

WATER, WIND, AND FIRE: A CALL FOR A FEDERAL RENEWABLE PORTFOLIO STANDARD

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“By failing to prepare, you are preparing to fail.”
– Benjamin Franklin

I. INTRODUCTION

In the 1980’s, acid rain began to have a serious cumulative effect on the Northeastern United States.¹ Acid rain is formed when electrical utilities and other industries combust fossil fuel and release sulfur dioxide and nitrogen oxide.² These byproducts react with water, oxygen, carbon dioxide, and sunlight to become sulfuric and nitric acids.³ Precipitation then transports the sulfuric and nitric acids as acid rain from the atmosphere to the ground where they harm the environment.⁴ The acid rain crisis in the 1980’s destroyed Northeastern spruce forests by depleting nutrients in the soil.⁵ It also damaged fish populations by leaching aluminum from the banks and clogging their gills.⁶ By 1991, 5% of lakes in northeastern states were acidic.⁷

Acid rain is an inherently trans-border problem. The acid rain in New England largely originates from emissions in the Midwest.⁸ Therefore, efforts

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1. *E.g.*, Frederic C. Menz & Hans M. Seip, *Acid Rain in Europe and the United States: An Update*, 7 ENVTL. SCI. & POL’Y 253, 253 (2004); Bill Chameides, *U.S. Acid Rain Regulations: Did They Work?*, HUFFINGTON POST (May 10, 2013 4:19 PM), http://www.huffingtonpost.com/bill-chameides/us-acid-rain-regulations_b_1.

2. *Acid Rain*, NAT’L ATMOSPHERIC DEPOSITION PROGRAM, http://nadp.sws.uiuc.edu/educ/acid_rain.aspx (last visited Nov. 10, 2014).

3. *Id.*

4. *Id.*

5. *Acid Rain Questions & Answers*, N.Y. DEP’T OF ENVTL. CONSERVATION, <http://www.dec.ny.gov/chemical/8418.html> (last visited Oct. 3, 2014).

6. *Id.*

7. Two percent of lakes could no longer support brook trout and 6% could no longer support minnow species. *Acid Rain in New England: A Brief History*, U.S. EPA (Sept. 19, 2013), <http://www.epa.gov/region1/eco/acidrain/history.html> [hereinafter *A Brief History*].

8. *See id.* (linking long-range SO₂ transportation with high pollutant concentrations in Northeastern lakes); *see also* Howard Perlman, *Acid Rain: Do You Need to Start Wearing a Rainhat?*, U.S. GEOLOGICAL SURVEY (last updated Mar. 17, 2014, 11:03 AM), <http://water.usgs.gov/edu/acidrain.html> (discussing wind

to curb sulfur or nitrogen emissions in the Northeast cannot prevent acid rain from falling on the region's waterways. In 1990, George H.W. Bush signed amendments to the Clean Air Act that established a federal program to control sulfur dioxide and nitrogen oxide emissions.⁹ Title IV of the amendments required an almost 10 million ton reduction of sulfur dioxide in two phases over five years.¹⁰ By 2013, sulfur dioxide emissions had already decreased 5.5 million tons while nitrogen oxide had decreased 3 million tons.¹¹ The new regulations led to an approximately 40% reduction in sulfate deposited by acid rain in New England.¹² The program succeeded by controlling pollution in the Midwestern origin states for the affected northeastern states' benefit.¹³

The acid rain program is one successful example of why federal action is needed on environmental issues. If the states were left to their own devices, those responsible for acid rain—that do not suffer the associated environmental degradation—would have little incentive to bear the regulatory costs.

Carbon dioxide (CO₂), like the air pollutants that cause acid rain, is a trans-boundary problem that cannot be effectively regulated on a state-by-state basis. One increasingly favored way to address carbon dioxide emissions from power plants is to institute a renewable portfolio standard (RPS),¹⁴ also called a renewable electricity standard (RES).¹⁵ An RPS is a legislative requirement that electricity providers obtain a certain amount of the power sold to consumers from renewable sources.¹⁶ An RPS is often stated as a percentage of total energy sold to consumers.¹⁷ Beyond this general definition, RPSs vary widely regarding the percentage of energy that must come from renewables; what is considered a renewable source; and how utilities can reach the required renewable energy percentage (whether from energy conservation, direct investment in new renewable generation facilities, purchasing agreements, or other options).¹⁸

One significant benefit of an RPS is that it can reduce carbon dioxide and

direction bringing pollution from the Midwest to the Northeast).

9. Clean Air Act Amendments of 1990, Pub. L. No. 101-549, §§ 403, 407, 104 Stat. 2399 (1990) (codified at 42 U.S.C. §§ 7401-7700 (2012)); *A Brief History*, *supra* note 7.

10. *See* 42 U.S.C. § 7651(c), (d) (delineating the two reduction phases).

11. *Acid Rain in New England*, U.S. EPA (Sept. 19, 2013), <http://www.epa.gov/region1/eco/acidrain/index.html>.

12. *Id.*

13. *See* Chameides, *supra* note 1 (maps depicting high levels of wet hydrogen ion deposits on the U.S. Eastern Seaboard in 1994, as compared with very mild levels in 2010; little to no change is shown on the Western Seaboard as there was minimal deposition in the earlier time period).

14. Lincoln L. Davies, *Energy Policy Today and Tomorrow—Toward Sustainability?*, 29 J. LAND RESOURCES & ENVTL. L. 71, 84 (2009).

15. *E.g.*, FRED BOSSELMAN ET AL., *ENERGY, ECONOMICS & THE ENVIRONMENT* 875 (Robert C. Clark et al. eds., 3d ed. 2010) (defining the terms as interchangeable).

16. *Id.*

17. *Id.*

18. *See Rules, Regulations & Policies for Renewable Energy*, DSIRE, <http://www.dsireusa.org/summarytables/rpre.cfm> (last visited Oct. 8, 2014) (illustrating the variation between RPS policies within the U.S.).

other pollution by replacing current fuel sources for electricity generation with lower-carbon alternatives.¹⁹ However, the real importance of RPSs is that they create a market for renewable energy sources. The market then drives investment and innovation, which in turn lays the groundwork for a sustainable energy future.²⁰ Economies of scale also help lower the cost of renewable energy generation.²¹

Before President Obama took office he promised to create a federal renewable portfolio standard as part of his Obama-Biden Economic Plan.²² The Plan proposed an RPS requiring that 25% of American electricity be renewably generated by 2025.²³ However, five years later, Obama's 2013 Climate Action Plan did not even mention a federal RPS.²⁴ Instead, the 2013 Climate Action Plan focused on EPA regulation of CO₂ emissions.²⁵

On June 28, 2014, per President Obama's Climate Action Plan, the U.S. Environmental Protection Agency (EPA) released a draft rule for addressing CO₂ emissions.²⁶ The rule, called the Clean Power Plan (CPP), proposes to regulate carbon dioxide emissions from existing fossil fuel-fired power plants by setting state-by-state rate-based goals.²⁷ The CPP has two parts: first, "state-specific emission rate-based CO₂ goals;" and second, "guidelines for how states can set-up and implement their state plans."²⁸ The CPP aims to reduce carbon pollution by up to 30% from 2005 levels.²⁹ While direct federal regulation may be relatively effective at reducing CO₂ emissions, the CPP does not supplant the need for a nationwide RPS.

The Clean Power Plan is an insufficient attempt to address carbon dioxide emissions in the United States because it does not compel the major fossil fuel-burning states to invest in renewable electricity infrastructure.³⁰ Instead, the

19. See, e.g., GALEN BARBOSE, LAWRENCE BERKELEY NAT'L LAB., RENEWABLES PORTFOLIO STANDARDS IN THE UNITED STATES: A STATUS UPDATE 2 (Nov. 6, 2013), available at http://emp.lbl.gov/sites/all/files/rps_summit_nov_2013.pdf (attributing domestic renewable energy growth to RPS policies); Davies, *supra* note 14, at 84.

20. Davies, *supra* note 14, at 85.

21. Benjamin K. Sovacool & Christopher Cooper, *Congress Got It Wrong: The Case for a National Renewable Portfolio Standard and Implications for Policy*, 3 ENVTL. & ENERGY L. & POL'Y J. 85, 118 (2009) [hereinafter Sovacool & Cooper, *Congress Got It Wrong*].

22. *The Obama-Biden Plan*, OFFICE OF THE PRESIDENT-ELECT, http://change.gov/agenda/economy_agenda/ (last visited Oct. 3, 2014).

23. *Id.*

24. See generally EXEC. OFFICE OF THE PRESIDENT, THE PRESIDENT'S CLIMATE ACTION PLAN 4 (June, 25 2013), available at <http://www.whitehouse.gov/sites/default/files/image/president27sclimateactionplan.pdf>.

25. *Id.* at 6.

26. Clean Power Plan, 79 Fed. Reg. 34,829 (proposed June 2, 2014) (to be codified at 40 C.F.R. pt. 60).

27. Clean Power Plan, 79 Fed. Reg. at 34,832.

28. *Id.*

29. Janet McCabe, *Understanding State Goals Under the Clean Power Plan*, U.S. EPA CONNECT (June 4, 2014), <http://blog.epa.gov/epaconnect/2014/06/understanding-state-goals-under-the-clean-power-plan/>.

30. See *Fact Sheet: Clean Power Plan State Roles*, U.S. EPA (June 13, 2014), <http://www2.epa.gov/carbon-pollution-standards/fact-sheet-clean-power-plan-state-roles> (providing a list of ways states can meet their goals, many of which do not involve building renewable energy facilities, such as: efficiency improvement at existing plants, energy conservation programs, transmission efficiency improvements, co-

CPP leaves the door open for states to invest in natural gas plants and avoid renewable energy all together.³¹ It is critical that the U.S. accepts its share of the responsibility for addressing current and future climate change by taking more drastic measures to reduce long-term dependence on fossil fuels. Even if the CPP is enacted, there is still a place and a need for a federal RPS.

Currently, thirty of the fifty U.S. states and the District of Columbia have enforceable RPSs.³² Another eight states have renewable portfolio goals.³³ The remaining 12 states, without any form of renewable energy targets, are mostly in two geographical blocks in the Southeastern corner of the U.S. and the Northwest.³⁴

Even though these individual RPSs are better than nothing at all, the state-by-state approach is a completely inadequate substitute for a federally-set, nationwide RPS. In the state-by-state system, a state with a strict RPS may not reap the benefits of its policy if an upwind neighbor is not making similar efforts to reduce fossil-fuel consumption.

In this political climate of tight budgets and a low appetite for increasing voters' living expenses, the state-by-state system incentivizes inaction. Kentucky, which does not have either an RPS or a renewable energy goal, perfectly illustrates this phenomenon. Kentucky emits over 100 million tons of carbon dioxide per year³⁵ and has a population of approximately 4.3 million people.³⁶ New York—which is downwind from Kentucky³⁷—has an RPS³⁸ and emits less than 50 million tons of CO₂,³⁹ despite having a population that is five times larger than Kentucky's.⁴⁰ This gross disparity is due in part to Kentucky's thriving coal combustion industry, and in part to the lack of a state RPS.⁴¹ For

firing or switching to natural gas, constructing new Natural Gas Combined-Cycle plants and demand-side energy efficiency programs).

31. *See id.*

32. The states are: Arizona, California, Colorado, Connecticut, Delaware, Hawaii, Illinois, Iowa, Kansas, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, Montana, Nevada, New Hampshire, New Jersey, New Mexico, New York, North Carolina, Ohio, Oregon, Pennsylvania, Rhode Island, Texas, Washington, West Virginia, and Wisconsin. *Rules, Regulations & Policies, supra* note 18.

33. The states are: Indiana, North Dakota, Oklahoma, South Carolina, South Dakota, Utah, Vermont, and Virginia. *Id.*

34. The states are: Alabama, Alaska, Arkansas, Florida, Georgia, Idaho, Kentucky, Louisiana, Mississippi, Nebraska, Tennessee, and Wyoming. *Most States Have Renewable Portfolio Standards*, U.S. EIA (Feb. 3, 2012), <http://www.eia.gov/todayinenergy/detail.cfm?id=4850>.

35. *GHGRP 2010: Reported Data*, U.S. EPA (last updated Sept. 30, 2014), <http://www.epa.gov/climate/ghgreporting/ghgdata/reported/index.html>.

36. *Kentucky*, U.S. CENSUS BUREAU, <http://quickfacts.census.gov/qfd/states/21000.html> (last visited Oct. 8, 2014).

37. *Cross State Air Pollution Rule: Where You Live*, U.S. EPA (last updated Feb. 27, 2013), <http://www.epa.gov/crossstaterule/whereyoulive.html>.

38. *Renewable Portfolio Standard: New York*, DSIRE (last reviewed Mar. 10, 2014), http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=NY03R.

39. *GHGRP 2010: Reported Data, supra* note 35.

40. *New York*, U.S. CENSUS BUREAU, <http://quickfacts.census.gov/qfd/states/36000.html> (last visited March 27, 2014); *Kentucky, supra* note 36.

41. Jonathan M. Roenker, *The Economic Impact of Coal in Appalachian Kentucky*, UNIV. KY. CTR. FOR

example, in 2009, the Kentucky Public Service Commission rejected a request from the Louisville Gas and Electric Company along with the Kentucky Utilities Company to raise rates as part of a joint long-term contract to purchase wind energy.⁴² Without a mandated renewable energy standard to meet, the increased rates could not be justified.

This Note provides the first broad survey of currently enacted state and international renewable portfolio standards. The background section begins by exploring the worldwide carbon emissions crisis. From there, the discussion examines successful RPSs in other countries to understand how it can be an effective policy tool for reducing emissions. The Note then looks at previous attempts to enact a federal RPS in the United States. Next, the discussion turns to a brief overview of RPSs currently enacted domestically; namely the state-by-state policies and goals. In the analysis section, the Note considers RPS cost implications at the state and federal levels. The last section proposes a federal RPS that is modeled after successful elements taken from state and international examples.

II. BACKGROUND

A. *Renewable Portfolio Standards Are Necessary to Reduce Carbon Dioxide Emissions in the Global Climate Change Era*

In March 2014, the Intergovernmental Panel on Climate Change (IPCC)—under the United Nations’ auspices—released a report on the impact of climate change on people, ecosystems, and the economy.⁴³ The report collated information from 73,000 other studies.⁴⁴ The IPCC found that climate change risks will get dramatically worse as warming increases.⁴⁵ According to the IPCC, these risks include but are not limited to: extreme weather; rising sea levels; ocean acidification; the “breakdown of food systems,” including decreased crop outputs; collapsing tropical fish stock; species migration towards the poles; greater spread of diseases like malaria; heat-associated deaths; and worldwide economic contraction by between 0.2 and 2% per year depending on the temperature rise.⁴⁶

According to more scientific studies than this note could possibly cover,

BUS. & ECON. RESEARCH, <http://cber.uky.edu/Downloads/Roenker02.htm> (last visited Oct. 5, 2014).

42. *Louisville Gas & Elec. Co.*, Case No. 2009-00353, at 8 (Ky. Pub. Serv. Comm. Oct. 21, 2009), available at http://psc.ky.gov/pscscf/2009%20cases/2009-00353/20091110_Attorney_General_and_KIUCs_Joint_Motion_to_Reconsider.PDF.

43. CHRISTOPHER B. FIELD ET AL., INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2014: IMPACTS, ADAPTATION, AND VULNERABILITY 3 (March 31, 2014), available at http://ipcc-wg2.gov/AR5/images/uploads/IPCC_WG2AR5_SPM_Approved.pdf.

44. *In the Balance*, THE ECONOMIST (April 5, 2014), <http://www.economist.com/news/science-and-technology/21600080-new-report-ipcc-implies-climate-exceptionalism-notion>.

45. *Id.*

46. FIELD ET AL., *supra* note 43, at 13; *Threat from Global Warming Heightened in Latest U.N. Report*, REUTERS (March 31, 2014), <http://www.reuters.com/article/2014/03/31/us-climate-ipcc-idUSBREA2U00E20140331>.

climate change is human-induced.⁴⁷ Vincente Barros, co-chair of the IPCC, in discussing the new climate report stated that “[w]e live in an era of man-made climate change.”⁴⁸ The main contributor to climate change is greenhouse gas emissions, specifically carbon dioxide, from fossil fuel combustion.⁴⁹ In 2012, power generation accounted for more than 34% of total carbon dioxide emissions worldwide.⁵⁰ In the United States, approximately 40% of total carbon dioxide emissions—or 2.2 billion tons of CO₂ per year—comes from power plants.⁵¹

Speaking about the IPCC report, UN Climate Chief Christiana Figueres said that the worldwide community has to remain within a “finite, cumulative amount of greenhouse gas emissions in the atmosphere” and “we have already used more than half of that budget.”⁵² In order to stay within that range, fossil fuel use has to decline.⁵³ In a speech to the oil and gas industry, Ms. Figueres said that “three-quarters of [available] fossil fuel reserves need to stay in the ground.”⁵⁴

B. International Examples of How RPSs Effectively Reduce Greenhouse Gas Emissions

It is not within this Note’s scope to cover all possible ways to address carbon dioxide emissions and climate change. Regardless of which other strategies and policies are employed, a federal RPS will play a critical role in pushing U.S. residential electricity consumption into a lower-emissions future for one main reason: it will work. There are numerous examples of successful RPS-type mechanisms being implemented outside the United States. International bodies

47. See, e.g., *Global Climate Change: Vital Signs of the Planet*, NASA, <http://climate.nasa.gov/scientific-consensus#ft2> (last visited Oct. 5, 2014) (stating that “ninety-seven percent of climate scientists agree that climate warming trends are due to human activities”); Letter from Am. Ass’n for the Advancement of Science et al. to U.S. Senators (Oct. 21, 2009), available at http://www.aaas.org/sites/default/files/migrate/uploads/1021climate_letter1.pdf (“Observations throughout the world make it clear that climate change is occurring, and rigorous scientific demonstrations that the greenhouse gases emitted by human activities are the primary driver”).

48. Doyle Rice, *Report: Effects of Climate Change Seen Everywhere*, USA TODAY (Mar. 31, 2013), <http://www.usatoday.com/story/weather/2014/03/30/climate-change-report-ipcc/7085937/>.

49. *Global Greenhouse Gas Emissions Data*, U.S. EPA (last updated Sept. 9, 2013), <http://www.epa.gov/climatechange/ghgemissions/global.html>.

50. See PBL NETH. ENVTL. ASSESSMENT AGENCY ET AL., *TRENDS IN GLOBAL CO₂ EMISSIONS 2013 REPORT* 32–33 (2013), available at http://edgar.jrc.ec.europa.eu/news_docs/pbl-2013-trends-in-global-co2-emissions-2013-report-1148.pdf (listing power generation as 38% of fossil fuel combustion, which accounts for 90% of total carbon dioxide emissions).

51. DAN LASHOF ET AL., NRDC, *CLEANER AND CHEAPER: USING THE CLEAN AIR ACT TO SHARPLY REDUCE CARBON POLLUTION FROM EXISTING POWER PLANTS, DELIVERING HEALTH, ENVIRONMENTAL, AND ECONOMIC BENEFITS* 3 (March 2014), available at <http://www.nrdc.org/air/pollution-standards/files/pollution-standards-1B-update.pdf>.

52. Alex Morales, *UN Tells Oil, Gas Industry to Leave Fuel in Ground*, BLOOMBERG (Apr. 3, 2014), <http://www.bloomberg.com/news/2014-04-03/un-tells-oil-gas-industry-to-leave-fuel-in-ground.html>.

53. *Id.*

54. *Id.*

with RPS-type policies include Portugal,⁵⁵ Germany,⁵⁶ Australia,⁵⁷ China,⁵⁸ Japan,⁵⁹ South Korea,⁶⁰ and the European Union.⁶¹

Portugal is one country that has had a significant boom in renewable energy development subsequent to establishing a national RPS.⁶² By 2001, Portugal launched the E4 Programme, a new energy policy that set a goal to deliver 39% of energy from renewable sources by 2010.⁶³ By 2005, only 17% of Portugal's electricity in the energy grid came from renewable sources.⁶⁴ Five years later, the country surpassed its original goal and was up to 45%.⁶⁵ The goal was subsequently raised to 60% by 2020.⁶⁶ In June 2013, damp conditions generated extensive hydropower capacity, allowing the country to supply a remarkable 72% of its energy from renewable sources.⁶⁷ The increase in Portugal's renewable energy generation and use has been accompanied by a notable decrease in greenhouse gas emissions.⁶⁸ In 2011, carbon dioxide emissions were already down in the country by over 37% from peak years.⁶⁹

Portugal's impressive increase in the percentage of renewable energy in the electricity grid is not due solely to its RPS.⁷⁰ Substantial public expenditure, an

55. ADENE, PLANO NACIONAL DE ACÇÃO PARA AS ENERGIAS RENOVÁVEIS AO ABRIGO DA DIRECTIVA 2009/28/CE [NATIONAL ACTION PLAN FOR RENEWABLE ENERGY UNDER DIRECTIVE 2009/28/CE], (2009) available at http://apren.pt/fotos/editor2/destaques/pnaer_vfinal.pdf.

56. *Erneuerbare Energien auf einen Blick [Renewable Energy at a Glance]*, BUNDESMINISTERIUM FÜR WIRTSCHAFT UND ENERGIE, <http://www.bmw.de/DE/Themen/Energie/Erneuerbare-Energien/erneuerbare-energien-auf-einen-blick.html> (last visited Sept. 30, 2014).

57. JOVANA JOVOVIC, INTEGRATION OF RENEWABLE ENERGY SOURCES INTO THE ELECTRICITY MARKET 9 (Jan. 2012), available at <http://dpc.sa.gov.au/sites/default/files/pubimages/documents/office-for-international-coordination/11%20-%20Jovovic.pdf>.

58. Eric Martinot & Li Junfeng, *Renewable Energy Policy Update for China*, RENEWABLEENERGYWORLD.COM (July 21, 2010), <http://www.renewableenergyworld.com/rea/news/article/2010/07/renewable-energy-policy-update-for-china>.

59. Aki Suwa & Joni Jupesta, *Policy Innovation for Technology Diffusion: Japanese Renewable Energy*, UN UNIV. (Dec. 3, 2010), <http://unu.edu/publications/articles/policy-innovation-for-technology-diffusion-japanese-renewable-energy.html>.

60. *South Korea: Overview*, U.S. EIA (last updated Apr. 1, 2014), <http://www.eia.gov/countries/cab.cfm?fips=KS>.

61. *Promotion of the Use of Energy From Renewable Sources*, EUROPA (Sept. 7, 2010), http://europa.eu/legislation_summaries/energy/renewable_energy/en0009_en.htm.

62. Elisabeth Rosenthal, *Portugal Gives Itself A Clean-Energy Makeover*, N.Y. TIMES (Aug. 9, 2010), http://www.nytimes.com/2010/08/10/science/earth/10portugal.html?pagewanted=all&_r=0.

63. EUROPEAN RENEWABLE ENERGY COUNCIL, RENEWABLE ENERGY POLICY REVIEW: PORTUGAL 6 (May 2004), available at http://www.erec.org/fileadmin/erec_docs/Projcet_Documents/RES_in_EU_and_CC/Portugal.pdf.

64. Rosenthal, *supra* note 62.

65. *Id.*

66. *Portugal Renewables Report - Q4 2014*, BUS. MONITOR INT'L (Sept. 10, 2014), <http://www.marketresearch.com/Business-Monitor-International-v304/Portugal-RenewablesQ4-8372241/>.

67. *Renewable Energy Output Hits 72% in June*, PORTUGAL NEWS ONLINE (July 18, 2013 11:27 AM), <http://theportugalnews.com/news/renewable-energy-output-hits-72-in-june/28915>.

68. PAULO CANAVARIA ET AL., AGENCIA PORTUGUESA DO AMBIENTE, PORTUGUESE NATIONAL INVENTORY REPORT ON GREENHOUSE GASES, 1990-2011 ii-iii (May 15, 2013), available at http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/7383.php.

69. *Id.* at iv (noting the peak year was 2005).

70. *E.g.*, Mario de Queiroz, *Portugal: Making Up for Lost Time in Renewable Energy*, IPS (June 20,

updated energy grid, privatized utilities, attractive government contracts, and ideal solar, tidal, and wind resources all contributed to Portugal's success.⁷¹ Nonetheless, the RPS goal was key to the transition because it allowed the Portuguese government to justify investing in renewable power projects even while making cuts in other sectors.⁷²

Germany is another country that saw a substantial increase in renewable energy development after adopting an RPS-type mechanism.⁷³ In 2000, Germany instituted *Erneuerbare-Energien-Gesetz* (the Renewable Energy Act), which set a goal for renewable energy production as a percentage of total energy production at 40 to 45% by 2025, and 55 to 60% by 2035.⁷⁴ By 2013, renewable energy already accounted for 24% of electricity production.⁷⁵ Most notably, Germany's RPS goal spurred so much renewable energy development that the country is now the European leader in installed solar and wind capacity.⁷⁶ This conversion to renewable energy helped reduce carbon dioxide emissions by almost 20% from 1990 levels.⁷⁷

It would be misrepresentative to attribute Germany's successful increase in renewable energy generation and consumption solely to its RPS. However, like Portugal's E4 Programme, Germany's Renewable Energy Act and RPS gave the country a framework and accountability for the transition to renewable energy.⁷⁸ To facilitate meeting the RPS, the Act set up a feed-in tariff that guaranteed investors 6 to 10% rates of return.⁷⁹ While it was the feed-in tariff that spurred investment in Germany's renewable energy sector, it was the RPS goal that allowed Germany to raise electricity prices and sacrifice net exports in the name of greening the energy grid.⁸⁰

2007), <http://www.ipsnews.net/2007/06/portugal-making-up-for-lost-time-in-renewable-energy/>.

71. *Id.*

72. *See id.* (discussing how wind and wave energy targets helped generate renewable energy deployment even while the government made cuts in other important sectors like education and healthcare).

73. BUNDESMINISTERIUM, *supra* note 56.

74. *Id.*

75. *Gross Electricity Production in 2013: 24% Came From Renewable Energy Sources*, DESTATIS STATISTISCHES BUNDESAMT (DESTATIS FED. STAT. OFFICE), <https://www.destatis.de/EN/FactsFigures/EconomicSectors/Energy/Energy.html> (last visited Apr. 4, 2014).

76. Catherine Bolgar, *Country Counts on Renewable Energy as an Economic Growth Driver*, WALL ST. J. (2010), <http://online.wsj.com/ad/article/germany-environment.html>.

77. *See* MICHAEL STROGIES ET AL., GERMAN FED. ENV'T AGENCY, NATIONAL INVENTORY REPORT FOR THE GERMAN GREENHOUSE GAS INVENTORY 1990-2011 59, 61 (Eric Allen trans., May 15, 2013), available at http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/7383.php (graph and table showing a 20% decrease over the 21-year period).

78. *See, e.g.*, Bolgar, *supra* note 76 (discussing how the Renewable Energy Act quickened the pace of renewable energy development).

79. *Id.*

80. *See, e.g.*, Melissa Eddy, *German Energy Push Runs Into Problems*, N.Y. TIMES (Mar. 19, 2014), http://www.nytimes.com/2014/03/20/business/energy-environment/german-energy-push-runs-into-problems.html?_r=0 (while Rainer Baake, a deputy energy minister, admits that the Renewable Energies Act financed an expensive learning curve, the Berlin government remains committed to the belief that "only by uncoupling from a dependence on gas and other fossil fuels through the expansion of power generated by renewable sources can Germany secure its energy future.").

It is worth noting that in certain countries with longstanding renewable energy infrastructure, an RPS may not be necessary to achieve substantial renewable energy production. For example, the country with the highest percentage of renewable energy production is Norway.⁸¹ In 2012, Norway was already producing 98% of its energy from renewable sources.⁸² Norway has a long history of using renewable energy, due to its coastal location and vast renewable resources.⁸³ In fact, the country's main electricity source is hydropower,⁸⁴ since water is inexpensive, easily accessible, and plentiful. Most interestingly, Norway does not have an RPS.⁸⁵ Instead, the country has a "target" for 67.5% renewable energy *consumption* by 2020; a modest increase of only 7% over fifteen years.⁸⁶

Whereas Norway may be able to generate almost all of its electricity renewably without an RPS, the United States is not in that position because we have not established comparable renewable energy infrastructure.⁸⁷ For this reason, the United States would do better to follow the model set by Portugal and Germany; specifically by establishing an RPS to spur renewable energy development.

C. RPSs in the United States

1. The History of a Federal RPS in the United States

While the U.S. does not have a federal RPS, there have been several attempts to enact one dating back to 2002.⁸⁸ A federal RPS came closest to fruition in 2009.

The House narrowly passed a federal RPS as part of the 2009 Waxman-Markey Energy Bill, also known as the American Clean Energy and Security Act.⁸⁹ The Waxman-Markey Bill required 6% of electricity from renewable

81. *Share of Renewables in Electricity Production (incl. hydro)*, ENERDATA, <http://yearbook.enerdata.net/renewable-data-in-world-primary-consumption-shares-by-region.html#renewable-in-electricity-production-share-by-region.html> (last visited Sept. 30, 2014) [hereinafter ENDERDATA].

82. This number actually reflects a decrease over the last two decades. *Id.*

83. MINISTRY OF PETROLEUM & ENERGY, NATIONAL RENEWABLE ENERGY ACTION PLAN UNDER DIRECTIVE 2009/28/EC: NORWAY 5 (Sept. 2012), available at http://ec.europa.eu/energy/renewables/transparency_platform/doc/dir_2009_0028_action_plan_norway__nreap.pdf.

84. *Id.*

85. *See id.* at 6 (discussing Norway's extensive renewable resources and the government's renewable programs, including a renewable energy target; there is no mention of an enforceable RPS).

86. *Id.* at 13.

87. Hydropower capacity in the United States is a paltry 79 GW (as of the most recently available data from 2011. *Electricity Generating Capacity*, U.S. EIA (Jan 3, 2013), <http://www.eia.gov/electricity/capacity/>).

88. *See* H.R. 5756, 107th Cong. (2002) ("to establish a Federal renewable energy portfolio standard for certain retail electric utilities"); *see also* H.R. 1294, 108th Cong. (2003); H.R. 983, 109th Cong. (2005); H.R. 969, 110th Cong. (2007); S. 433, 111th Cong. (2009); S. 741, 112th Cong. (2011); and most recently, Renewable Electricity Standard Act of 2013, S. 1595, 113th Cong. § 610(c) (2013) (recommending 25% renewable energy generation by 2025, read twice then died in the Committee on Energy and Natural Resources).

89. In this instance, the bill called the standard an RES rather than an RPS but it is effectively the same. American Clean Energy and Security Act, H.R. 2454, 111th Cong. (2009) (as passed by the House, June 26, 2009).

sources in the first three years, increasing to 20% by 2020.⁹⁰ The Bill had several loopholes, such as allowing utilities to meet a percentage of the requirement through energy efficiency instead of purchasing renewably generated electricity.⁹¹ Additionally, small utilities with loads less than four million megawatt-hours were excluded.⁹² Finally, states could petition to have up to 40% of the total renewable energy requirement met by efficiency instead of renewable energy purchases.⁹³

The main arguments from conservatives against the Waxman-Markey Bill focused on the costs and the potentially significant tax on industry.⁹⁴ Meanwhile, many scientists and other liberal detractors claimed that the targets were too meager and that they were undermined by the efficiency loophole.⁹⁵ The Bill passed the House by seven votes, and was lauded in international media outlets as “historic.”⁹⁶ Despite the hard-fought win, the Bill ultimately died in the Senate where it was read twice but never put to vote.⁹⁷ The Senate did not have the appetite for sweeping climate legislation that session.

The same year, the Bingaman Bill, also called the American Clean Energy Leadership Act of 2009, was reported to the Senate.⁹⁸ The Bingaman Bill had much less stringent targets than the Waxman-Markey Bill.⁹⁹ It only required that 3% of total electricity sold be generated renewably by 2013, 12% by 2020, and 15% thereafter.¹⁰⁰ Additionally, it allowed utilities to petition for a one year waiver if compliance would raise utility rates more than 4% per customer.¹⁰¹ The Act also included an alternative compliance option—essentially a fine of 2.1 cents per kilowatt-hour—if the utility could not or chose not to purchase renewable energy or renewable energy credits.¹⁰² The

90. H.R. 2454 § 101(d)(2).

91. H.R. 2454 § 101(f).

92. H.R. 2454 § 101(a)(18).

93. H.R. 2454 § 101(b)(4)(A).

94. *E.g.*, William W. Beach et al., *The Economic Impact the Waxman-Markey*, THE HERITAGE FOUNDATION (May 13, 2009), <http://www.heritage.org/research/reports/2009/05/the-economic-impact-of-waxman-markey>.

95. *E.g.*, Dr. James Hansen, *G-8 Failure Reflects U.S. Failure on Climate Change*, HUFFINGTON POST (Aug. 9, 2009, 5:12 AM), http://www.huffingtonpost.com/dr-james-hansen/g-8-failure-reflects-us-f_b_228597.html; Steven F. Hayward & Kenneth P. Green, *Waxman-Markey: An Exercise in Unreality*, 3 AM. ENTER. INST. FOR PUB. POL’Y RES., July 2009, at 3.

96. *E.g.*, Suzanne Goldenberg, *Barack Obama’s US Climate Change Bill Passes Key Congress Vote*, THE GUARDIAN (June 26, 2009), <http://www.theguardian.com/environment/2009/jun/27/barack-obama-climate-change-bill>.

97. *See H.R. 2454 – American Clean Energy and Security Act of 2009*, OPENCONGRESS, http://www.opencongress.org/bill/111-h2454/actions_votes (last visited Sept. 30, 2014) (showing that the last action on the bill was that it was read a second time and placed on the Senate Legislative calendar).

98. American Clean Energy Leadership Act, S. 1462, 111th Cong. (2009).

99. *See* S. 1462 § 132 (proposing to add § 610 (b)(1)(B) to the Public Utility Regulatory Policies Act of 1978, 16 U.S.C. § 2601 (2012)).

100. *Id.*

101. *Id.* (proposing to add § 610 (d)(3)(C) to 16 U.S.C. § 2601).

102. *Id.* (proposing to add § 610 (b)(2)(C) to 16 U.S.C. § 2601).

Bingaman Bill never even made it out of committee.¹⁰³

Other RPS versions have been proposed in the Senate in every Congressional session since 2001, but have never made it out of committee.¹⁰⁴ There is currently legislation before both the House and the Senate related to a federal RPS.¹⁰⁵ A federal renewable electricity standard was introduced in the House as recently as December 4, 2013.¹⁰⁶ The Renewable Electricity Standard Act of 2013 proposed a ramp-up RES (equivalent to an RPS) requiring that 6% of retail energy be supplied from renewable sources in 2014, and eventually increasing to 25% by 2025.¹⁰⁷ The Bill has been referred to the Subcommittee on Energy and Power under the House Committee on Energy and Commerce.¹⁰⁸ The Senate version, under the same Act name, was referred to the Committee on Energy and Natural Resources in October 2013.¹⁰⁹ Given that previous RPS bills have failed to gain traction, it is highly unlikely that the current ones will meet with any success.

2. State-Level RPSs

The thirty states with RPSs all passed their legislation without any federal obligation to do so. Each RPS varies greatly in terms of its target percentages, timelines, qualifying renewable energy sources, and exceptions.

The first state to establish an RPS was Iowa, when it passed a law in 1983 requiring that 2% of electricity be provided from renewable sources.¹¹⁰ The law was modified in 1991 to require the state's two private utilities to either invest in or contract for 105 MW of renewable energy capacity.¹¹¹ Iowa's standard requires a fixed amount of renewable energy, unlike most RPSs, which mandate that a certain percentage of total energy come from renewable sources.¹¹² In 2001 the governor added an additional voluntary goal: 1,000 MW of installed wind capacity by 2010.¹¹³ Iowa far surpassed this voluntary goal; by 2012 it had 5,133 MW of wind capacity, which is enough to power over 1,500 homes and is

103. See *S. 1462 - American Clean Energy Leadership Act of 2009*, OPENCONGRESS, http://www.opencongress.org/bill/s1462-111/actions_votes (last visited Sept. 26, 2014 10:12 PM) (showing that the bill was placed on the Senate Legislative calendar but never read).

104. Renewable Electricity Standard Act of 2013, S. 1595, 113th Cong. (2013); S. 741, 112th Cong. (2011); S. 433, 111th Cong. (2009); American Renewable Energy Act, S. 2642, 110th Cong. (2008); Renewable Energy Investment Act of 2005, S. 427, 109th Cong. (2005); Renewable Energy Investment Act, S. 944, 108th Cong. (2003); Renewable Energy and Energy Efficiency Investment Act, S. 1333, 107th Cong. (2001).

105. Renewable Electricity Standard Act of 2013, H.R. 3654, 113th Cong. (2013).

106. *Id.*

107. H.R. 3654, 113th Cong. § 610(c).

108. *Bill Summary & Status 113th Congress (2013-2014) H.R. 3654 All Congressional Actions*, LIBRARY OF CONG., <http://thomas.loc.gov/cgi-bin/bdquery/z?d113:h.r.3654>: (last visited Sept. 7, 2014).

109. *Bill Summary & Status 113th Congress (2013-2014) S.1595*, LIBRARY OF CONG., <http://thomas.loc.gov/cgi-bin/bdquery/z?d113:SN01595>: (last visited Sept. 30, 2014).

110. *Iowa: Alternative Energy Law*, DSIRE (last reviewed Dec. 3, 2012), http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=IA01R&re=1&ee=0.

111. *Id.*

112. *Id.*

113. *Id.*

almost 25% of all electricity generated in the state.¹¹⁴ Iowa's success is due in large part to \$9.8 billion of capital investment and the state's significant wind resources.¹¹⁵ Even so, the RPS did help drive renewable energy development by setting strict parameters that required private investment.¹¹⁶

The state RPS with the highest renewable energy target is Hawaii's.¹¹⁷ In 2001, Hawaii passed a renewable portfolio goal of 9% by 2010.¹¹⁸ In 2004, this goal was replaced with an RPS requiring that 20% of electricity come from renewable sources by 2020.¹¹⁹ In 2008, the state signed a non-binding Memorandum of Understanding with the U.S. Department of Energy, called the Hawaii Clean Energy Initiative, to help transform renewable energy resource planning.¹²⁰ The following year Hawaii enacted a twenty-year ramp-up RPS that required utilities to provide 40% of energy from renewable sources by 2030.¹²¹ Possible renewable energy sources permitted by the bill include wind, sun, "falling water," biogas, geothermal, tidal, ocean thermal, biomass, biofuels, and hydrogen produced from renewable energy sources.¹²²

Hawaii's transition to 40% renewable energy by 2030 will require an extraordinary infrastructure overhaul. Hawaii relies on petroleum more than any other state, using imported oil to generate 75% of its electricity.¹²³ The Hawaiian government is incentivizing renewable energy investment through feed-in tariffs;¹²⁴ twenty-year fixed rate contracts in which the government guarantees the price; energy loans to farmers; and public financing.¹²⁵ The state seems to be having some success. In 2011, Hawaii generated 12% of its electricity using renewable sources.¹²⁶ In 2012 alone, Hawaii more than doubled

114. *Wind Power Facts*, IOWA WIND ENERGY ASS'N, <http://www.iowawindenergy.org/whywind.php/> (last visited Oct. 8, 2014).

115. *Id.*

116. See *Iowa State Energy Profile: Renewable Energy*, U.S. EIA (Mar. 27, 2014) <http://www.eia.gov/state/print.cfm?sid=IA> (attributing Iowa's renewable energy resource development to the Alternative Energy Law, the Mandatory Utility Green Power Option, and the state's energy efficiency standards).

117. *Hawaii: Renewable Portfolio Standard*, DSIRE (last reviewed Sept. 3, 2014), http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=HI06R [hereinafter *Hawaii RPS*].

118. *Id.*

119. *Id.*

120. *Id.* (citing Memorandum of Understanding Between The State of Hawaii and the U.S. Dep't of Energy 1 (Jan. 28, 2008), available at http://apps1.eere.energy.gov/news/pdfs/hawaii_mou.pdf).

121. *Id.* (citing HAW. REV. STAT. § 269-92 (West 2009)).

122. HAW. REV. STAT. § 269-91 (West 2009).

123. STATE OF HAW. DEP'T OF BUS. ECON. DEV. & TOURISM, HAWAII ENERGY FACTS & FIGURES 1 (Jan. 2013), available at http://energy.hawaii.gov/wp-content/uploads/2011/10/EnergyFactsFigures_Jan_2013.pdf.

124. A feed-in tariff is a system by which governments offer utilities long-term electricity contracts at different prices for different energy sources to reflect varying costs. For example, a government could offer a higher long-term fixed price for solar than for wind if it cost utilities more to generate solar power. *Feed-in Tariff: A Policy Tool Encouraging Deployment of Renewable Energy Technologies*, U.S. EIA (May 20, 2013), <http://www.eia.gov/todayinenergy/detail.cfm?id=11471>.

125. AM. COUNCIL ON RENEWABLE ENERGY, RENEWABLE ENERGY IN HAWAII 16 (Sept. 2013), available at <http://www.acore.org/files/pdfs/states/Hawaii.pdf> [hereinafter RENEWABLE ENERGY IN HAWAII].

126. STATE OF HAW. DEP'T OF BUS., *supra* note 123, at 2.

its installed solar power capacity.¹²⁷ Hawaii appears to be on track to meet its second RPS target—15% of net electricity sales from renewables by 2015.¹²⁸

Iowa's RPS may have been the first, and Hawaii's RPS may be the most ambitious, but California's RPS is perhaps the most noteworthy based on sheer scale. California has the largest population of any state.¹²⁹ It also has the second highest total energy consumption,¹³⁰ the second highest renewable energy generation,¹³¹ and the second highest total carbon dioxide emissions.¹³² California first enacted an RPS in 2002, requiring 20% of retail sales come from renewable energy by 2010.¹³³ The state government realized California would narrowly miss the 2010 target, so in 2009 they amended the targets to be 20% by 2013, 25% by 2016, and 33% by 2020.¹³⁴ In 2013, California surpassed its target, with retail utilities generating over 20% of electricity from renewable sources.¹³⁵

The technologies eligible to meet California's RPS are more limited than in other states. For example, only certain types of hydroelectric and fuel cells are eligible, and the state does not accept direct combustion of municipal waste or biomethane.¹³⁶ However, since 2011 California has allowed utilities to use tradable renewable energy credits to meet up to 25% of their renewable energy obligations.¹³⁷

In response to the pressure to reach the 33% RPS in six years, California has made a big push to increase installed renewable capacity.¹³⁸ In 2013, California installed more solar energy capacity than in the previous 30 years combined.¹³⁹ The state can now power 626,000 homes with solar energy.¹⁴⁰

127. RENEWABLE ENERGY IN HAWAII, *supra* note 125, at 15.

128. See *Hawaii State Energy Profile*, U.S. EIA, <http://www.eia.gov/state/?sid=HI> (last visited Sept. 6, 2014) (graph showing that consumption from renewables, not including biomass, was approaching 15% in 2012).

129. *U.S. & World Population Clock: Most Populous*, U.S. CENSUS BUREAU (Apr. 5, 2014), <https://www.census.gov/popclock/>.

130. After Texas, according to most recently available data. *U.S. States: State Profiles & Energy Estimates, Table C1. Energy Consumption Overview: Estimates by Energy Source & End-Use Sector, 2011*, U.S. EIA, http://www.eia.gov/state/seds/data.cfm?incfile=/state/seds/sum/html/sum_btu_1.html&sid=US (last visited Apr. 4, 2014).

131. After Washington State, based on most recently available data from 2010. *State Renewable Electricity Profiles*, U.S. EIA (Mar. 8, 2012) <http://www.eia.gov/renewable/state/>.

132. After Texas, based on most recently available data from 2011. *Rankings: Total Carbon Dioxide Emissions 2011*, U.S. EIA, <http://www.eia.gov/state/rankings/#/series/226> (last visited Oct. 5, 2014) [hereinafter *Rankings*].

133. *California: Renewables Portfolio Standard*, DSIRE (Oct. 30, 2013), http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=CA25R.

134. *Id.*

135. The three large investor-owned utilities collectively averaged 22.7% of total energy from renewable sources. *California Renewable Portfolio Standard (RPS): Current Renewable Procurement Status*, CAL. PUB. UTILS. COMM'N, <http://www.cpuc.ca.gov/PUC/energy/Renewables/> (last visited Nov. 6, 2014).

136. *California: Renewables Portfolio Standard*, *supra* note 133.

137. *Id.*

138. E.g., Lydia O'Connor, *California More Than Doubles Solar Energy in 2013*, HUFFINGTON POST (Jan. 25, 2014), http://www.huffingtonpost.com/2014/01/09/california-solar-energy-doubled_n_4570432.html.

139. *Id.*

140. *Id.*

California also invested in a 393 MW solar-thermal electric project built on federal land.¹⁴¹ At this point, California leads U.S. states in installed geothermal, biomass, solar photovoltaic, and solar thermal energy.¹⁴² Additionally, the state was second for wind power with over 5,800 MW of capacity.¹⁴³ The state plans to fund continued growth in the renewable energy sector with a demand-adjusted tariff,¹⁴⁴ a renewable energy auction mechanism,¹⁴⁵ and an incentive-rebate program.¹⁴⁶

In January 2014, an independent advisory panel sponsored by five major California utilities released a report on the potential of a 50% statewide RPS by 2030.¹⁴⁷ The report was favorable.¹⁴⁸ The results showed that a 50% RPS would be possible if (1) California stays on track to meet its current RPS goals, and (2) renewable resource output in the state does not become so prodigious that it outstrips demand and drives prices down.¹⁴⁹ California's RPS has been a success, by leading to increased renewable energy capacity and diminished fossil fuel dependence.

Colorado is another interesting example, as it was the first state to institute an RPS by ballot.¹⁵⁰ The RPS (in this instance it was called an RES) was put to a vote after it failed to pass in the state legislature for four consecutive years.¹⁵¹ In 2004, Colorado citizens voted for Amendment 37 to effectuate a statewide RES.¹⁵² The RES required larger scale utilities, those serving 40,000 or more customers, to generate or purchase 10% of their retail sales from renewable

141. AM. COUNCIL ON RENEWABLE ENERGY, RENEWABLE ENERGY IN CALIFORNIA 11 (Sept. 2014), available at <http://www.acore.org/files/pdfs/states/California.pdf> [hereinafter RENEWABLE ENERGY IN CALIFORNIA].

142. RENEWABLE ENERGY IN CALIFORNIA, *supra* note 141, at 11.

143. *Id.*

144. Called the Renewable Market Adjusting Tariff (or Re-MAT), the mechanism can increase or decrease the price for each type of renewable energy bi-monthly based on demand. Order Instituting Rulemaking to Continue Implementation and Administration of California Renewables Portfolio Standard Program, Rulemaking 11-05-055, at 2-3 (Cal. Pub. Util. Comm'n May 31, 2012), available at http://docs.cpuc.ca.gov/word_pdf/FINAL_DECISION/167679.pdf.

145. The "RAM" program requires California's three investor-owned utilities (IOUs) to purchase renewable energy from facilities that have a minimum capacity of 3MW. The state sponsors auctions for the IOUs to bid on renewable contracts in a competitive market. *Renewable Auction Mechanism*, CAL. PUB. UTILS. COMM. (last modified June 23, 2014), <http://www.cpuc.ca.gov/PUC/energy/Renewables/hot/Renewable+Auction+Mechanism.htm>.

146. The Self-Generation Incentive Program (SGIP) provides financial incentives ranging from \$0.46 to \$1.83 per watt of energy generated by renewable technologies. *About the Self-Generation Incentive Program*, Cal. Pub. Utils. Comm., http://www.cpuc.ca.gov/PUC/energy/DistGen/sgip/about_sgip.htm (last visited Sept. 6, 2014).

147. DAN ARVIZU ET AL., ENERGY+ENVTL. ECON., INVESTIGATING A HIGHER RENEWABLES PORTFOLIO STANDARD IN CALIFORNIA 3 (Jan. 2014), available at https://ethree.com/documents/E3_Final_RPS_Report_2014_01_06_with_appendices.pdf.

148. *Id.* at 11.

149. *Id.*

150. JEFF LYNG & TOM PLANT, GOVERNOR'S ENERGY OFFICE, COLORADO'S 30% RENEWABLE ENERGY STANDARD: POLICY DESIGN & NEW MARKETS 2 (Aug. 2010), available at <http://cnee.colostate.edu/graphics/uploads/HB10-1001-Colorados-30-percent-Renewable-Energy-Standard.pdf>.

151. *Id.*

152. *Id.*

energy sources.¹⁵³ Later state legislation increased the larger-scale utility RES to 20% by 2015 and 30% by 2020.¹⁵⁴ Colorado's cooperatives and municipal utilities have always had set a separate RES target, which was originally set at 10% by 2020.¹⁵⁵ The state has been consistently permissive in determining what qualifies as a renewable energy source. For example, unlike California, Colorado's RES includes coalmine methane and municipal solid waste pyrolysis (burning) so long as they are greenhouse gas neutral.¹⁵⁶

Colorado's RES has been relatively successful, spurring renewable energy deployment in the state. For instance, in 2012, Colorado built 500 MW of wind capacity.¹⁵⁷ The following year, Colorado built 58 MW of solar photovoltaic capacity—an almost 20% growth.¹⁵⁸ The state has funded this renewable energy development through direct loans; property and sales tax exemptions; biofuel research grants; and net metering.¹⁵⁹ Colorado's two private utilities both reported that they were able to meet the 2012 RES target with a combination of renewable energy generation and renewable energy credits.¹⁶⁰ The Colorado RES has had a positive enough impact in the state that, despite pushback over potential costs, the legislature was able to double the RES for rural coops to 20% by 2020.¹⁶¹

These state policies demonstrate the different types of RPSs currently being enforced throughout this country. Unlike the international RPSs discussed in Section II-B, the RPSs in the United States are problematic because they do not lay the groundwork for coordinating nationwide action.

III. ANALYSIS

A. *Why We Need a Federal RPS*

The individual, highly variable state renewable energy policies provide a fractured framework for U.S. renewable energy infrastructure development. The state-by-state approach embodies the free rider problem, wherein the

153. *Colorado: Renewable Energy Standard*, DSIRE (June 25, 2013) http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=CO24R.

154. *Id.*

155. *Id.*

156. Greenhouse gas neutral means burning will not increase net carbon output. *Id.* (citing COLO. REV. STAT. ANN. § 40-2-124 (West 2013)).

157. AM. COUNCIL ON RENEWABLE ENERGY, RENEWABLE ENERGY IN THE 50 STATES, 2012 EDITION 23 (Sept. 2013), available at <http://www.acore.org/files/pdfs/states/2012-50staterreport-lowres.pdf>.

158. AM. COUNCIL ON RENEWABLE ENERGY, RENEWABLE ENERGY IN COLORADO 13 (Sept 2014), available at <http://www.acore.org/files/pdfs/states/Colorado.pdf>.

159. *Id.* at 14.

160. XCEL ENERGY, 2012 RENEWABLE ENERGY STANDARD COMPLIANCE REPORT 16 (July 2013), available at <http://www.xcelenergy.com/staticfiles/xcel/Marketing/Files/CO-RES-Compliance-Report-2012.pdf>; BLACK HILLS/COL. ELEC. UTIL. CO., 2012 RENEWABLE ENERGY COMPLIANCE REPORT 5 (Dec. 2012), available at <http://www.blackhillsenergy.com/sites/default/files/bhe-coe-res-compliance-rpt.pdf>.

161. Mark Jaffe, *Hickenlooper Signs Bill to Double Rural Renewable-Energy Requirement*, DENVER POST (June 5, 2013), http://www.denverpost.com/ci_23394636/bill-double-rural-renewable-energy-floor-signed-into.

biggest fossil fuel burning states are not shouldering their fair share of the cost of curbing nationwide carbon dioxide emissions.¹⁶² In fact, nine of the top twenty carbon dioxide emitting states do not have enforceable renewable portfolio standards.¹⁶³ Texas, which does in fact have an RPS, still exemplifies why a state-by-state system does not work.

Texas is the biggest carbon dioxide emitter; releasing almost twice as many metric tons per year as the second highest state.¹⁶⁴ Nonetheless, the Lone Star State has only a modest renewable portfolio mandate, which expires in 2015 and then becomes an unenforceable goal.¹⁶⁵ Without a state-level RPS to spur renewable infrastructure growth, cities in Texas have had to enact their own RPSs.¹⁶⁶ For instance, the City of Austin has an RPS goal to meet 65% of its energy needs from renewable sources by 2025, eventually reaching net zero community greenhouse gas emissions by 2050.¹⁶⁷

Texas is one of the top five states for solar energy potential.¹⁶⁸ However, Texas is not even one of the top ten states for installed solar capacity.¹⁶⁹ Without an ambitious, enforceable renewable energy goal, Texas utilities have little incentive to invest in costly installations, and so solar development in the state continues to limp along.¹⁷⁰

In addition to a lack of accountability for major state emitters, the state-by-state approach also fails to create a nationwide demand for renewable energy. As a result, utilities and private companies in states without RPSs are left to confront evolving energy demands on their own terms. Given ExxonMobil's recent response to curtailed fossil fuel use—the company stated that it is

162. See generally Sovacool & Cooper, *Congress Got It Wrong*, *supra* note 21, at 120 (explaining that pollution is geographically boundless, which causes a “classic free rider problem” in which the downwind states adopt stringent renewable energy policies, while the polluting states have no incentive to do so but still receive the ecological benefits).

163. Those nine states are: #5 Florida, #7 Louisiana, #8 Indiana (RPS goal), #11 Georgia, #12 Kentucky, #14 Alabama, #17 Oklahoma (RPS goal), #18 Tennessee, #19 Virginia (RPS goal). *Rankings*, *supra* note 132; *State Renewable Electricity Profiles*, *supra* note 131.

164. *Rankings*, *supra* note 132.

165. The state RPS requires 5,000 MW of new renewables installed by 2015, after which it becomes a 10,000 MW target for total renewable capacity by 2025. *Texas: Renewable Energy Systems Property Tax Exemption*, DSIRE (last reviewed Aug. 8, 2014), http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=TX03F&re=1&ee=1. In conjunction with the inadequate statewide RPS, Texas also has a property tax incentive. The incentive exempts property owners from being taxed on the increased property value from solar, biomass, or wind powered energy device installation. *Id.*

166. *City of Austin: Renewables Portfolio Standard*, DSIRE (last reviewed Sept. 8, 2014), http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=TX11R&re=1&ee=1.

167. *Id.*

168. *Solar Energy Potential*, U.S. DEP'T OF ENERGY, <http://energy.gov/maps/solar-energy-potential> (last visited Apr. 4, 2014).

169. Zachary Shahan, *Top Solar Power States Per Capita (Updated) vs. Top Solar Policy Leaders (CleanTechnica Exclusive)*, CLEANTECHNICA (June 25, 2013), <http://cleantechnica.com/2013/06/25/solar-power-by-state-solar-rankings-by-state/>.

170. See AM. COUNCIL ON RENEWABLE ENERGY, RENEWABLE ENERGY IN TEXAS 28 (Jan. 2014), available at <http://www.acore.org/files/pdfs/states/Texas.pdf> (noting the state's “nationally notable solar resource potential” and ascribing the slow development pace to the lack of financial incentives).

confident that producing hydrocarbon assets “is essential to meeting growing energy demand worldwide”¹⁷¹—leaving the U.S.’s energy future up to oil companies seems unwise.

Building an efficient, dependable, cost-competitive renewable energy system is an expensive and lengthy process. The former German Deputy Energy Minister, Rainer Bake, explained this phenomenon:

With the Renewable Energies Act that we created in 2000, we financed a learning curve that was expensive . . . [b]ut the good news is that we have learned in only 13 years to produce electricity with wind power and large solar facilities at the same price as if we were to build new coal or gas power stations[.]¹⁷²

If the U.S. does not get started today, we will continue to lag behind other developed nations in renewable energy generation.¹⁷³ While the United States is the second highest energy consumer and producer in the world, it is not in even the top ten countries for renewable energy consumption or production (as a percentage of total consumption and production).¹⁷⁴ In 2012 only 6.2% of energy consumed in the United States came from renewable sources as compared with 12.5% in the European Union.¹⁷⁵ U.S. renewable energy production (including hydropower) made up only 12.8% of total energy production, as compared with 28.5% in the European Union.¹⁷⁶ This data serves to show that individual efforts by states are insufficient to transition the United States away from fossil-fuel based energy production and consumption, as required to address climate change.

B. Potential Cost Implications for RPS Electricity Consumers

The main argument against instituting a federal RPS is the potential cost. Just recently an article in *Forbes* claimed that residents in states with RPS mandates pay 30% higher electricity prices than people in states without an RPS.¹⁷⁷ The article went so far as to assert that RPS costs are “gouging job creators,” citing a Kansas Policy Institute Study that found Kansas’ RPS will cost industrial businesses in the state over \$25,000 a year and families \$660 a

171. Meagan Clark, *Exxon Mobil Acknowledges Climate Change Risk to Business For First Time*, INT’L BUS. T. (Apr. 1, 2013, 3:18 PM), <http://www.ibtimes.com/exxon-mobil-acknowledges-climate-change-risk-business-first-time-1565836>.

172. Eddy, *supra* note 80.

173. See, e.g., ENERDATA, *supra* note 81 (listing the top ten nations for renewable energy production in 2013, which does not include the U.S.; the nations were from one to ten: Norway, Brazil, New Zealand, Colombia, Venezuela, Canada, Portugal, Sweden, Spain, and Italy).

174. *Id.*

175. *Id.*

176. *Id.*

177. Christine Harbin Hanson, *Bureaucrats are Boosting Your Utility Bill*, FORBES (Apr. 7, 2014, 11:17 AM), <http://www.forbes.com/sites/realspin/2014/04/07/bureaucrats-are-boosting-your-utility-bill/>.

year when it is in full force.¹⁷⁸

While an RPS may initially raise costs, there is also strong evidence that it can drive costs down. A recent study by the Illinois Power Agency found that the state's RPS mandate has actually helped reduce electricity prices.¹⁷⁹ The agency's Locational Marginal Price¹⁸⁰ (LMPs) study showed that integrating renewable resources into the power grid lowered LMPs by \$1.30 per megawatt-hour in 2011.¹⁸¹ Aggregated, those savings may have totaled as much as \$176.85 million dollars that year.¹⁸² According to the report, similar results were found in Massachusetts.¹⁸³ The report also indicated that Illinois' RPS has "enabled significant job creation and economic development opportunities as well as environmental benefits."¹⁸⁴

In Ohio, where lawmakers were trying to repeal their RPS, the state utility regulator hired an economist to analyze how much the law costs resident electricity consumers.¹⁸⁵ The study found that instead of raising prices, the "Alternative Energy Portfolio Standard" was causing downward pressure on wholesale market prices, and that the perceived risks of "severe congestion" and "emergency curtailments" were not observed.¹⁸⁶ Furthermore, the report predicted that the state's RPS would reduce CO₂ emissions by between 200,000 and 570,000 metric tons in 2014.¹⁸⁷

A study on regional electricity markets also showed that greater renewable energy usage could lower prices. The study focused on RPS costs in the largest competitive wholesale electricity market in the world, the "PJM."¹⁸⁸ The study analyzed two scenarios for doubling wind power consumption in PJM states by 2026; one in which the states' wind power was sourced from within the region,

178. *Id.*

179. ILL. POWER AGENCY, ANNUAL REPORT: THE COSTS & BENEFITS OF RENEWABLE RESOURCE PROCUREMENT IN ILLINOIS UNDER THE ILLINOIS POWER AGENCY AND ILLINOIS PUBLIC UTILITIES ACT 30 (May 29, 2013), available at <http://www.illinois.gov/ipa/Documents/201304-IPA-Renewables-Report.pdf>.

180. A market-pricing mechanism used in deregulated markets, which shows the electricity price at every location on the grid. *Wholesale Power Price Map Reflects Real-Time Constraints on Transmission of Electricity*, U.S. EIA (Sept. 20, 2011), <http://www.eia.gov/todayinenergy/detail.cfm?id=3150>.

181. ILL. POWER AGENCY, *supra* note 179, at 3.

182. *Id.* at 4.

183. *Id.* at 3.

184. *Id.*

185. See TIM BENEDICT, OH. PUB. UTILITIES COMM., RENEWABLE RESOURCES AND WHOLESALE PRICE SUPPRESSION 2 (Aug. 2013), available at <http://www.midwestenergynews.com/wp-content/uploads/2013/09/PUCO-renewable-energy-standard-study.pdf> (detailing the findings on how much Ohio's RPS cost consumers).

186. *Id.* at 7.

187. *Id.* at 6.

188. The "PJM region" is named after PJM Interconnection, L.L.C., which is a connected network of more than 875 company members serving 61 million customers. PJM, PJM 2013 ANNUAL REPORT 30 (May 2014), available at <http://www.pjm.com/~media/about-pjm/newsroom/annual-reports/2013-annual-report.ashx>. The region comprises all or parts of Delaware, Illinois, Indiana, Kentucky, Maryland, Michigan, New Jersey, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia, and D.C. PJM, PJM MARKETS FACT SHEET 1 (March 27, 2014), available at <https://www.pjm.com/~media/about-pjm/newsroom/fact-sheets/pjms-markets-fact-sheet.ashx>.

and another in which some wind comes from within the region and some from neighboring, high-performing wind states.¹⁸⁹ In both scenarios the study found a net savings for consumers of close to \$7 billion per year.¹⁹⁰ The total production cost savings from incorporating wind—as compared with using non-renewable energy for that same electricity generation—was projected at between \$14.5 and \$14.9 billion per year by 2026.¹⁹¹ The reason consumers are only expected to reap half the production cost savings is because the utility company will keep the balance as incremental revenue for making new investments.¹⁹² In other words, the utility would see both savings and a profit; and investors would certainly recover their costs.

Thus far this Note has shown that an RPS can actually cause price suppression instead of inflation. The studies discussed above prove that RPS-related cost increases can be controlled, if not lowered, at both the state and regional levels. The studies discussed below provide compelling evidence that a federal RPS will have similarly marginal or beneficial effects on electricity prices.

A joint study by Georgia Tech and the Duke Nicholas School of the Environment looked at the effect on electricity prices of expanding renewable generation in the South.¹⁹³ The authors analyzed the price over the next twenty years by comparing six scenarios: (1) no renewable energy development; (2) expanded renewable-favorable policies but no RPS; (3) a federal RPS of 25% by 2025; (4) renewable-favorable policies plus the federal RPS; (5) carbon regulation; and (6) renewable-favorable policies plus carbon regulation.¹⁹⁴ The report concluded that energy prices would increase during the sample period under any circumstances, including maintaining the status quo.¹⁹⁵ The analysis showed that the scenario with the lowest price increase (8.9 cents per kilowatt-hour¹⁹⁶) was the one with a federal RPS of 25% by 2025 coupled with research and development, and tax subsidies.¹⁹⁷ A federal RPS alone showed the fourth lowest price increase (9.9 cents per kilowatt-hour), only a moderate increase of 0.2 cents over maintaining the status quo.¹⁹⁸

The U.S. Energy Information Administration (EIA) conducted a study in

189. BOB FAGAN ET AL., SYNAPSE ENERGY ECON. INC., THE NET BENEFITS OF INCREASED WIND POWER IN PJM 2 (May 9, 2013), available at http://www.synapse-energy.com/sites/default/files/SynapseReport.2013-05.EFC_Increased-Wind-Power-in-PJM.12-062.pdf.

190. *Id.* at 1.

191. *Id.*

192. *Id.*

193. MARILYN A. BROWN ET AL., S.E. EFFICIENCY ALLIANCE, RENEWABLE ENERGY IN THE SOUTH xv (Dec. 2010), available at <http://nicholasinstitute.duke.edu/sites/default/files/publications/renewable-energy-in-the-south-paper.pdf>.

194. *Id.* at xv, 18, 102.

195. *Id.* at 102.

196. *Id.* at 103.

197. *Id.*

198. *Id.*

2007, analyzing a 15% federal RPS from the years 2010 to 2020.¹⁹⁹ The report projected that this RPS would cause a 0.2% net increase on prices for residential consumers.²⁰⁰ For a family with a \$100 monthly energy bill, that would cost them an extra 20 cents a month.²⁰¹

Another study conducted in the same year by the Union of Concerned Scientists (UCS), analyzed prices based on a 20% federal RPS by 2020.²⁰² The UCS study found that a 20% RPS would lower consumer energy bills by 1.5%, with net savings totaling \$49.1 billion.²⁰³ The report attributed the savings to (1) reduced demand for fossil fuels lowering fossil fuel prices; (2) certain renewable energy sources costing less overall than fossil fuels; (3) reduced deployment costs for renewable energy based on economies of scale; and (4) hedging against natural gas price fluctuations.²⁰⁴

Both the EIA and the UCS studies are old enough to raise questions about their continued validity. Thus, the best way to analyze the cost of a national RPS is to look at energy prices in countries that already have one. Germany, as Europe's largest electricity market,²⁰⁵ is similar enough to the United States in terms of its economic strength and diversity to provide a constructive comparison.

In Germany, wholesale power prices have consistently fallen for the last four years, declining 32% since 2010.²⁰⁶ The price drop has been attributed to record solar and wind output, along with decreased electricity demand.²⁰⁷ Solar and wind infrastructure were installed to meet the RPS requirement, therefore we can deduce that the RPS helped to bring wholesale energy prices down. An added benefit is that Germany has simultaneously experienced record electrical grid reliability since increasing the percentage of renewable energy being transmitted.²⁰⁸

Based on the above studies and examples, a national RPS appears to have either a minor or beneficial effect on consumer energy bills. However, it is important to remember that the purpose of an RPS is not to save money but rather to save the environment. Accordingly, the assurance that consumers will not face debilitating costs is just an added incentive to adopt a federal RPS.

199. JOHN J. CONTI ET AL., U.S. EIA, IMPACTS OF A 15-PERCENT RENEWABLE PORTFOLIO STANDARD iv (June 2007), available at [http://www.eesi.org/files/sroiaf\(2007\)03.pdf](http://www.eesi.org/files/sroiaf(2007)03.pdf).

200. *Id.* at 10.

201. *Id.*

202. Sovacool & Cooper, *Congress Got It Wrong*, *supra* note 21, at 118 (citing Alan Noguee et al., *The Projected Impacts of a National Renewable Portfolio Standard*, 20 ELEC. J. 33, 39 (2007)).

203. *Id.*

204. *Id.*

205. Rachel Morison & Julia Mengewein, *German Power Costs Seen Dropping for Fourth Year*, BLOOMBERG (Jan. 3, 2014), <http://www.bloomberg.com/news/2014-01-03/german-power-costs-seen-dropping-for-fourth-year-energy.html>.

206. *Id.*

207. *Id.*

208. *German Grid Reaches Record Reliability in 2011*, RENEWABLES INT'L THE MAG. (May 9, 2012), <http://www.renewablesinternational.net/german-grid-reaches-record-reliability-in-2011/150/537/56183/>.

C. Federal RPS Benefits

The foremost benefit of an RPS is that it will reduce U.S. carbon dioxide emissions. As discussed in Section II-D, states with renewable portfolio standards have already seen CO₂ emissions decrease. At the regional level, the Georgia Tech-Duke University study found that a federal RPS could prevent 160 million tons of CO₂ from being emitted by 2030 in the South alone.²⁰⁹ At the national level, the EIA report predicted that a 15% RPS by 2030 would cumulatively eliminate 2,925 million metric tons of CO₂.²¹⁰

Studies in New York and Virginia both found that the renewable electricity required by their state RPSs would otherwise have come from a mix of coal, oil, natural gas, and out-of-state energy imports.²¹¹ In other words, the renewable energy infrastructure that was deployed to meet the RPS requirement replaced electricity generation that would have come from fossil fuels. Thus, instituting an RPS was more than just an exercise in bureaucratic meddling because it actually helped decrease emissions.

Another key feature of a federal RPS is that it would give rise to a nationwide market for Renewable Energy Certificate (REC) trading. RECs are a market instrument whereby renewable energy's "green" attributes are sold separately from the physical electricity produced.²¹² Utilities can buy the green attributes as a REC without purchasing the electricity that was generated.²¹³ The REC then works as an offsetting mechanism to allow the utility to meet renewable energy requirements. The renewable energy that was produced for those RECs is no longer considered green energy; instead, it would be sold and transmitted to the grid as if it were generated by fossil fuel combustion.²¹⁴ REC trading allows utilities that invest in renewable infrastructure to sell RECs in addition to selling the energy they produce. RECs also provide flexibility for utilities operating fossil fuel combustion power plants that do not have the resources to build new renewable generation facilities.

Establishing a federal RPS would create a nationwide REC market because areas that have limited renewable energy infrastructure would need to buy RECs to comply.²¹⁵ RECs provide an alternative compliance method for regions where it would be cost-prohibitive to deploy local renewable energy

209. BROWN ET AL., *supra* note 193, at xx.

210. CONTI ET AL., *supra* note 201, at v.

211. Sovacool & Cooper, *Congress Got It Wrong*, *supra* note 21, at 127.

212. BOSSELMAN ET AL., *supra* note 15, at 879.

213. *Id.*

214. *Renewable Energy Certificates*, U.S. EPA, <http://www.epa.gov/greenpower/gpmarket/rec.htm> (last visited Oct. 1, 2014).

215. See, e.g., Benjamin Sovacool & Christopher Cooper, *Hidden Costs of State Renewable Portfolio Standards*, 15 BUFF. ENVTL. L.J. 1, 34 (2007) [hereinafter Sovacool & Cooper, *Hidden Costs*] (describing the benefits of RECs for utility companies as allowing them to meet a minimum renewable energy generation standard without having to build new facilities).

generation.²¹⁶ Additionally, states with well-developed coal industries, like Kentucky, could keep burning coal, but they would have to buy REC credits from the states that invested in developing renewable power. The result is that a state like Kentucky would begin to shoulder its share of carbon emissions costs, but it would not be forced to shutter the coal-fired power plants that are profitable and integral to the state economy.

Another advantage of a federal RPS is that it would standardize the energy sources that could qualify as renewable. The current state-by-state system is highly inefficient in this regard, as illustrated by Washington State's hydropower crisis.²¹⁷ Washington has a vast hydropower resource but its RPS does not consider hydropower to be a "renewable energy."²¹⁸ Neighboring states, such as California, allow utilities to purchase hydropower-generated energy to meet their RPS requirements.²¹⁹ As a result, Washington now exports its affordable hydropower resource to its neighbors to allow those states' utilities to meet their RPSs. Meanwhile, Washington's utilities are forced to buy RECs to meet the state's RPS at an increased cost to ratepayers.²²⁰

An unexpected benefit of a federal RPS is that it will lower costs for both the utility and the end-use consumer due to economies of scale.²²¹ As greater numbers of wind turbines, solar panels, and geothermal units are installed, the cost of manufacturing each should go down.²²² Consumer electricity rates are set in part to guarantee the utility a return on its investment.²²³ If the cost to build an offshore wind farm decreases, the electricity rate consumers pay will go down.

D. A Proposed RPS Model

The ideal national RPS would have to balance economic considerations with environmental concerns. In order for an RPS to be effective, the target renewable energy percentage has to be large enough to actually spur investment and initiate benefits (such as a nationwide REC market and manufacturing economies of scale).²²⁴ Given that the United States is already generating 13% and consuming 10% of electricity from renewable sources,²²⁵ an effective RPS would have to be set at 20% or more.

216. *Id.*

217. Sovacool & Cooper, *Congress Got It Wrong*, *supra* note 21, at 121.

218. *Id.*

219. *Id.*

220. *Id.*

221. Sovacool & Cooper, *Hidden Costs*, *supra* note 215, at 29.

222. *Id.*

223. Incorporated in rates as a percentage of the utility's expenditure. BOSSELMAN ET AL., *supra* note 15, at 65.

224. Sovacool & Cooper, *Congress Got It Wrong*, *supra* note 21, at 97.

225. *Frequently Asked Questions: How Much U.S. Energy Consumption and Electricity Generation Comes from Renewable Sources?*, U.S. EIA (June 26, 2014), <http://www.eia.gov/tools/faqs/faq.cfm?id=92&t=4> [hereinafter *How Much U.S.*].

Most successful state RPSs have ramp-up clauses, which start with a modest RPS goal and then increase over a period of ten years or more before the RPS is fully enforced.²²⁶ This system allows utilities to come into compliance over time rather than all at once. It also reduces the burden on consumers because any short-term price increases would happen gradually. Therefore, this “model RPS” should include a ten-year or longer ramp-up.

In addition to ramp-up clauses, many RPSs also include “off-ramp” clauses; a loophole for utilities that are unable to comply.²²⁷ In order for this “model RPS” to work, the off-ramp clause cannot be overly lenient. Allowing utilities to easily delay meeting targets or waive out altogether will frustrate compliance efforts. Similarly, the penalties have to be severe enough to incent utilities to meet the targets instead of paying a fine. An RPS can only be effective if utilities comply, so the model RPS should not have an off-ramp clause.

Another vitally important feature found in successful international RPSs is a diverse mix of renewable energy resources.²²⁸ Many renewable energy resources are variable and cannot be turned on by flipping a switch; sometimes the wind does not blow, the sun does not shine, and it is low tide. To balance this risk, countries like Germany include a wide range of energy sources in their RPSs, such as: wind, solar, biomass, biofuel, hydropower, and geothermal.²²⁹ To be equitable to all states, a federal RPS would have to be highly inclusive because different geographic regions have varying renewable resources. There is insufficient information available at this time regarding what energy types (biomass, waste combustion, etc.) are truly “sustainable.” Therefore, the Federal Government would have to set up a task force to investigate which resources should be included.

Based on the Georgia Tech-Duke study, the most cost-effective way to increase renewable energy is to institute an RPS coupled with renewable-energy-favorable policies and other tax incentives.²³⁰ Thus, this RPS proposal should be accompanied by tax incentives for renewable energy infrastructure construction, and property tax exemptions for renewable energy-producing improvements.

In summary, the “model RPS” that this Note proposes would require that 20% of total electricity sold to consumers be generated renewably over a ten-year or longer period. The RPS would include a ramp-up provision that set modest initial benchmarks to help utilities scale renewable deployment. Off-ramp clauses and waivers would only be available in extreme circumstances,

226. Sovacool & Cooper, *Congress Got It Wrong*, *supra* note 21, at 133.

227. *See, e.g.*, MD. CODE ANN., PUB. UTIL. COS. § 705(e), (f) (West 2011) (allowing Maryland utilities to request a delay in the incremental renewable energy target increases).

228. *See, e.g.*, Bolgar, *supra* note 76 (detailing Germany’s diverse renewable energy mix including wind, biomass, biofuel, solar, and other energy sources).

229. *Technologien*, BUNDESMINISTERIUM FÜR WIRTSCHAFT UND ENERGIE, <http://www.erneuerbare-energien.de/EE/Navigation/DE/Technologien/technologien.html> (last visited Oct. 5, 2014).

230. BROWN ET AL., *supra* note 193, at 102.

and penalties for noncompliance would be severe. The energy sources that could be used to meet the RPS would be diverse but clearly specified. Lastly, the Federal Government would provide tax incentives for renewable energy investments.

IV. CONCLUSION

During the 1970's energy crisis, then-director of the Solar Energy Research Institute, Denis Hayes, predicted that solar resources could provide 40% of the global energy budget by 2000 and 75% by 2025.²³¹ Mr. Hayes wrote in his book that "[e]very essential feature of the proposed solar transition has already proven technically viable."²³² Four decades later, the EIA predicts that only 25% of world energy generation and 15% of world energy consumption will come from *all* renewable resources by 2040.²³³

Even more disappointing, the U.S. actually lags behind aggregated world percentages for renewable energy consumption and generation. Based on the most recent estimates from 2013, world renewable energy consumption was 11% of total consumption and renewable generation was 21%.²³⁴ By comparison, in the same year the U.S. only consumed 10% of energy from renewable sources and only generated 13% of domestic electricity generation using renewables.²³⁵ There are many possible explanations for this deficiency, including a powerful coal lobby and insufficient incentives for large-scale renewable energy infrastructure investment. However, examining history to understand the United States' renewable energy shortage is not as constructive as looking forward to determine what actions are necessary for the U.S. to catch up with, or preferably surpass, the rest of the world.

In the climate change future that we face, rich and powerful countries like the United States must curb fossil fuel consumption. It is both politically and morally unacceptable for this country to be surpassed by similarly situated countries in terms of renewable energy consumption and generation. Furthermore, the Federal Government should not depend on the states to be responsible for critical system-level renewable energy policies (namely through the individual RPSs). The prevailing state-by-state approach cannot effectively move American energy infrastructure forward because it does not allow for nationwide coordination. The state-level RPSs also embody the classic free-rider problem, wherein several states are shouldering the cost for everyone's benefit.

The current federal proposal to address CO₂ emissions, the Clean Power

231. DENIS HAYES, RAYS OF HOPE: THE TRANSITION TO A POST-PETROLEUM WORLD 155 (1977).

232. *Id.*

233. *Frequently Asked Questions: How Much of World Energy Consumption and Electricity Generation Is From Renewable Energy?*, U.S. EIA (last updated June 13, 2014), <http://www.eia.gov/tools/faqs/faq.cfm?id=527&t=1> [hereinafter *How Much World*].

234. *Id.*

235. *How Much U.S.*, *supra* note 225.

Plan, will not solve fragmented action or freeriding. The CPP allows states to use natural gas and energy efficiency to meet state goals.²³⁶ While natural gas may have lower CO₂ emissions than coal, it is still a carbon-based fuel source.²³⁷ Permitting utilities to use natural gas, which is less expensive in the short-term, stymies renewable energy deployment and innovation. The CPP could never lead to the same benefits as an RPS because it will not stimulate the same degree of large-scale renewable energy infrastructure development. Additionally, the CPP does not foster an emerging nationwide REC market; diminished cost to build renewable facilities, due to economies of scale; or renewable technology advancements in response to increased demand. Even if the EPA enacts the “Less Dirty” Power Plan—as it should be called—the United States will still need a federal RPS to incentivize investment in renewable electricity generation and build the foundation for a no-carbon future.

The problem with climate change is that, unlike with acid rain, it is more difficult to both trace the offender and see the positive effects of responsible action. Nonetheless, that is not an excuse for the United States to shirk its duty. Instead, the U.S. Federal Government needs to immediately increase clean energy infrastructure development in order to decrease fossil fuel dependence. The most effective way to do so is to adopt an RPS, like the model one suggested in this Note. If the United States enacted the model RPS, CO₂ emissions would decrease by 20%.

A 20% reduction in CO₂ emissions by the third largest country in the world²³⁸ would be an enormous victory against climate change. Even if most U.S. renewable resource generation occurred in concentrated areas, the aggregate effect would still be substantial. Kentucky could keep its coal, but it would also have to pay for the true cost of fossil fuel combustion.

The United States did not singlehandedly cause climate change, and the United States cannot singlehandedly solve it. Climate change requires global-level collective action. Nevertheless, the U.S. Government can be proactive by instituting policies that are proven to be effective, and a federal RPS would be a decisive step in the right direction.

236. *Fact Sheet: Clean Power Plan State Roles*, *supra* note 30.

237. See *How Much Carbon Dioxide Is Produced When Different Fuels Are Burned*, U.S. EIA (last updated June 4, 2014), <http://www.eia.gov/tools/faqs/faq.cfm?id=73&t=11> (showing that coal emits 228.6 pounds of CO₂ per million Btu of energy, whereas natural gas emits 117 pounds of CO₂ per million Btu of energy).

238. *Countries of the World*, WORLD ATLAS, <http://www.worldatlas.com/aatlas/populations/ctypopls.htm> (last visited Nov. 7, 2014).