sup> *Id.* at 22.

<sup>32</sup> *Id.* at 40.

<sup>33</sup> See *Annual Energy Outlook of 2018*, *supra* note 3, at 20.

<sup>34</sup> See *2017 Energy and Employment Report*, *supra* note 27, at 24.

<sup>35</sup> *Id.* at 28.

<sup>36</sup> *Id.*

<sup>37</sup> *The Clean Power Plan*, ENVTL. DEFENSE FUND, <https://www.edf.org/clean-power-plan-resources>.

renewable energy, energy efficiency, natural gas, and nuclear power”; (2) slowing the hasty transition to natural gas reliance; and (3) “shifting away from coal-fired power.”<sup>38</sup> States that joined would ultimately compete to invest in clean energy and develop technologies to reduce energy-related carbon emissions.<sup>39</sup>

The CPP set a goal of thirty-two percent reduction of carbon emissions by 2030, estimated that it would save the United States \$20 billion in climate-related costs, and predicted the delivery of up to \$34 billion in positive health benefits.<sup>40</sup> However, critics argued that the Clean Power Plan allowed the EPA to “dramatically stretch[] the EPA’s authority under the Clean Air Act.”<sup>41</sup> Critics further argued that states were not given as much control as they should have had, noting that twenty-seven states, twenty-four trade associations, thirty-seven electric cooperatives, and three labor unions filed lawsuits to stop the regulation.<sup>42</sup>

In addition to the CPP, the Obama Administration also allocated funding to encourage the transition of fossil fuel workers into the renewable energy sector.<sup>43</sup> In May 2016, the Department of Energy (“DOE”) awarded \$10 million to ten different projects through its Solar Training and Education for Professionals (“STEP”) program, which was created to help meet rising demand for “well-qualified, highly skilled installers and other industry-related professionals.”<sup>44</sup> The STEP program was intended “to advance America’s solar workforce by providing innovative

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<sup>38</sup> *The Clean Power Plan*, *supra* note 7.

<sup>39</sup> *Id.*

<sup>40</sup> *Save the Clean Power Plan*, NAT. RES. DEFENSE COUNCIL (2018), <https://www.nrdc.org/save-clean-power-plan>.

<sup>41</sup> Dan Byers, *Seven Ways EPA’s Affordable Clean Energy Rule is a Better Approach than the Clean Power Plan*, GLOBAL ENERGY INSTITUTE, U.S. CHAMBER OF COMMERCE, (Aug. 21, 2018), <https://www.globalenergyinstitute.org/seven-ways-epa%E2%80%99s-affordable-clean-energy-rule-better-approach-clean-power-plan>.

<sup>42</sup> *Id.*

<sup>43</sup> *Fact Sheet: Obama Administration Announces New Financing for Renewable Energy Projects*, DEP’T OF ENERGY, (Nov. 14, 2016), <https://www.energy.gov/articles/fact-sheet-obama-administration-announces-new-financing-renewable-energy-projects-and>

<sup>44</sup> *Energy Department Launches Five New Solar Ready Vets Training Locations, Announces \$10 Million for National Solar Training Programs*, DEP’T OF ENERGY (MAY 17, 2016), <https://www.energy.gov/articles/energy-department-launches-five-new-solar-ready-vets-training-locations-announces-10>.

training programs that will help to meet President Obama’s goal to train 75,000 [people] in solar energy by 2020.”<sup>45</sup>

STEP programs included Solar Ready Vets and Engineering for Accelerated Renewable Energy Deployment, both programs where veterans were connected to solar training institutions and engineering students were trained to add increased distributed energy to the grid, respectively.<sup>46</sup> Further, STEP allocated money to the North American Board of Certified Energy Professionals (“NABCEP”) to provide training and qualifications for solar installers and develop industry-validated certifications to help transition coal workers into the solar industry.<sup>47</sup>

However, the integration of displaced fossil fuel workers into the renewable energy sector offers challenges of its own due to geographic resource availability. To address this critical issue, the Obama Administration implemented the Power Plus (“Power+”) initiative that set aside \$38 million to assist the influx of communities struggling with the decline of the coal industry.<sup>48</sup> Power+ grants were designed to help "create a more vibrant economic future for coal-impacted communities by cultivating economic diversity, enhancing job training and re-employment opportunities, creating jobs in existing or new industries, and attracting new sources of investment" and have been awarded to projects in places like West Virginia and New Mexico.<sup>49</sup>

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<sup>45</sup> *Solar Training and Education for Professionals (STEP)*, OFFICE OF ENERGY EFFICIENCY & RENEWABLE ENERGY, <https://www.energy.gov/eere/solar/solar-training-and-education-professionals-step> (last visited Jan. 5, 2019).

<sup>46</sup> *Id.*

<sup>47</sup> Jennifer Runyon, *Renewable Energy Training Opportunities for Vets and Displaced Fossil Energy Workers*, RENEWABLE ENERGY WORLD (July 20, 2016), <https://www.renewableenergyworld.com/articles/2016/07/renewable-energy-training-opportunities-for-vets-and-displaced-fossil-energy-workers.html>.

<sup>48</sup> *POWER Initiative — POWER+ For The People*, APPALACHIAN CITIZENS' LAW CENTER (2018), <http://www.powerplusplan.org/power-initiative/>.

<sup>49</sup> *Id.*

## V. ENERGY POLICY UNDER THE TRUMP ADMINISTRATION

Research shows that political orientation significantly influences support for energy policies.<sup>50</sup> The conservative movement is known to challenge progressive social movements and the utilization of impact science,<sup>51</sup> which is being demonstrated under the Trump administration.

The Trump Administration has made their support for fossil fuel production obvious. In early 2017, the Trump administration swiftly moved to repeal various Obama-era coal and fossil fuel-related environmental regulations.<sup>52</sup> The first of these included a rule aimed at keeping pollutants out of streams in areas near mountaintop removal coal-mining sites.<sup>53</sup> Next, President Trump quickly repealed the CPP, replacing it with the Affordable Clean Energy Rule (“ACE”).<sup>54</sup> Components of ACE include emission-reduction through setting “heat-rate improvements” for coal power plants and state-set limits of power-plant emissions.<sup>55</sup> Critics argue that ACE sets a low bar for emission regulation where heat rate improvements do not apply to gas plants and that miniscule efficiency improvements may only slightly reduce emissions.<sup>56</sup> Furthermore, critics state that ACE allows states to “set weaker standards, or no standards at all, letting old, inefficient coal-fired power plants continue to emit carbon pollution unchecked.”<sup>57</sup>

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<sup>50</sup> Thomas Dietz, et al., *Politics Shapes Individual Choices About Energy Efficiency*, PROCS. NAT’L. ACAD. SCI., (May 24, 2013), <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3677459/>.

<sup>51</sup> Arron M. McCright & Riley E. Dunlap, *Anti-Reflexivity: The American Conservative Movement’s Success in Undermining Climate Science and Policy*, 27 THEORY CULTURE & SOCIETY 100, 105 (May 2010).

<sup>52</sup> Michael Greshko, et al., *A Running List of How President Trump is Changing Environmental Policy*, NAT’L GEOGRAPHIC (Dec. 6, 2018), <https://news.nationalgeographic.com/2017/03/how-trump-is-changing-science-environment/>.

<sup>53</sup> Lisa Lambert, *Coal Rule Killed by U.S. Congress, others near chopping block*, REUTERS (02 Feb. 2017), <https://www.reuters.com/article/us-usa-congress-regulations/coal-rule-killed-by-u-s-congress-others-near-chopping-block-idUSKBN15H2PC>.

<sup>54</sup> Lissa Lynch, *Trump’s Clean Power Plan Replacement Is WORSE Than Nothing*, NAT. RES. DEFENSE COUNCIL (Aug 21, 2018), <https://www.nrdc.org/experts/lissa-lynch/trumps-clean-power-plan-replacement-worse-nothing>.

<sup>55</sup> *Id.*

<sup>56</sup> *Id.*

<sup>57</sup> *Id.*

## VI. CONCLUSION

Ultimately, U.S. energy production is nowhere near being dominated by renewable resources. Although zero-reliance on fossil fuels is currently unfeasible, this reliance can be significantly reduced if the U.S. pursues renewable energy as wholeheartedly as it once did with fossil fuels.

Many who oppose the idea of transitioning from fossil fuels, particularly coal, to renewable energy, center their argument on the high cost and capital investment of transitioning to and building new infrastructure.<sup>58</sup> This argument is flawed, since the current direct and indirect negative externalities and monetary expenses associated with fossil fuels are not considered.<sup>59</sup> National subsidies to oil, gas and coal producers amount to \$20 billion annually in the U.S.,<sup>60</sup> not including the additional indirect monetary impacts discussed earlier.

Fossil fuels have significant negative externalities, and data presented by the EIA suggests an inevitable shift to cleaner, renewable energy production. The costs of retraining the majority of coal employees to solar workers is estimated to cost \$180 million or a worst-case scenario of \$1.87 billion,<sup>61</sup> which still would only be 0.0052% to 0.0543% of the annual Federal Budget.<sup>62</sup> The energy market is dictated by technology, available resources, and market conditions. Through a combination of reductions in technology costs and implementation of

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<sup>58</sup> See Roberts, *supra* note 14.

<sup>59</sup> *Id.*

<sup>60</sup> Janet Redman, *Dirty Energy Dominance: Dependent on Denial – How U.S. Fossil Fuel Industry Depends on Subsidies and Climate Denial*. OIL CHANGE INT’L, (Oct. 3, 2017), <http://priceofoil.org/2017/10/03/dirty-energy-dominance-us-subsidies/>.

<sup>61</sup> Derek Markham, *Relatively Minor Retraining Investment Could Transition All Coal Workers To Solar Jobs*. CLEANTECHNICA (Aug. 10, 2016), <https://cleantechnica.com/2016/08/10/relatively-minor-retraining-investment-transition-coal-workers-solar-jobs/>.

<sup>62</sup> *Id.*

policies that encourage the use of renewables at the federal and state levels, generation costs will continue to decrease, which will continue to drive the adoption of renewable generation up.<sup>63</sup>

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<sup>63</sup> See *Annual Energy Outlook of 2018*, *supra* note 3, at 14.