LEGAL CHALLENGES FOR 'LEAVING IT IN THE GROUND': TOUCHSTONE 2016 DEVELOPMENTS AND HOLDINGS

Professor Steven Ferrey[1]

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[1] Steven Ferrey is Professor of Law at Suffolk University Law School and was Visiting Professor of Law at Harvard Law School. He is the author of seven books on energy and natural resource law, the most recent of which are UNLOCKING THE GLOBAL WARMING TOOLBOX, 2010; ENVIRONMENTAL LAW: Examples & Explanations, 7th ed. 2016, THE NEW RULES: A GUIDE TO ELECTRIC MARKET REGULATION, 2000, and THE LAW OF INDEPENDENT POWER, 40th ed., 2016. He also is the author of more than one hundred articles and book chapters on these topics. Since 1993, Professor Ferrey has served as a primary legal consultant to the World Bank and the U.N. Development Program on their renewable energy and carbon reduction policies in developing countries, where he has worked extensively in Asia, Africa, and Latin America. He holds a B.A. in Economics from Pomona College, a Juris Doctor degree and a Masters degree in Regional Energy Planning both from U.C. Berkeley, and was a post-doctoral Fulbright Fellow at the University of London between his graduate degrees.

I. FOCUSING THE PERSPECTIVE

Electric power is technology. Technology changes. And technological change in energy creates a springboard and platform on which law operators as a regulator. We are now at a technological inflection point where it is possible to leave a significant amount of traditional energy sources "in the ground." Rather than urge the population to do without this traditional electric energy, a viable option now is to switch to other forms of more renewable energy.

As a matter of economics, leaving traditional energy resources in the ground conserves our energy capital stock: We can save and harbor fossil fuel resources in the ground for use later if so chosen; they are not wasted, they are conserved. One cannot save for another day many of the renewable power resources (today's sunshine, wind, moving water). From a policy perspective, leaving traditional energy resources in the ground purchases a virtual 'insurance policy,' by a nation holding resources fossil resources in reserve by consuming today's renewable resources. The Obama administration has done so in starts and stops during the last 8 years, through its Clean Power Plan[2] and other initiatives.

Even more important in terms of new technology, during the past decade, the price of implementation of many renewable energy alternatives has dropped dramatically recently. For example, the cost of wind power has dropped within the range of being competitive with the price of some more traditional fossil fuel resources for the production of electricity.[3] Wind, along with natural gas, has dominated new sources of electric energy deployed in the most recent

[2] See infra, at Section IV B.
[3] Tara Patel, Fossil Fuels Losing Cost Advantage Over Solar, Wind, IEA Says, Bloomberg, Aug. 31, 2015, http://www.bloomberg.com/news/articles/2015-08-31/solar-wind-power-costs-drop-as-fossil-fuels-increase-iea-says.

decade.[4] Solar electric energy is cost competitive with traditional fossil fuels now with its substantial subsidies[5] and it is now projected to dramatically expand in use in the coming decade.[6]

Policy also is a key factor for whether we leave traditional fossil fuels "in the ground." The Presidents' Clean Power Plan has been delayed by years, and potentially forever, by a preliminary injunction issued by the Supreme Court, in a highly unusual step where the Court enjoined this program even before the case reached the court of appeals.[7] With a change in presidential administrations in 2017, the executive action which created the Clean Power Plan, can be reversed by a second contrary executive action. With energy, market economics, as well as government policy, exert a significant impact on the route travelled. The legal, technical, and policy implications are analyzed in this article.

Section II lays the technical foundation on which to 'leave it in the ground.' It examines exactly what one would leave in the ground, and why this is important for both global warming and criteria pollution control targets.[8] Section II traces the implications for emissions of carbon dioxide, the principle greenhouse gas (GHG), as well as methane, the second most important GHG whose impact has been dramatically underestimated in its impact on climate. Here, the "what" and "how" matter. The implications of leaving it in the ground, to date in the U.S., have been to leave only coal in the ground; increasing amounts of natural gas and oil have been hydro-

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[4] U.S. Energy Dept. Reports: U.S. Wind Energy Production and Manufacturing Reaches Record Heights (Aug. 6, 2013), http://energy.gov/articles/energy-dept-reports-us-wind-energy-production-and-manufacturing-reaches-record-highs.

[5] IRENA, Solar Power is Cost Competitive, https://www.irena.org/remap/REmap-FactSheet-7-Cost%20Competitive.pdf.

[6] Solar Industry Data, Solar Industry Growing at Record Pace, SOLAR ENERGY INDUSTRIES ASSOCIATION, http://www.seia.org/research-resources/solar-industry-data (last visited, Oct. 2, 2016).

[7] Obama's Clean-Power Plan Put on Hold by U.S. Supreme Court, Feb. 9, 2016, http://www.bloomberg.com/politics/articles/2016-02-09/obama-s-clean-power-plan-put-on-hold-by-u-s-supreme-court.

[8] For more on the criteria pollutants regulated under the Clean Air Act, see Steven Ferrey, Environmental Law: Examples & Explanations, Wolters Kluwer/Aspen, 7th edition, 2016, at 186-189.

fracked for extraction and use. Section II examines the economics of why this is occurring, while the Obama Administration legal initiatives to accomplish this, the Mercury Air Toxics rule and the Clean Power Plan, have both been enjoined at the Supreme Court.[9]

Section III examines renewable power alternatives to also leave more natural gas in the ground going forward. Section III examines the technical challenge posed by the dominant forms of renewable energy – wind and solar power – which are intermittent and do not provide power pursuant to electric system reliability requirements. Section III takes the next step and examines how this is now compensated by more 'ramping' of traditional fossil fuel resources, which has distinct environmental consequences. Section III next analyzes the possibility of advanced options to store power, which to date has been a challenge and expensive. Finally, Section III looks at the option to 'virtually' store electric power through net metering programs that more than 40 of the 50 states have adopted, as well as the significant legal effect of net metering.

Section IV confronts legal jurisdictional limits on both state and federal governments when they decide to 'leave it in the ground.' On a federal level, the Clean Power Plan (CPP) to leave more GHGs in the ground, has been arrested by a multi-year temporary injunction. Even if eventually set free and not withdrawn by future administrations, what will be left in the ground? I analyze the uneven impact the CPP, as drafted, would have because of its deference to state discretion, whereby

- approximately half the states participate in obtaining wholesale power through Independent System Operators and half do not
- CPP allows the adoption of very different mass-based standards or rate-based standards

[9] C. Boyden Gray & Sam Kazman, *It's Judgment Day for the EPA's Clean Power Plan, America*, FOX NEWS (Sept. 27, 2016), http://www.foxnews.com/opinion/2016/09/27/its-judgment-day-for-epas-clean-power-plan-america.html.

- one-quarter of the states have deregulated and made more competitive their power sectors, while a majority of states have not

- some states have the ability to engage in interstate trading of CPP compliance

Section V analyzes the legal issues through several 2016 Supreme Court and other federal decisions:

- decisions of the Federal Energy Regulatory Commission which greatly restrict the authority of state energy regulators and public utility commissions to exercise authority over new energy decisions in energy markets[10]

- decisions of the Eight Circuit and the Seventh Circuit Courts of Appeals, additionally restricting on Constitutional grounds the authority of states over electric sector decisions[11]

- the Supreme Court 2016 decision under the Supremacy Clause restricting the authority of states to make decisions on electric power, which affect what is left in the ground[12]

- two decisions of the Seventh Circuit restricting state power[13]

- state use of an option that the 2016 Supreme Court decision left available, state renewable portfolio standards, influencing what is left in the ground[14]

II. WHAT WE LEAVE IN THE GROUND; IMPLICATIONS

A. TERRESTRIAL METES AND BOUND

If we "leave it in the ground," predominately what we will leave in the ground are the fossil fuels that we use for energy, and which cause greenhouse gas emissions when burned. Producing electricity from fossil fuels has a significant environmental cost. The World Bank released a report predicting global temperatures could rise by 7.2 degrees Fahrenheit by the end

[10] See infra, Section V B.
[11] See infra, Section V C.
[12] See infra, Section V A.
[13] See infra, Section V D
[14] See infra, Section V E.

of the century or sooner if current modest commitments to curb emission are not realized.[15] That is a very large temperature change.

CO_2 emissions grew 5.9% in 2010 reaching 9.1 GtC (33.5Gt CO2) and overshadowing a 1.4% decrease in CO_2 emissions in 2009.[16] Energy-related emissions are expected to increase fifty-seven percent from 2005 to 2030.[17] At current rates of energy development, energy-related CO_2 emissions in 2050 would be 237% of their current levels under the existent pattern.[18] Life as we know it would change fundamentally with the consequent warming of the climate.[19] The International Panel on Climate Change in 2014 concluded that in order to maintain world warming below 2°C, there must be a 40-70% reduction of GHGs emission from 2010 levels by 2050.[20]

Figure 1 illustrates the use of different energy sources over the past almost 400 years. Since its harnessing approximately 135 years ago, electricity was originally generated by hydro power and coal-fired power.[21] During the past 150 years, coal has been the dominant energy source for half of this period, and is the energy source consistently deployed among the top three energy sources during the entire past 150 years.

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[15] *See* William C. Ramsay, *Energy Technology Perspectives: Scenarios and Strategies to 2050*, INT'L ENERGY AGENCY (July 14, 2006), http://www.unece.lsu.edu/biofuels/ documents/2007July/SRN_020.pdf (Press Conference at OECD Tokyo Center).

[16] Jutin Gillis, Carbon Emissions Show Biggest Jump Ever Recorded, N.Y. TIMES, Dec. 4, 2011, at A4.

[17] U.S. GOV'T ACCOUNTABILITY OFFICE, GAO-09-151, INTERNATIONAL CLIMATE CHANGE PROGRAMS: LESSONS LEARNED FROM THE EUROPEAN UNION'S EMISSIONS TRADING SCHEME AND THE KYOTO PROTOCOL'S CLEAN DEVELOPMENT MECHANISM 48 (2008), *available at* http://www.gao.gov/assets/290/283397.pdf.

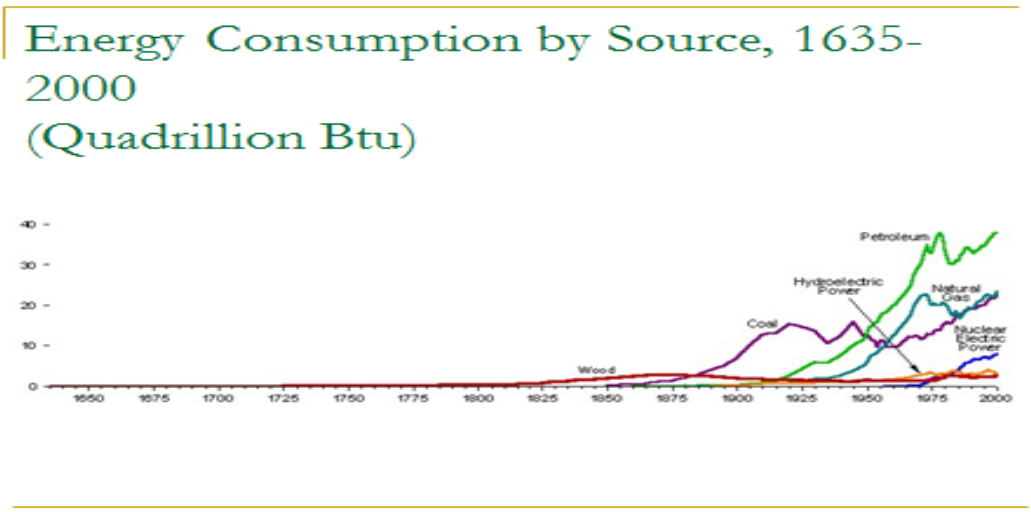
[18] WILLIAM C. RAMSAY, INT'L ENERGY AGENCY, ENERGY TECHNOLOGY PERSPECTIVES: SCENARIOS AND STRATEGIES TO 2050, PRESS CONFERENCE AT OECD TOKYO CENTER (July 14, 2006), *available at* http://www.unece.lsu.edu/biofuels/documents/2007July/SRN_020.pdf.

[19] The Nature Conservancy, Climate Change: Threats and Impacts, http://www.nature.org/ourinitiatives/urgentissues/global-warming-climate-change/threats-impacts/.

[20] Climate Change 2014 Synthesis Report, IPCC (November 1, 2014), p. 39.

[21] Hydropower: Going With the Flow, NAT. GEO., http://environment.nationalgeographic.com/environment/global-warming/hydropower-profile/; *See also*, A Brief History of Coal Use, U.S. DEP'T OF ENERGY, http://www.fe.doe.gov/education/energylessons/coal/coal_history.html.

Figure 1[22]



The majority of energy produced in the United States is derived from fossil fuels. The Congressional Research Service concluded that "in 2010, fossil fuels accounted for [seventy-eight percent] of U.S. primary energy production."[23] However, CO_2 is not as damaging as methane in terms of warming. A gram of methane absorbs seventy times more infrared radiation than a gram of carbon dioxide. Short-lived climate pollutants, including methane,[24] are powerful climate forcers that remain in the atmosphere for a much shorter period of time than longer-lived climate pollutants, including CO_2, which is the primary driver of climate change.[25] The GHGs are displayed in Figure 2.

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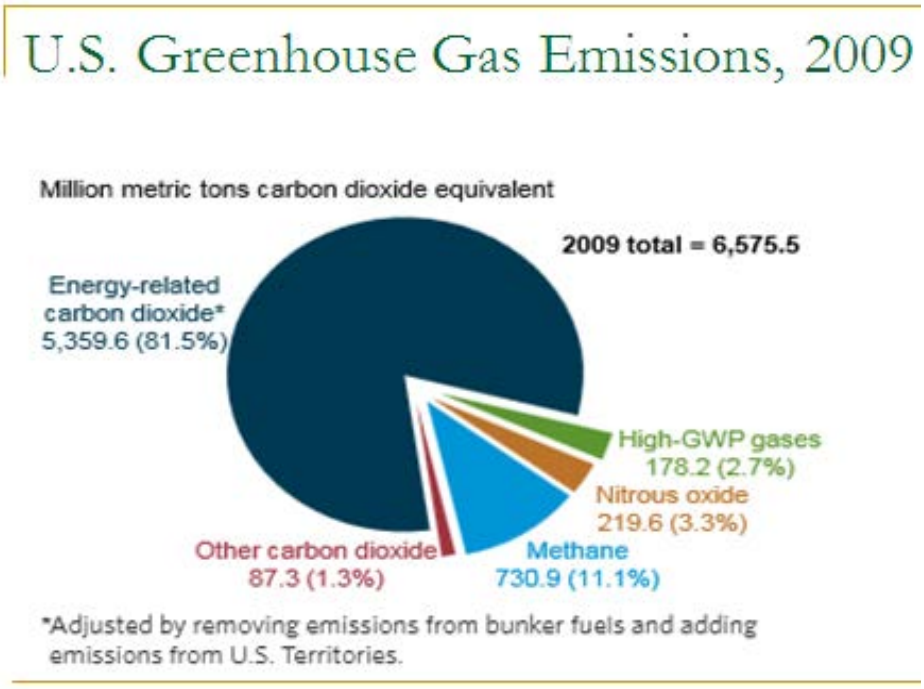
[22] Steven Ferrey, Unlocking the Global Warming Toolbox, Pennwell Pub. 2010, at 34, Fig. 3-3.
[23] *See generally*, MOLLY F. SHERLOCK, CONG. RESEARCH SERV., R41953, ENERGY TAX INCENTIVES: MEASURING VALUE ACROSS DIFFERENT TYPES OF ENERGY RESOURCES, at Summary (2012), *available at* http://www.fas.org/sgp/crs/misc/R41953.pdf.
[24] Calif. Air Resources Board, "Proposed Short-Lived Climate Pollutant Reduction Strategy, at 15 (April 2016)
[25] *Id.*

Figure 2[26]



B. LEAVING SOLID FOSSIL FUELS IN THE GROUND

Global extraction of natural gas increased 1,000% between 1950 and 1970 and then doubled again by 1990.[27] Hydro-fracking technology has greatly increased the recoverable amount of underground natural gas in the U.S.[28] A Harvard University study claim that if 3 percent or more of hydro-fracked methane leaked, that leaked methane would contribute more to climate damage than CO_2 from coal burning.[29] Their preliminary data showed leak rates of 3.6 - 7.9 percent of methane gas from shale-drilling; fracking basins in Utah found leak rates as high as 9 percent.[30]

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[26] *Id.*
[27] *Id.*
[28] "An Unconventional Bonanza," The Economist, July 14, 2012; "Natural Gas Reserves," The Economist, June 5, 2012.
[29] Bill McKibben, "Global Warming's Terrifying New Chemistry," The Nation, March 23, 2016, http://www.thenation.com/article/global-warming-terrifying-new-chemistry/.
[30] *Id.*

Almost one-third of methane emissions in America come from oil and gas production and distribution.[31] As with the production of coal and oil, methane is released into the atmosphere when gas is transported and stored. The U.S. Environmental Protection Agency (EPA) estimates that 0.35 to 0.70 percent of the gas carried in pipelines leaks to the atmosphere, and much of the leakage is from older cast iron and steel pipes. Methane also leaks from upstream oil and gas extraction.

Coal has been a major part of the U.S. electricity profile since electricity was first harnessed and produced one and a quarter centuries ago, and is the most carbon-intensive fossil fuel when burned, releasing approximately 29% more carbon per unit of energy generated than does oil, and 80% more than natural gas.[32] Coal-fired power plants also emit significantly more SO_2, NOx and particulate matter, three of the six Clean Air Act EPA-regulated criteria pollutants, per Mwh generated compared to natural gas and oil-fired plants, with existing coal units yielding greater emissions per unit of energy produced than newer coal technologies.[33] Coal production accounts for approximately 5 to 10% of methane emissions, mostly from newly opened mines.

The Congressional Research Service noted that "coal is inherently a 'dirty' fuel that emits sulfur dioxide, (SO_2), nitrogen oxides (NOx), particulates, mercury, acid gases, and other pollutants, in greater abundance than other fossil fuels."[34] Coal-fired power also was disproportionately targeted by unilateral executive action because EPA encourages states to exercise discretion to target electric power and/or coal-fired power generation to achieve

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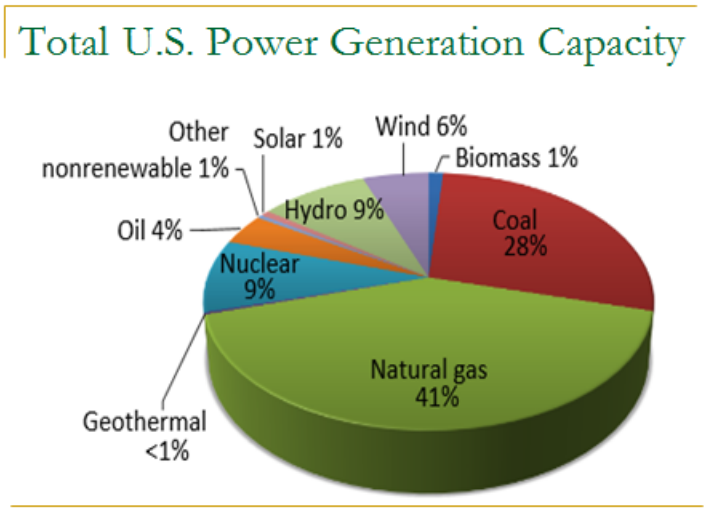
[31] Tripp Baltz, State Rules Target Fugitive Methane Emissions from Oil, Gas Industry, BNA Environment Report B-5-6, June 23, 2016.
[32] STEVEN FERREY, LAW OF INDEPENDENT POWER , THOMSON-REUTERS-WEST, 40th ed., 2014, at 6-127
[33] *Id.* at p. 6-131.
[34] James McCarthy & Claudia Copeland, EPA's Regulation of Coal Power: Is a 'Train Wreck' Coming," D.C.: Congressional Research Service (January 8, 2011).

National Ambient Air Quality Standards Clean Air Act compliance.[35] Coal-fired power generation units also emit more hazardous air emissions when operating, including mercury, compared to other fossil fuel plants.[36]

Coal and natural gas are supplying an approximately equal share of U.S. energy supply.[37] See Figure 3. 406 U.S. coal-fired power plants produce about ninety-five percent of the coal-fired power in the United States, accounting for approximately half of total U.S. electricity production in 2009, at an average cost of 3.2 cents/Kwh.[38] Approximately ten percent of these older coal-fired power plants produce about forty-three percent of the CO_2 emissions.[39]

FIGURE 3[40]



The U.S. Energy Information Administration (EIA) reports that 60 gigawatts (Gw) of existing coal-fired capacity will be shuttered by 2020; ninety percent of this coal capacity

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[35] See infra, section III A, notes 69-74.
[36] U.S. EPA, "Reducing Toxic Pollution from Power Plants: EPA's Proposed Mercury Standards," March 16, 2011.
[37] Monthly Coal-and Natural Gas-Fired Generation Equal for First Time in April 2012, U.S. ENERGY INFO. ADMIN., (July 6, 2012), http://www.eia.gov/todayinenergy/detail.cfm?id=6990.
[38] What Cost Energy? What Market Prices Fail to Reveal, 22 ELECTRICITY J. 3, 3 (2009).
[39] *Id.*
[40] Density of Power Plants by Operating Capacity: Continental United States, SNL ENERGY (July 9, 2014), available at http://www.snl.com/Global_Financial_Analysis_Infographics.aspx.

retirements will occur by 2016.[41] This will cause more of the coal resources to stay in the ground. At the end of 2012 there were 1,308 coal-fired generating units in the United States, totaling 310 Gw of capacity. In 2012 alone, 10.2 Gw of coal-fired capacity was retired, representing 3.2% of the 2011 total.[42] U.S. coal-fired generating capacity will fall from 310 Gw in 2012 to 262 Gw in 2040, according to EIA — a 15 percent decrease in the country's coal-fired capacity. Standard & Poor's estimated that 40 - 75 Gw of coal-fired power generation units may be shut by 2020.[43] Half of recent existing shutdowns are attributed to an indirect effect of the EPA's Mercury and Air Toxics Standard (MATS), even though it was recently overturned and remanded by the Supreme Court in 2015.[44]

There has been a significant transition from coal to natural gas among fossil fuels used for power in the U.S.[45] It is on the horizon that coal's share of electricity generation will continue to decrease in the near-term, and coal will be more "left in the ground." Four-fifths of the total energy-related CO_2 emissions permitted to be emitted by 2035 in the so-called "450 Scenario" to keep climate change in manageable dimension by the atmosphere containing no more 450 ppm of CO_2, are already locked-in by existing capital stock, including power stations, buildings, and factories.[46] Without further action to limit emissions, by the time this article goes to press, the energy-related infrastructure then in place already in 2017 would generate all the CO_2 emissions allowed from now to 2035 in the "450 Scenario" that would

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[41] Michael Bastasch, "Report: EPA regulations to accelerate coal plant shutdowns," THE DAILY CALLER, available at http://dailycaller.com/2014/02/14/report-epa-regulations-to-accelerate-coal-plant-shutdowns/.
[42] U.S. Dept. of Energy, Energy Information Administration, Annual Energy Outlook 2014, available at http://www.eia.gov/forecasts/aeo/er/index.cfm; "AEO2014 projects more coal-fired power plant retirements by 2016 than have been scheduled," March 10, 2014, available at http://www.eia.gov/todayinenergy/detail.cfm?id=15031.
[43] Naureen S. Malik and Harry R. Weber, "Breathing Clean Air Will Come at a Cost as U.S. Utility Bills Are Predicted to Surge," Bloomberg BNA, Energy & Climate Report, Oct. 29, 2015. 20,000 Mw of coal operated at 38 percent of capacity for the first half of 2014, and will shut permanently by the end of 2015.
[44] *Id.*
[45] Sarah Zielinski, Natural Gas Really is Better than Coal, SMITHSONIAN (Feb. 13, 2014), http://www.smithsonianmag.com/science-nature/natural-gas-really-better-coal-180949739/?no-ist.
[46] World Energy Outlook, Paris, IEA (2012).

raise world temperature two degrees.[47] In other words, the world goal, announced at the Paris COP-21 conference in December 2017, to hold world temperature increase to no more than 2 degrees this century, would already have been frustrated 18 months later. Because of this looming policy frustration, the U.S. is under international pressure to leave traditional energy resources in the ground.

According to a recent Organization for Economic Cooperation and Development (OECD) report examining policy challenges for the next 50 years, unless CO_2 emissions are reduced, climate change could curb global gross domestic project (GDP) by 1.5% by 2060 and by nearly 6% in South and South-East Asia.[48] The International Energy Agency presents evidence that the estimated $ 444 trillion[49] in additional investment needed to de-carbonize the energy system in line with their plus "2 degree scenario" by 2050 is more than offset by over $ 115 trillion in fuel savings, yielding net savings of $ 71 trillion.[50]

III. THE RENEWABLE TECHNOLOGY CHANGE

A critical question is what replaces coal resources left in the ground? It could be natural gas, it could be renewable power, it could be greater energy efficiency and demand response resources. Use of renewable energy continues to grow rapidly in the U.S. In 2013, electricity generated from renewable energy technologies, including conventional hydropower,

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[47] Id.
[48] "Shifting Gear: Policy Challenges for the Next 50 Years," OECD Econ. Dep't., available at http://www.oecd.org/eco/growth/Shifting%20gear.pdf.
[49] Energy Technology Perspectives 2014: Harnessing Electricity's Potential 8, IEA, available at http://www.iea.org/Textbase/npsum/ETP2014SUM.pdf. (last visited Dec. 16, 2014). In real 2012 USD, i.e. excluding inflation; includes other infrastructure beyond just sustainable energy.
[50] *Id.* Even with a 10% discount rate, the net savings are more than USD 5 trillion.

represented 13 percent of total U.S. electricity, up from 9 percent in 2005.[51] In 2012, wind energy was the most deployed new U.S. electricity generation capacity, contributing 43% of all new electric generation.[52] Wind energy provided 4.5 percent of total U.S. power supplies in 2013.[53] Since 2009, U.S. wind generation has tripled and solar generation has grown twentyfold.[54] The global market for renewable energy is projected to grow to $460 billion per year by 2030.[55] Wind is now the predominant new power generation source added each year.[56] Renewable energy will absorb almost two-thirds of the spending on new power plants over the next 25 years, dwarfing spending on fossil fuels, as solar energy becomes the first choice for consumers.[57]

A. RENEWABLE ENERGY CRITICAL DIFFERENCES AND LIMITATIONS WHEN OTHER RESOURCES ARE LEFT IN THE GROUND

Wind and solar power are intermittent in supply, and distinct form traditional forms of energy deployed in the U.S. The intermittency of the 30 days of the month for wind power generation in California is shown on the left side of Figure 4. The amount of wind power available every single day is different across the 24 hours of the day and from day to day. The capacity factor of an electric generation technology documents what percentage of maximum

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[51] Clean Power Plan, at p. 734, referencing Energy Information Administration, Annual Energy Outlook 2015 with Projections to 2040, at LR-5 (2014), P. ES-6; Energy Information Administration, Monthly Energy Review, May 2015, Table 7.2b, Available at: http://www.eia.gov/totalenergy/data/monthly/pdf/sec7_6.pdf.

[52] U.S. Energy Dept. Reports: U.S. Wind Energy Production and Manufacturing Reaches Record Heights (Aug. 6, 2013), http://energy.gov/articles/energy-dept-reports-us-wind-energy-production-and-manufacturing-reaches-record-highs

[53] Id.

[54] Id.. referencing Energy Information Administration, Monthly Energy Review, May 2015, Table 7.2b. Available at: http://www.eia.gov/totalenergy/data/monthly/pdf/sec7_6.pdf.

[55] Id., referencing "Global Renewable Energy Market Outlook." Bloomberg New Energy Finance, November 16, 2011, Available at: http://bnef.com/WhitePapers/download/53.688

[56] Roy L. Hales, ⅔ of New US Electricity Capacity Was From Wind In October, CLEAN TECHNICA (Nov. 24, 2014), http://cleantechnica.com/2014/11/24/two-thirds-of-us-installations-were-from-the-wind-sector/.

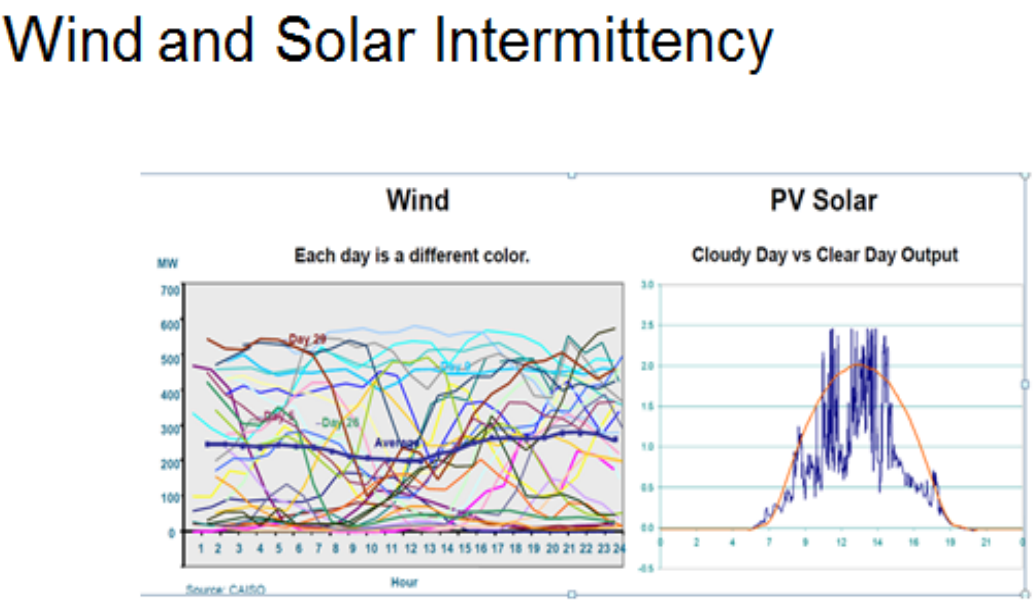
[57] Ehren Goossens, "Renewable Energy Expected to Draw Bulk of Spending for New Power Plants," Bloomberg BNA Environment Reporter, June 23, 2015.

power generation of the equipment is realized in operation. The record US annual wind capacity factor was 33.9% in 2014. The U.S. Department of Energy EIA says the median wind capacity over the past decade is 31%.[58] In the UK, the wind capacity factor ranged from a low of 21.5% in 2010 to a high 27.9% in 2013.[59] This poses the critical problem for intermittent energy – where less than half of it generating capacity is realized and at somewhat unpredictable times, to be solved below.

The right side of Figure 4 illustrates the profound intermittency of solar output on a clear day (red parabola) versus a typical day with passing clouds (the blue radically bouncing line) for a solar photovoltaic (PV) panel project. It is much different. Neither solar nor wind power is reliable at a given minute; both are intermittent. Our electric energy system requires a foundation of reliable power, which constrains how much intermittent power can be accommodated in a power system.

[58] Planning Engineer and Rud Istvan, "True costs of wind electricity," May 12, 2015,"available at http://judithcurry.com/2015/05/12/true-costs-of-wind-electricity/.
[59] Id.

FIGURE 4



Some renewable power generation resources are not intermittent, including hydroelectric and geothermal renewable resources. By the early 1900s, hydroelectric power accounted for more than 40 percent of the U.S. supply of electricity.[60] Today, more than 2,200 hydropower plants in the U.S. provide the country with 100,000 MW of reliable hydropower capacity, about 10% of all installed electric generating capacity.[61] Geothermal and hydro are a "baseload" power generation resource in the sense that it can be managed to produce around the clock or at specific designated times, rather than in an uncontrolled and highly variable pattern, that characterizes intermittent wind and solar power.

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[60] *See The History of Hydropower Development in the United States*, U.S. DEP'T OF INTERIOR: BUREAU OF RECLAMATION, http://www.usbr.gov/power/edu/history.html (last visited Dec. 20, 2014).
[61] *See* U.S. Hydropower Industry Snapshot, NATIONAL HYDROPOWER ASSOCIATION, available at http://www.hydro.org/why-hydro/available/industrysnapshot/ (last visited Dec. 20, 2014).

B. **RAMPING FOSSIL FUEL TO COMPENSATE FOR INTERMITTENCY**

More renewable power changes the generation hardware necessary to maintain adequate resources and stability for the U.S. electric power system. First, grid modifications, upgraded circuits and transformers, and expansion of the transmission and distribution infrastructure, is necessary to accommodate an increased percentage of renewable power.[62] In Germany, their switch to more intermittent renewable generation already resulted in an additional 1 billion Euro cost, with tens of billions more of investment still required.[63]

Even at no more than 20% wind penetration in a grid, there could be a 33-50% displacement of the operation of existing combined cycle fossil-fuel-fired generation units in the system.[64] There is a need for operation in the grid of more quick-start spinning reserve to respond to the constantly changing intermittency of solar and wind generation and provide load-following generation.[65] This need for spinning reserve of traditional units would call on existing fossil-fired and other base-load units to 'spin' when not needed to be capable of 'ramping' up to fill the power gaps, as necessary, created by operation of intermittent power resources. Ramping and cycling of fossil fuel plants is estimated to add $23/Mwh to the delivered cost of wind energy.[66] Achieving a lower capacity factor of operation than wind, solar PV resources experience a higher per/Mwh ramping charge than does wind power.

As one ramps existing fossil-fuel facilities to fill growing gaps created by intermittent power, there is an efficiency and environmental price which policymakers have not yet fully

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[62] Lincoln Davies and Kirsten Allen, "Feed-In Tariffs in Turmoil," 116 West Virginia L.R. 937, 1002 (2014).
[63] Id. at n. 419.
[64] J. Nicholas Puga, "The Importance of Combined Cycle Generating Plants in Integrating Large Levels of Wind Power Generation," 23 Electricity Journal 33 (Aug.-Sept. 2010).
[65] W. Platt & R. Jones, "The Impact of Carbon Trading on Performance: What Europe's Experience can Teach North American Generators," Power, January 2010.
[66] M. Giberson, "Assessing Wind Power Cost Estimates." 9. October 2013, Institute for Energy Research, http://instituteforenergyresearch.org/wp-content/uploads/2013/10/Giberson-study-Final.pdf.

recognized. The most efficient ramping resources, gas combined-cycle units, will experience higher heat rates, less efficient operation, greater maintenance expenses and consequent unavailability.[67] Ramping fossil generation units can increase maintenance costs requiring earlier replacements of certain generation facility components.[68] European data illustrates that their shift from traditional coal unit operation to more operation of natural gas-fired combined cycle units, resulted in an increase in these units' operation & maintenance (O&M) costs, outages, and less equipment availability.[69]

This is an additional significant, and often uncalculated, cost to maintain reliability of the electric system that becomes necessary if and only if intermittent power is given first-priority to supply power.[70] Who should pay for these additional costs to alter the power system, has avoided by most states, [71] which by default have used the second option below, among the two options:

- Allocate the cost of new quick-start ramping generation and/or power storage against the value ascribed to the owners of intermittent power generation whose entrance to the market necessitates these investments, or
- allocate these costs to all consumers of power by raising all power rates. to m to necessary because of the switch to intermittent generation supplied by wind and PV units.

[67] Puga, supra.
[68].WILSON RICKERSON ET AL., RESIDENTIAL PROSUMERS—DRIVERS AND POLICY OPTIONS (RE-PROSUMERS) 52 (2014), AVAILABLE AT http://iea-retd.org/wp-content/uploads/2014/06/RE-PROSUMERS_IEA- RETD_2014.pdf.
[69] W. Platt & R. Jones, "The Impact of Carbon Trading on Performance," supra.
[70] See, for example, ISO-NE and PJM ISO rules requiring that all wind and solar power is taken as initial supply whenever it is supplied to the grid without advance scheduling or bidding supply into the system.
[71] R. Simmons, et al.,"The True Cost of Energy: Wind." Final Report, July 2015. Institute of Political Economy, Utah State University, at 9, available at http://www.strata.org/wp-content/uploads/2015/07/Full-Report-True-Cost-of-Wind1.pdf.

C. **THE MISSING TECHNOLOGY: STORAGE**

With more solar and wind energy deployed, there are increased reliability issues newly created because the American economy does not operate only during daylight hours when solar energy is generated. Intermittent solar or wind power can cause stability issues with grid voltage or frequency fluctuations when PV inverters trip off when solar stops being produced either temporarily or for the evening.[72] With advanced intermittent power in Germany, there are five times as many potential disruptions due to German grid instability caused in significant part by more intermittent generation, as four years before, raising the risk of blackouts.[73]

Distribution utilities have the responsibility as part of maintaining a uniform, interconnected system, to deliver electricity to customers within narrow ranges of specified voltage levels as required by the National Electricity Reliability Council (NERC), a voluntary technical grid maintenance organization, and state rules.[74] When photovoltaic (PV) solar or other distributed generation resources are introduced onto the grid in significant number, this can affect the stability of line voltages depending upon generator rating, available solar resource, load, line conditions, and other factors.[75] In the most solar U.S. state, Hawaii, solar PV units in certain areas back-feeding into the distribution circuit, cause voltage increases and other power quality issues.[76]

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[72] Rickerson, International Energy Agency, *supra.* at 54.

[73] Julia Mengewein "German Push for Renewable Power Outlet Doubles Utilities Joining Balancing Market," Bloomberg BNA Energy and Climate Report, July 25, 2014. One grid operator requiring balancing adjusts of generation 1,009 times in 2013 to stabilize the grid, 209 times in 2010. In Germany's balancing market auctions, winning bidders have been paid as much as 13,922 euros ($18,700) to pledge set aside one megawatt for balancing services provided on notice of 15 minutes, 5 minutes or 30 seconds.

[74] *Id.* at 53.

[75] *Id.* at 52–53.

[76] *Id.* at 52. Advanced inverters can provide support to network stability. Upgrading inverters can also help. Germany has required that inverters on an estimated 315,000 PV systems be retrofitted in an effort to improve electricity system reliability and prevent potential instability issues. *Id.*

Microsoft's former Chairman Bill Gates stated that "There's no battery technology that's even close to allowing us to take all of our energy from renewables . . . [it's necessary] to deal not only with the 24-hour cycle but also with long periods of time where it's cloudy[77] and you don't have sun or you don't have wind." Unlike all other forms of energy, the moving electrons cannot be efficiently stored as electricity for more than a second before, with nowhere to go, they are converted to and lost as waste heat.[78] Therefore, the supply of electricity must match the demand for electricity over the centralized utility grid on an instantaneous, constant, real-time, and ongoing basis, or else the electric system shuts down or expensive equipment is damaged.[79] Either too much or too little power causes system instability on a real-time, second-by-second basis.[80] If power supply does not respond and is deficient to satisfy instantaneous demand, the grid can shut down and blackout large areas, as happened in the Northeast U.S. on August 14, 2003,[81] affecting 50 million people and caused a loss of at least $6 billion.[82]

The grid has mobilized some second-best alternatives to manage these imbalances, by converting electricity either into chemical energy stored in batteries, physical energy stored as compressed air, stored weight in reservoir capacity in hydroelectric pumped storage facilities, active physical energy stored in flywheels, or heat energy storage.[83] Pumped storage of water is the only significant storage deployed for the past half-century; pumped-storage facilities remain

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[77] Lewis Page, *Gates: Renewable Energy Can't Do the Job. Gov Should Switch Green Subsidies into R&D*, THE REGISTER (June 26, 2015 3:03 PM), http://www.theregister.co.uk/2015/06/26/gates_renewable_energy_cant_do_the_job_gov_should_switch_green_subsidies_into_rd.

[78] FERREY, ENVIRONMENTAL LAW, *supra* , at 586; MICHAEL BRUCH ET AL. CRO FORUM, POWER BLACKOUT RISKS 6 (Markus Aichinger ed., 2012) *available at* https://www.allianz.com/v_1339677769000/media/ responsibility/ documents/position_paper_power_blackout_risks.pdf.

[79] CRO Forum, "Power Blackout Risk," supra. at 3.2.1, at 6; *see* Steven FERREY, ENVIRONMENTAL LAW, *supra* at 586.

[80] CRO Forum, "Power Blackout Risk," supra. at 3.2.1., at 6.

[81] Matthew L. Wald, Richard Perez-Pena, & Neela Banerjee, "The Blackout: What Went Wrong; Experts Asking Why Problems Spread So Far," N.Y. TIMES, Aug. 16, 2003, at A1 (examining cause of 2003 blackout across northeastern United States).

[82] CRO Forum, "Power Blackout Risk," supra. at §3.2.1.

[83] Steven Ferrey, Law of Independent Power, supra., § 2:21; U.S. DEP'T OF ENERGY, GRID ENERGY STORAGE 11 (Dec. 2013), http://www.energy.gov/sites/prod/files/2014/09/f18/Grid%20Energy%20Storage%20December%202013.pdf.

the cheapest form of large-scale electricity storage according to the Energy Department, which estimates they make up about 99% of such storage world-wide It takes 5 units of electricity to pump water that makes 4 units of power. The contribution of other storage media to date is minimal.[84]

Battery storage has emerged as the key hoped for storage option for more deployment of intermittent distributed sources of renewable energy, which is expensive and not yet cost-effective. Here is the value of storage for intermittent power. California has ordered its utilities to build additional significant 1.3 Gw of storage capacity by the end of 2020, which is to be billed to all utility consumers, who themselves do not supply intermittent power or require or utilize this storage of energy that they produce.[85] Immunized from this additional charge for storage incorporated as a component of the distribution charge, is net metering of power.

D. **NET METERING**

Forty-four of the 50 states enacted regulations to implement net metering of electric power, although Hawaii, Georgia, and Nevada have pulled back recently on net metering; the current number is 41 states.[86] As of mid-2016, those states are shown in Figure 5.[87] When implemented as a regulatory option, net metering substitutes for storage capacity: The utility provides the equivalent of free personal quasi-storage (in the form of instantaneously selling

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[84]See, https://en.wikipedia.org/wiki/Grid_energy_storage#Batteries (surveying the forms of energy storage of electricity). Total world battery, compressed air, flywheel, and thermal storage capacity still amounts to only about 1.2 GWh. U.S. DEP'T OF ENERGY, GRID ENERGY STORAGE, *supra.* at 11.

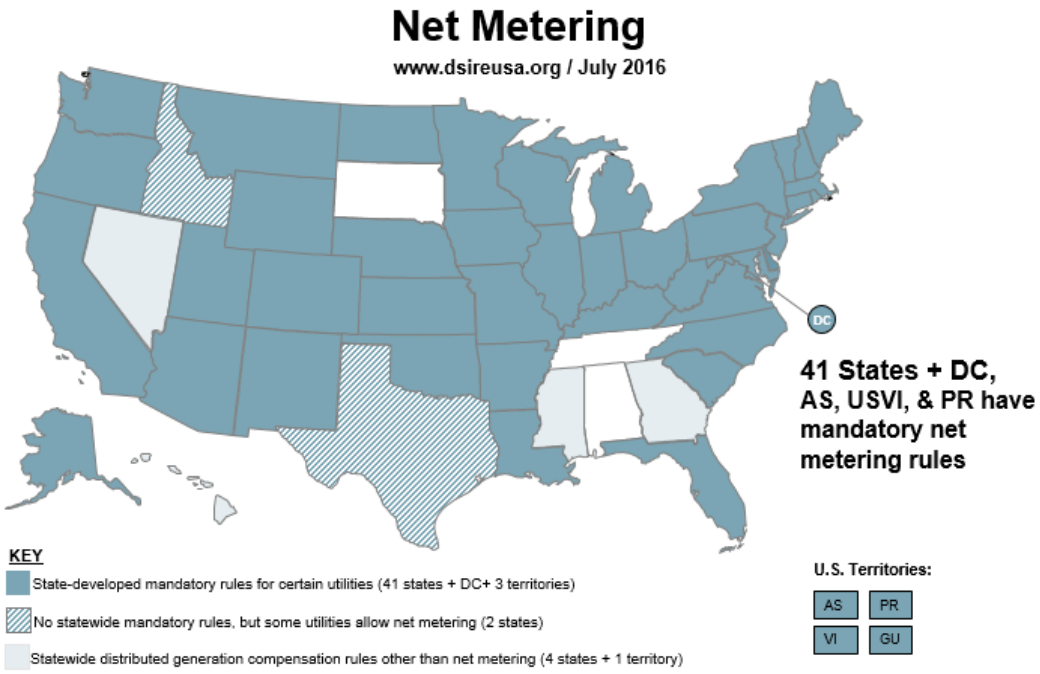
[85] California AB 2514 (2010). See, http://www.cleanenergylawreport.com/energy-regulatory/california-public-utilities-commission-approves-pioneering-energy-storage-mandate/.

[86] Steven Weissman & Nathaniel Johnson, The Statewide Benefits of Net-Metering in California and the Consequences of Changes to the Program, U.C. BERKELEY CTR. L., ENERGY & ENV'T 2 (Feb. 17, 2012), https://www.law.berkeley.edu/wp-content/uploads/2015/06/The_Statewide_Benefits_of_Net-Metering_in_CA_Weissman_and_Johnson3.pdf; for a current lineup, see http://www.dsireusa.org/resources/detailed-summary-maps/

[87] http://www.dsireusa.org/resources/detailed-summary-maps/.

the power to another customer and given the generator a credit to reclaim the power for free at a later time) for distributed renewable power generators, with costs passed on not to the generator benefiting from the storage, but to non-net metering customers who do not store any power they produce.[88] Net metering is a state policy that allows retail electricity customers to receive credits on their utility bills for on-site renewable energy generation exported to the state's electric grid in excess of their electric load.[89]

FIGURE 5.[90]



During times when energy is not being used by the customer but the retail customer's renewable energy system is producing electricity, the net meter spins in reverse direction registering all automatically exported electricity to the utility.[91] Customers are given credit by the utility for every Kwh of electricity not used by the generating customer and instead

[88] For detailed analysis of all state net metering programs and their associated legal issues, see Steven Ferrey, Virtual 'Nets' and Law: Power Navigates the Supremacy Clause," 24 Georgetown International Environmental Law Review 267 (2013).
[89] *See* Distributed Generation: Net Metering (Nat'l Grid 2012).
[90] http://www.dsireusa.org/resources/detailed-summary-maps/.
[91] *See* Distributed Generation: Net Metering (Nat'l Grid 2012).

exported to the utility grid.[92] By turning the meter backwards, and because only a single utility rate applies to a single meter, net metering effectively compensates the generator at, or near, the full retail rate that the meter registers.

Net metering, through a regulatory mechanism, substitutes "virtual" personal power storage for real physical energy storage. The power, in fact, is not capable of storage[93] and instead is instantaneously sold by the receiving utility to other retail customers with current demand, or if not sold is lost in the conversion of the power to waste heat. Costs incurred by the utility to facilitate such instantaneous transactions in power for the power sent to the grid are not passed on to the net metering customer, but through increased power distribution charges are passed on to the 99% of non-net metering retail electricity customers in the U.S. who still purchase conventional power.[94]

The utility and its customers are actually paying a net metering credit typically at or near the retail rate that is more—often triple or quadruple -- the wholesale value of any power, including the net-metered power sent to the utility. For example, the value of wholesale power sold through ISO-NE in the six New England states, for the past 8 years has averaged approximately $0.04/Kwh. The retail residential rate metered by Boston Edison Company on the author's meter, is now approximately $0.20/Kwh. This is a 5:1 differential retail/wholesale. Transacting parties for power would rather be credited the retail net metered rate rather than the wholesale rate. Notwithstanding its popularity, net metering customers still comprise a small fraction of less than one percent of all energy consumers.[95]

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[92] *See* Id.
[93] See supra. at Section III C.
[94] *See* Ker Than, *As Solar Power Grows, Dispute Flares Over U.S. Utility Bills*, NAT'L GEOGRAPHIC (Dec. 25, 2013, 10:10 PM), http://news.nationalgeographic.com/news/energy/2013/12/131226utilitiesdisputenetmeteringforsolar.
[95] Id. As of 2010, net metering customers represented only 0.1% of all energy customers in the United States. *Id.*

IV. 2016 CHANGING LEGAL JURISDICTIONAL LANDSCAPE FOR LEAVING IT IN THE GROUND

The Obama Administration embarked through unilateral executive action through the CPP to command and implement a 32% reduction of annual CO_2 emissions from fossil-fuel-fired power plants by 2030, compared to a baseline of 2005 emission levels; with first steps in place by 2022.[96] In the interim, EPA is cutting NOx, PM, and SO_2 emission limits, which with coal power generation are all related to combustion of the fuel. Since burning any fossil fuel releases CO_2 emissions, these various unilateral executive actions creates regulatory pressure to leave fossil resources in the ground and implement power generation alternatives. EPA estimates that this will cost private power generators $5.4 billion to $8.8 billion.[97] Below, we look at two primary elements.

A. NEW COAL RESOURCES DISCOURAGED

For new power plants, the proposed "New Source Rule" issued by EPA establishes separate performance standards for new coal- and gas-fired power plants.[98] This would establish a regulatory threshold 40% lower than current "best-in-class" new coal turbine technologies available on the market at the time the regulation was promulgated. These new regulations require the addition of partial or full carbon capture and storage (CCS) technologies for new

[96] EPA Clean Power Plan, 80 Fed. Reg. 64661 (Oct. 23, 2015); Amy Harder, EPA Power-Plant Proposal will Seek 30% Carbon Dioxide Emissions Cut by 2030, THE WALL STREET J. (June 1, 2014), http://www.wsj.com/articles/epa-power-plant-proposal-will-seek-30-carbon-dioxide-emissions-cut-by-2030-sources-1401650325.

[97] Andrew Childers, EPA Proposal Seeks 30 Percent Reduction in Carbon Dioxide from Power Plants by 2030, BLOOMBERG BNA (June 3, 2014), http://www.bna.com/epa-proposal-seeks-n17179890926/.

[98] A "new source" does not include existing sources undertaking modifications or reconstructions, and certain projects currently under development. 1,100 lbs of CO_2 /MWh of electricity produced for new coal plants (on a 12 operating month rolling basis); 1,000 lbs CO_2/MWh for new gas-fired facilities with a heat input exceeding 850 MMBtu/h (250 MW); and 1,100 lbs CO_2/MWh for new gas-fired facilities with a heat input between 250 MMBtu/h (73 MW) and 850 MMBtu/h (250 MW).

coal-fired generating facilities.[99] This is a level that conventional coal-fired electric generation will not be able to meet, since they generate about 1770 lbs. CO_2/MWh, which is well in excess of the new regulatory limit of 1100 lbs. CO_2/MWh.[100] There is an express exemption for simple cycle turbines.[101] The proposed rule effectively exempts new gas-fired power plants, which emit approximately 700 lbs CO_2/MWh. This promotes natural gas or any other alternative technologies, in lieu of new coal-fired power generation.

A large question now looms as to whether these regulations will be reversed by the new presidential administration. If these regulations remain, they will leave coal in the ground and the question is do we get more gas-fired power, more renewable power, or more demand response resources as our substitute? The near-term answer, two years after the promulgation of the CPP, is "some of each."

B. **THE CLEAN POWER PLAN AND EXISTING COAL RESOURCES**

Pursuant to Section 111(d) of the Clean Air Act, EPA proposed rules under the Obama Administration Clean Power Plan, also implemented by unilateral executive action without separate Congressional approval, restricting CO_2 emissions from existing, rather than new, power plants.[102] EPA received 2.5 million comments in preparing the regulation under which

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[99] EPA calculated that a new coal plant without CCS would emit approximately 1700 lbs of CO2/MWh. The national average is 2,200 lbs CO2 /MWh. U.S. EPA Issues Proposed New Source Performance Standard to Limit Carbon Dioxide Emissions from New Fossil Fuel Electricity Generating Power Plants, SULLIVAN & WORCESTER, (last visited Dec. 17, 2014).

[100] *See* Seth Hilton, "The Impact of California's Global Warming Legislation on the Electric Utility Industry," 19 ELECTRICITY JOURNAL 10, 14 (Nov. 2006). CAL. PUB. UTIL. CODE § 8340(a) (2007).

[101] The rule would require combustion turbine units (defined as including both simple cycle and combined cycle units) with a heat input rating greater than 850 MMBtu/hr to meet an emissions standard for CO2 of 1,000 lbs/Mwh, whereas combustion turbine units with a heat input rating at or below that threshold would have to meet an emissions standard of 1,100 lbs. CO2/Mwh.

[102] Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units, 79 Fed. Reg. 34, 380 (June 18, 2014) ("Proposed Rule" pursuant to 42 U.S.C. § 7411(d).). EPA also proposed standards for modified and reconstructed sources. Carbon Pollution Standards for Modified and Reconstructed Stationary Sources. 79 Fed. Reg. 34,959 (June 18, 2014)(Electric Utility Generating Units Proposed Rules).

each state will be required to develop standards of performance to limit CO_2 emissions from existing fossil-fuel-fired generating facilities.[103] This sheer volume of public comment is testament that leaving it in the ground is not without a fair bit of controversy, and the CPP may not survive the change of presidential administration.

EPA's final regulation indicates that the goal of this rule is to substitute gas for coal in the generation of electricity.[104] Coal would be left in the ground, while the thinking is that more natural gas is extracted. This program creates uncertainty as to which states will leave which resources in the ground. As part of the rule, EPA determines differentially Best System of Emission Reduction (BSER) under the existing federal Clean Air Act, based on each state's mix of individual existing generating sources calculated as a statewide CO_2 lbs/MWh generated emission rate.[105] Moreover, the "New Source Rule" issued by EPA establishes separate performance standards for new coal and gas-fired power plants.[106] In various states, this results in up to a required 50% cut in carbon intensity of existing generation.[107] Great uncertainty also is created because states have freedom to use a mass-based (gross state CO2 emission) or rate-based (calculated for each power plant) calculation to document compliance and can engage in a multi-state plan or join a regional system of compliance, in lieu of an individual state plan.[108]

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[103] Regulatory Impact Analysis for the Proposed Standards of Performance for Greenhouse Has Emission for New Stationary Sources: Electric Utility Generating Units, ENVTL. PROT. AGENCY (EPA), at 1-1 (Sept. 2013), http://www2.epa.gov/sites/production/files/2013-09/documents/20130920proposalria.pdf.
[104] 80 Fed. Reg. 64661 (Oct. 23, 2015).
[105] *Id.*
[106] A "new source" does not include existing sources undertaking modifications or reconstructions, and certain projects currently under development.
[107] Paul Decotis, What the Clean Power Plan Means for You & How to Tackle Building a Compliance Strategy, ENERGY BIZ (Nov. 7, 2014), http://www.energybiz.com/article/14/11/what-clean-power-plan-means-you-how-tackle-building-compliance-strategy.
[108] Rate-based limits for emissions limit the pounds of a pollutant emitted per million British thermal units of energy produced by a power generation facility. Mass-based limits do not deal with emissions from individual sources, but instead limit the mass of regional emissions. California A.B. 32, RGGI, and the EU-ETS utilize mass-based limits for GHGs. With mass-based limits, they can be achieved by using lower-emission forms of generation such as

With the Clean Power Plan, EPA seemed to be not leaving it in the ground, but shifting what is extracted and burned from the ground from one fossil fuel to another. EPA utilizes a planning assumption that states and ISOs should take natural gas combustion turbines, which have been running only at a national 40-50% capacity factor, and increase those to a 75% capacity factor, which increase in operation of gas combined cycle turbines will then displace operation of simple cycle coal-fired steam turbines, whose history demonstrates that they can operate at 91% availability.[109] States have freedom under the CPP to use a mass-based or rate-based calculation.[110] Those states which are members of ISOs and transact all wholesale power sales through them, are affected by this additional factor as to which generation resources are operated at lowest cost.

All of these choices create more than a few forks in the policy road; they create a 50 x 3 x 2 Rubik's cube of policy implementation outcomes. Along one dimension there are 50 different mandatory EPA BSER emission requirements set for each of the 50 states, plus a second dimension of multistate ISOs, single-state ISOs or no ISOs controlling wholesale power markets to achieve lowest-cost power generation, and a third dimension of whether state power production is done by the state's regulated utilities or by unregulated independent power generators.

The possible compliance variations are in the hundreds, while there is nothing in the U.S. economy more uniform than power flowing interstate between states. And the possibilities are magnified another order of magnitude when one takes into account that different states and different regions of the country rely on different types of fuels for electricity production, have

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renewable generation, or by reducing the need for power through end use efficiency, but does not affect the rate of emissions per unit of energy produced by conventional generators even when they operate for fewer hours.

[109] Id.

[110] 80 Fed. Reg. 64661 (Oct. 23, 2015); Carbon Pollution Emission Guidelines for Existing Stationary Sources (codified at 40 C.F.C. pt. 60).

different amounts of electric heating of buildings ranging from minor to a majority of buildings, and have different vintages of power plants scheduled for different remaining lifetimes.

Between the EPA CPP rule's promulgation in 2014, and final rule issuance in 2015, EPA both ramped up the degree of shift in CO_2 emissions and changed aspects to try to provide itself a more solid legal defense for when its promulgated regulation was challenged, as it immediately was.[111] These changes included more time for state compliance with a 2-year delay from 2016 to 2018 for states filing required plans, and a 2-year delay from 2020 to 2022 in the first year of required demonstrated CO_2 emission reductions.[112] EPA increased from 30% proposed initially to 32% in the final rule the requirement as to how much CO_2 emissions will have to be brought down after 2022 from the 2005 baseline.[113] And EPA demoted the option of energy efficiency and demand response resources from a featured compliance option for states in the proposed to rule to not listed in the final rule.[114] Of note, greater energy efficiency is one option which definitely results in a larger amount of fossil fuel being left in the ground, unlike some of the other compliance options in the CPP which switch from one extracted and burned fossil fuel to another.

Whether the CPP or a successor program is in place, the U.S. electric sector is differently structured from state to state, and the factors discussed below will need to be accounted for in any policy.

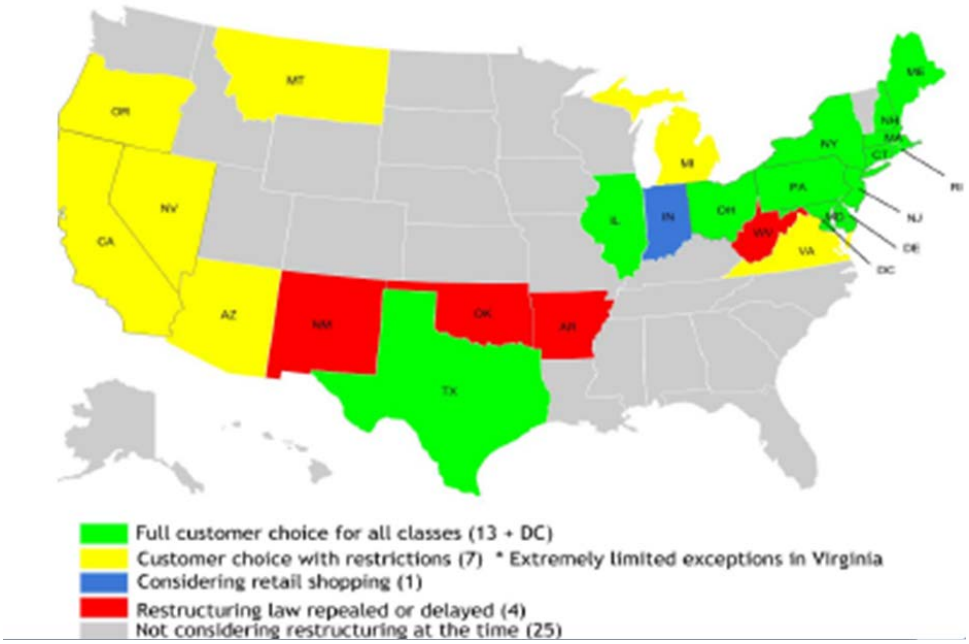
C. RESTRUCTURING STATE AUTHORITY

[111] 80 Fed. Reg. 64661 (Oct. 23, 2015). EPA published a 1,445 page preamble to its 115-page 2015 final rule on the Clean Power Plan, which regulates future CO_2 emissions from existing fossil-fuel-fired power plants.
[112] Id.
[113] Id.
[114] Id.

Restructuring and deregulation of the retail electric power sector dramatically changed the operative regulatory paradigm for electric energy in one-quarter of the states.[115] Beginning in 1997 in Massachusetts and Rhode Island,[116] and then spreading to 13 states (see Figure 6), competition and partial deregulation of retail power was adopted in approximately one-quarter of the states.[117] Nineteen of the states restructured prior to the electric sector deregulation debacle in California in 2000–2001, whereafter a half dozen states reversed course and returned to a regulated retail electric system. See Figure 6.

[115]Electric Energy Market Competition Task Force, "Report to Congress on Wholesale and Retail Competition Markets for Electric Energy," at 149–50, *available at* http://www.ferc.gov/legal/staff-reports/competition-rpt.pdf.
[116] Steven Ferrey, Law of Independent Power, supra. at §§ 10:12 and 10:13; Steven Ferrey, Environmental Law, supra., at 616; Steven Ferrey, The New Rules: A Guide to Electric Market Regulation. Pennwell Publishers, 2000, at Chapter 8 and Appendix B.
[117] Steven Ferrey, The New Rules: A Guide to Electric Market Regulation. Pennwell Publishers, 2000, at Chapter 8; Steven Ferrey, Environmental Law, supra. at 616.

FIGURE 6. DEREGULATION OF RETAIL POWER



Today, three-quarter of the states are conventionally regulated and retain traditionally structured retail electric sectors.[118] In a significant number of the 13 deregulated states, this also resulted by order of the state regulator in the regulated monopoly utilities selling their generation units to independent power companies to spur more competition in power generation.[119] This was a major transition, which recent legal battles demonstrate that some states did not fully appreciate.[120] Thereafter, now for more than a decade, more new power generation is constructed each year by independent power ("merchant") companies than by the regulated utilities.[121] With several states, as shown in Figure 5,[122] having deregulated retail power sales

[118]See Steven Ferrey, "Sale of Electricity," in Michael B. Gerrard ed., THE LAW OF CLEAN ENERGY: EFFICIENCY AND RENEWABLES 218–19 (American Bar Association Press, 2011); Steven Ferrey, Environmental Law, supra., at 616.

[119] U.S. Department of Energy, Energy Information Administration. *The Changing Structure of the Electric Power Industry 2000: An Update*, October 2000, 106.

[120] See infra., at Section V.

[121] "In the 1970s, vertically integrated utility companies (investor-owned, municipal, or cooperative utilities) controlled over 95 percent of the electric generation in the United States…… by 2004 electric utilities owned less than 60 percent of electric generating capacity. Increasingly, decisions affecting retail customers and electricity rates are split among federal, state, and new private, regional entities." Electric Energy Market Competition Task Force, "Report to Congress on Wholesale and Retail Competition Markets for Electric Energy," at 10. Steven Ferrey,

and required their utilities to divest all of their power generation capacity,[123] regulatory authority has shifted with these utilities having to engage in wholesale acquisition of their power from the wholesale market.[124] The Federal Power Act shifts exclusive jurisdiction over wholesale power to federal authority, preempting state authority.[125]

V. NEW 2016 LEGAL DETERMINATIONS

With any change in presidential administrations, federal energy policy changes either marginally or in a major fashion. There is recent federal court interpretation of states can and cannot do in terms of regulating energy.

A. SUPREME COURT 2016 RESTRICTION ON STATE REGULATION OF ENERGY

Maryland energy regulation raised constitutional Supremacy Clause and Commerce Clause issues for the Supreme Court in 2016, regarding the ability of states to influence options which did not leave fossil fuel in the ground.[126] To set the regulatory context, Maryland adopted competitive retail markets along with a dozen other states at the end of the 20th century as shown in Figure 6,[127] and had its retail utilities participate in the PJM Independent Service Operator (ISO) wholesale power supply markets.[128] See Figure 7. The PJM annual interstate wholesale "capacity auction" is designed to ensure that the most cost-effective winning electricity

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"Sale of Electricity," in Michael B. Gerrard ed., The Law Of Clean Energy: Efficiency And Renewables 217-218 (American Bar Association Press, 2011).

[122] *See* FERREY, LAW OF INDEPENDENT POWER, *supra*., at §8.3, n.7-8.

[123] *See* FERREY, NEW RULES, *supra*, at app B, 280-286, 298-301.

[124] *See* Steven FERREY, LAW OF INDEPENDENT POWER, *supra.*, at §8.3, pp. 8-16 through 8-17.

[125] See infra., Section V.

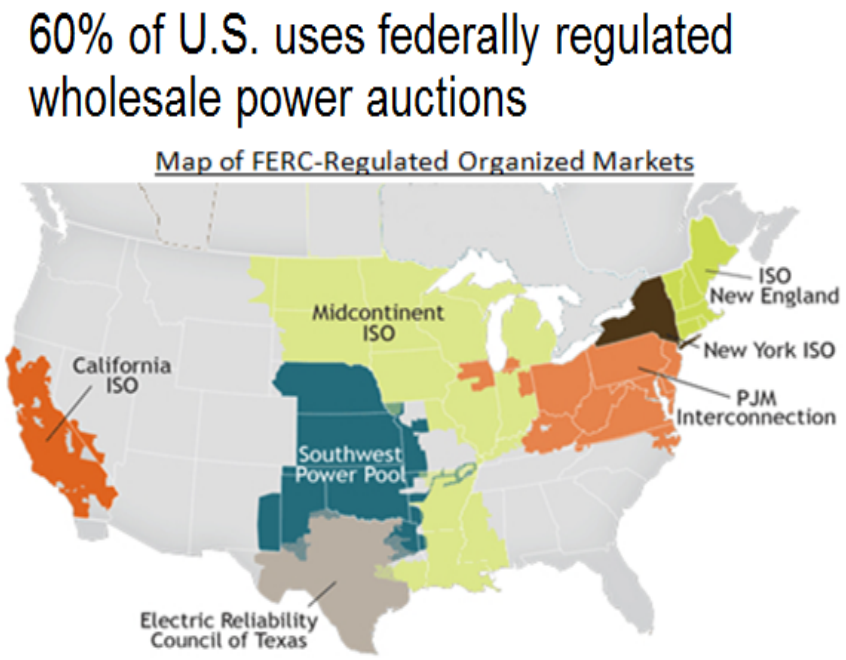
[126] *PPL Energyplus, LLC, et al. v. Nazarian*, 974 F.Supp.2d 790 (D.Md.2013); *affirmed*, 753 F.3d 467 (4th Cir. 2014).

[127] *Map of Deregulated Energy Market (2016)*, ELECTRIC CHOICE, https://www.electricchoice.com/map-deregulated-energy-markets/ (last visited Aug. 25, 2016).

[128] See PJM, available at http://pjm.com/about-pjm/who-we-are.aspx.

generation will be constructed to meet future demand, taking bids and awarding entitlements approximately 3 years in advance of power capacity need.[129] PJM provides capacity payments for siting new winning power generation facilities, selected as the most competitive capacity auction bids throughout its 13 state PJM area.[130]

FIGURE 7



Maryland adopted a regulatory scheme to cause new power generation facilities to locate in its state rather than elsewhere in the PJM region. To do so, Maryland required its utilities to enter 20-year long-term "contracts for differences" ("CfD," a form of power purchase agreement (PPA)) only with the winning independent power producer, Commercial Power Ventures Maryland ("CPV"), which proposed a fossil-fuel fired power generation option, on the condition that it was willing to locate this new electricity generation capacity in Maryland or in the District

[129] *Hughes, slip op. at 4.* Capacity owners that have cleared the market by remaining in as the bid price bar is lowered, are all paid the clearing price for capacity, which is the price of the highest accepted bid. Id. at 6.
[130] Id. at 8.

of Columbia.[131] This CfD established the final wholesale rates that CPV would receive for a 20-year period comprised, in part, by capacity payment from the PJM capacity auction and, in part, from Maryland 'topping off' the amount received to a preset contractual amount, in return for CPV locating in Maryland.[132]

PJM has a federally FERC-approved[133] permission to run the capacity auction.[134] Maryland retail utilities, which were required to divest their power generating facilities, must purchase energy for their retail customers through the federally regulated wholesale PJM interstate market.[135] Constitutional challenges were raised by unselected wholesale power generators who alleged that they were disadvantaged by the Maryland program because of how it interfered with the federal PJM market.[136] The Federal Power Act of 1935 establishes that FERC exercises exclusive authority to regulate the commerce and rates for the interstate and wholesale sale and transmission of electricity in the United States.[137]

The Supreme Court has held that Congress meant to draw a "bright line," easily ascertained and not even requiring case-by-case analysis, between state and federal

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[131] Id. One notes that there is not that much spare land in the small District of Columbia.
[132] Id. If CPV's winning bid for capacity payments was less than the Maryland contract price, Maryland utilities would pay it the difference; if the reverse, CPV would pay the Maryland utilities the difference. Consequently, CPV had no incentive to submit its true competitive auction bid.
[133] Regional Transmission Organizations (RTOs) or Independent System Operators (ISOs) are FERC-approved and regulated entities which facilitate commercial electricity transfers, through a private corporation that functions as a tariff administrator. RTOs are responsible for managing both electrical and financial transactions. See, Steven Ferrey, Law of Independent Power, supra. at Sections 8:10, 10:87, 10:91; Steven Ferrey, The New Rules: A Guide to Electric Market Regulation, Pennwell, 2000, at 49-50.
[134] PJM, an ISO, is a FERC-created and authorized entity. In the PJM ISO, which serves multiple Eastern states, there are two retail energy markets, a real-time (spot) and a day-ahead (forward) market. See, http://www.pjm.com/documents/agreements.aspx; see also, http://www.ferc.gov/market-oversight/mkt-electric/pjm.asp.
[135] Id. Slip op. at 93.
[136] *Hughes, supra.*
[137] *Public Utility District No. 1 of Snohomish County Washington v. FERC*, 471 F.3d 1053, 1058 (9th Cir. 2006), *aff'd in part and rev'd in part sub nom. Morgan Stanley Capital Group, Inc. v. Public Utility District No. 1,* 554 U.S. 527 (2008).

jurisdiction."[138] "FERC has exclusive authority to set and to determine the reasonableness of wholesale rates."[139] The Maryland federal district court held the Maryland "Order field preempted."[140] The Fourth Circuit Court of Appeals unanimously affirmed and held that the Maryland program was "field preempted because it functionally set[] the rate that CPV receive[d] for its sales in the [wholesale] auction."[141] Relying on a "wealth of case law [that] confirms FERC's exclusive power to regulate wholesale sales of energy in interstate commerce,"[142] the Circuit Court found that "if FERC has jurisdiction over a subject the States cannot have jurisdiction over the same subject."[143]

Certiorari was granted despite no split in circuit courts on this question, and the Supreme Court in 2016 unanimously upheld the Fourth Circuit opinion. The Supreme Court found that the Maryland statute intrudes on exclusive FERC wholesale market authority:[144] "Maryland's program sets an interstate wholesale rate, contravening the FPA's [Federal Power Act's] division of authority between state and federal regulators."[145] In *Hughes,* the Supreme Court stated that "The FPA leaves no room either for direct ….or for regulation that would indirectly achieve the same result."[146]

The *Hughes* decision has important implications for whether the U.S. chooses to leave energy resources in the ground, or to continue more with business-as-usual. This 2016 Supreme

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[138] *Fed. Power Comm'n v. S. Cal. Edison Co*., 376 U.S. 205, 215–16 (1964); *Public Utility District No. 1 of Snohomish County, Washington v. FERC*, 471 F.3d at 1066 (2006), *aff'd in part and rev'd in part sub nom. Morgan Stanley Capital Group, Inc. v. Public Utility District No. 1 of Snohomish County et al.*, 554 U.S. 527 (2008)(citing the separate Supreme Court opinions in *Nantahala, Southern California Edison, and Mississippi Power).*
[139] *Mississippi Power & Light Co. v. Mississippi*, 487 U.S. 354, 371 (1988)("FERC has exclusive authority to determine the reasonableness of wholesale rates."); *accord, Public Utility District No. 1 of Snohomish County, Washington v. FERC*, 471 F.3d at 1066*; aff'd in part and rev'd in part sub nom. Morgan Stanley Capital Group, Inc. v. Public Utility District No. 1*, 554 U.S. 527 (2008).
[140] *PPL EnergyPlus, LLC v. Nazarian*, 974 F.Supp.2d 790 (D. Md. 2013), slip op. at 111-112.
[141] *PPL EnergyPlus, LLC v. Nazarian*, 753 F.3d 467, 474 (4th Cir. 2014).
[142] Id. at 475.
[143] Id.
[144] *Hughes*, 578 U.S. ___, slip op. at 13
[145] *Id*. at 5.
[146] Id. slip op. at 12.

Court opinion limits state authority over energy decisions and markets. Where states attempt to tweak interstate wholesale power prices as a way to accomplish their policy ends, they cross the 'bright line' of prohibited state power. As a constitutional limitation, this 'line' is not going to move as state preferences and policies change. States still retain authority over regulatory decisions regarding energy efficiency, which by its very design, leaves energy resources in the ground.[147]

While the *Hughes* case involved interstate electric capacity markets, which affect what resources are and are not left in the ground, other decisions of FERC in 2016 addressed interstate energy markets.

B. FEDERAL ENERGY REGULATORY COMMISSION (FERC) 2016 ORDERS

Two virtually identical FERC 2016 decisions substantially limit state authority over the energy markets and what is and is not, corresponding, left in the ground.[148] Several of the Ohio investor-owned retail utilities, including the large multi-state utilities First Energy and American Electric Power Company, proposed a concept, *inter alia,* to extend the life of their existing coal-fired power projects, several of which had already gone beyond their originally expected lifetimes. The Ohio retail electric utility subsidiaries of these companies proposed to enter a relatively long-term contract to purchase power from their commonly-owned sister wholesale market generators' output from several older coal and nuclear facilities.

Rather than supply their retail customers in Ohio with this purchased power, the Ohio retail electric utilities would sell that power into the PJM Independent System Operator

[147] For a detailed treatment of state and federal jurisdiction over energy efficiency, see Steven Ferrey, "Efficiency in the Regulatory Crucible: Navigating 21st Century 'Smart' Technology and Power," George Washington University Journal of Energy & Environmental Law 1, winter 2012-13 (2013).

[148] Electric Power Supply Association, et al v. FirstEnergy Solutions Corporation, et al., 155 FERC ¶ 61,101, FERC Docket No. EL16-34-000, Order Granting Complaint, April 27, 2016. In this discussion, we will analyze the First Energy decision, for which the American Electric Power decision was similarly decided.

wholesale power market, and then repurchase power back from that same PJM market in a wholly separate transaction to serve their retail customers.[149] That power sold into the PJM wholesale market by the retail subsidiaries, and any loss or gain realized on those sales, would be credited or billed to Ohio retail electric customers.[150] In essence, the purchased electrons in the direct sale from their sister wholesale generators were then in a second wholesale sale washed through the PJM market and repurchased at either a gain or a loss. Customers were fully responsible for any final bill or credit related to the loss or gain resulting from the dual transaction.

The Ohio Public Utility Commission, after lengthy hearings, approved this proposed Electric Security Plan, on March 31, 2016.[151] A group of complainants brought a petition before FERC regarding the constitutional legality of the Ohio plans affecting several of the Ohio retail utilities and their related wholesale energy suppliers.[152] FERC's decision in April 2016, granted the complaint and held that the requirement of 18 C.F.R. § 35.39(b) to obtain prior FERC approval for affiliate sales of electric energy or capacity, applies to the Ohio wholesale power

[149] Id. In connection with the implementation of retail choice in Ohio, the FE Ohio Regulated Utilities divested virtually all of their generation assets to FE Ohio Market Affiliates, including interests in various coal- and oil-fired units at the W.H. Sammis Plant, the nuclear-powered David-Besse power station, and an entitlement to a portion of the output of generation units in Ohio and Indiana owned by Ohio Valley Electric Corporation. These assets represent an aggregate generating capacity of approximately 5531 MW. FE Solutions markets the output of these assets owned by its subsidiaries, FirstEnergy Generation Corporation, FirstEnergy Nuclear Generation Corporation, and FirstEnergy Generation Mansfield Unit 1 Corp. Id. Complaint at 8. Under the terms of the affiliate power purchase agreements (PPAs) between the independent utility-owned wholesale plants and their retail subsidiaries, which has never been made public, First Energy Ohio Regulated Utilities (FE) would purchase the output of the Sammis coal and Davis-Besse nuclear generation facilities, as well as an entitlement to certain output owned by Ohio Valley Electric Corporation coal-fired plants, owned by FE Ohio Market Affiliates.

[150] Id.

[151] Electric Power Supply Association, et al v. FirstEnergy Solutions Corporation, et al., 155 FERC ¶ 61,101, FERC Docket No. EL16-34-000, Order Granting Complaint, April 27, 2016.

[152] Notice of the complaint was published in the *Federal Register*, 81 Fed. Reg. 5729 (2016).

sales to affiliated retail utilities, which the Ohio PUC had approved after the FERC complaint was filed and while the complaint at FERC was pending.[153]

These two FERC 2016 Ohio decisions affect what states can and cannot cause to continue to be extracted from the ground or left in it. Unlike the federal Clean Power Plan,[154] none of the cases discussed in this Section V turn on authority under the Clean Air Act. These federal decisions turn on the Supremacy and Commerce Clauses of the Constitution, as limits on state power over this extractive sector of the economy. Next, the Eighth Circuit in 2016 addressed state regulation of interstate electric power transactions, which affect multi-state decisions of whether fossil fuel resources are left in the ground.

C. EIGHTH CIRCUIT 2016 HOLDING

The state of North Dakota challenged the constitutionality of a Minnesota statute restricting the import of resources not left in the ground – specifically coal and coal-fired power exported in to Minnesota from other states. In 2007, Minnesota passed a law regulating emissions from power plants, which law did not apply to Minnesota power plants. North Dakota interests complained that the Minnesota's statute "interferes with the interstate transmission and wholesale marketing of electric power in the integrated interstate region."[155]

The district court held the statute was in violation of the dormant Commerce Clause of the Constitution because "the practical effect of the provisions was to control non-Minnesota

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[153] Electric Power Supply Association, et al v. FirstEnergy Solutions Corporation, et al., 155 FERC ¶ 61,101, FERC Docket No. EL16-34-000, Order Granting Complaint, April 27, 2016 ("We note that, pursuant to this finding, no sales may be made with respect to the Affiliate PPA unless and until the Commission approves the Affiliate PPA under *Edgar* and *Allegheny*. As such, the requirement in 18 C.F.R. § 35.39(b) to obtain prior approval for affiliate sales of electric energy or capacity applies to any FE Ohio Market Affiliate to the extent such entity is a seller under the Affiliate PPA.").

[154] See supra, Section IV B.

[155] *See N. Dakota v. Heydinger*, 15 F. Supp. 3d 891, 910 (D. Minn. 2014).

entities" and thus violated the sparingly construed extraterritoriality doctrine of the Commerce Clause.[156] The federal trial court upheld plaintiffs' motions for summary judgment and agreed with the plaintiffs that parts of the statute regulated extraterritorially and were therefore invalid under the dormant Commerce Clause.[157] The court concluded that Minnesota's regulation of out-of-state transactions also violates the dormant Commerce Clause.[158]

The challengers also asserted that the provisions of the Minnesota statute are preempted by the Federal Power Act and Clean Air Act and therefore invalid under the Constitution's Supremacy Clause.[159] The federal trial judge made a decision that the Minnesota statute clearly violated the Commerce Clause, and since that is a constitutional violation, the trial court found it unnecessary to resolve at the trial level the additional preemption claims of plaintiffs.[160] The trial court held that Minnesota could not even indirectly control what other states did or did not leave in the ground, nor the electricity in interstate commerce produced from what was not left in the ground.

On appeal, the Eighth Circuit fund the state statute unanimously unconstitutional, but the three-judge panel had different reasons.[161] The opinion of the first judge on the Eighth Circuit panel affirmed the district court opinion which held that the challenged prohibitions have the practical effect of controlling conduct beyond the boundaries of Minnesota regarding what was or was not left in the ground or how it was utilized in the electric sector, violating the Commerce Clause.[162] Two other of these judges found that the Minnesota statute violated the Supremacy

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[156] Id. , at 909.
[157] Id. at 910 (D. Minn. 2014).
[158] Id.
[159] Id.
[160] Id.
[161] *North Dakota v. Heydinger*, No. 14-2156, 14-2251 (8th Cir. June 15, 2016).
[162] Id.

Clause of the Constitution and was preempted either by the Federal Power Act or by the Clean Air Act.[163]

D. SEVENTH CIRCUIT

The Seventh Circuit rendered two recent decisions relevant to the Constitutional separation of authority over energy regulation under the Supremacy and Commerce Clauses, which also influences what is left in the ground. Judge Posner, along with Judges Easterbrook and Hamilton, issued a decision in 2016[164] upholding FERC's prohibition of state rights-of-first-refusal (ROFRs) in ISO transmission planning.[165] The Circuit held that an ISO operating pursuant to federal FERC authorization, or FERC itself, alone can control wholesale generation transactions so as to create a competitive wholesale power market, and there is no state authority.[166]

In a similar vein, the Seventh Circuit rendered a decision addressing promoting renewable energy as a means to dis-incentivize the extraction of fossil fuel power resources from the ground. Judge Richard Posner, speaking for the Seventh Circuit Court of Appeals in a unanimous decision, affirmed exclusive Federal Energy Regulatory Commission authority over

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[163] Id.

[164] *MISO Transmission Owners, et al., v. FERC*, __ F.3d__, No. 14-2153 (April 2016), slip op. (Petitions for Review of Orders of the Federal Energy Regulatory Commission).

[165] For more on legal issues associated with FERC Order 1000 and ISO authority, see Steven Ferrey, "State Refusal Triggers Constitutional Crisis: Past is Prologue on Energy and Infrastructure," 34 University of Texas Review of Litigation 423 (2015).

[166][166] *MISO Transmission Owners, et al., v. FERC*, __ F.3d__, No. 14-2153 (April 2016), slip op. at 3 ("an independent system operator can coordinate the transmission system in a way that among other things promotes competition among the producers of electrical power. Federal Energy Regulatory Commission, Energy Primer: A Handbook of Energy Market Basics" 40, 47, 58–61 (November 2015), www.ferc.gov/market-oversight/guide/energy-primer.pdf; *Illinois Commerce; Commission v. FERC*, 721 F.3d 764, 769–70 (7th Cir. 2013)). The court determined that the incumbent utilities were "sophisticated enough to understand the benefits of a contract that would give each party protection against competition in the creation of new facilities." Id.

wholesale electric markets in the U.S.[167] The Circuit limited states discrimination based on geography pursuant to the dormant Commerce Clause, when awarding state renewable portfolio standards Renewable Energy Credits (RECs).[168] A significant number of states do so discriminate.[169] The Seventh Circuit relied on a law review article authored by Professor Ferrey for its authority on the respective jurisdiction of state and federal governments to regulate electricity.[170] As set forth below,[171] Renewable Portfolio Standards (RPS) are one of the most significant legal mechanisms by which a majority of the states influence what is left in the ground.

E. STATE RENEWABLE PORTFOLIO STANDARDS

The *Hughes* case showcased the basic viability of state Renewable Portfolio Standards, while the Seventh Circuit correctly noted that while such state programs are available, states cannot violate the Commerce Clause by discriminating against interstate renewable power, which several states do.[172] What the 2016 *Hughes* decision of the Supreme Court leaves available to state authority, is to deploy state funds, as long as it does not directly or indirectly affect the wholesale pricing markets for power, to incentivize certain power technologies or locations:

> "We therefore need not and do not address the permissibility of various other measures States might employ to encourage development of new or clean generation, including tax incentives, land grants, direct subsidies, construction of state owned generation facilities,

[167] MISO's service area extends from the Canadian border, east to Michigan and parts of Indiana, south to northern Missouri, and west to eastern areas of Montana. *See Illinois Commerce Comm'n v. FERC*, 721 F.3d 764, 770 (7th Cir. 2013).
[168] See infra., at Section V E.
[169] See Steven Ferrey, "Threading the Constitutional Needle with Care," 7 University of Texas Journal of Oil, Gas and Energy Law 59 (2012).
[170] *Id.* at 776 (citing Ferrey, *Threading the Constitutional Needle*, *supra*, at 69, 106–07 (2012)).
[171] See infra., Section V E.
[172] Steven Ferrey, "Threading the Constitutional Needle with Care," 7 University of Texas Journal of Oil, Gas and Energy Law 59 (2012).

> or re-regulation of the energy sector….[that are] 'untethered to a generator's wholesale market participation.'"[173]

Twenty-nine U.S. states and the District of Columbia have some form of RPS.[174] These mandatory RPS programs cover about half of nationwide retail electricity sales.[175] It is estimated that roughly half of new renewable energy power capacity in the U.S. over the last decade has occurred in states with RPS programs in place.[176]

Renewable Portfolio Standards require electric utilities and other retail electric providers to include in their retail sales a specified percentage of electricity supply annually from eligible renewable energy sources, as dictated by state law.[177] These acquisitions are evidenced by state RECs awarded with production of each megawatt-hour of generation from an eligible renewable energy facility. In most states, RECs are acquired by utilities (and in some states, also by competitive retail power providers) apart from the actual sale of the energy commodity or service. RECs exist as a separate commodity to be traded and transferred, as allowed by the state.[178]

The RPS programs in the states are very different in terms of what technologies qualify. The required state percentage of energy delivered from renewables currently ranges from 2%-

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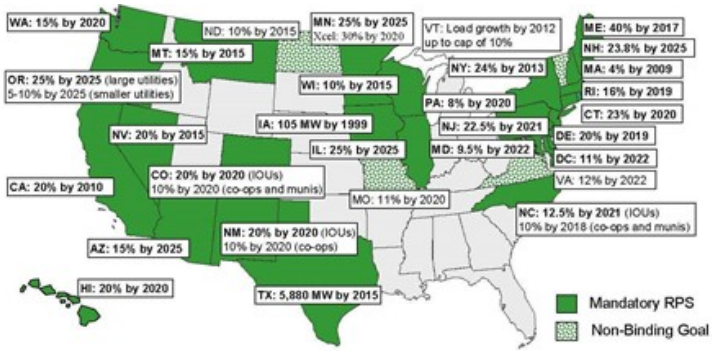
[173] *Hughes, supra.*, slip op. at 15.
[174] *See* Database Of St. Incentives For Renewables & Efficiency, Detailed Summary Maps, http://www.dsireusa.org/resources/detailed-summary-maps/.
[175] Ryan Wiser & Galen Barbose, *Renewables Portfolio Standard in the United States: A Status Report with Data Through 2007*, Lawrence Berkeley Nat'l Lab. 1 (Apr. 2008), http://emp.lbl.gov/sites/all/files/REPORT%20lbnl-154e-revised.pdf.
[176] Ryan Wiser, et al., *The Experience with Renewable Portfolio Standards in the United States*, ELEC. J. (2007) (quoting an estimate by Black & Veatch that half of the capacity equals approximately 5,500 MW).
[177] *See Renewable Portfolio Standards*, Nat'l Renewable Energy Lab., http://www.nrel.gov/tech_deployment/state_local_governments/basics_portfolio_standards.html.
[178] Wiser & Barbose, supra.,

40% of annual retail sales in different state programs, as shown in Figure 8. The current RPS standards are projected to add 76,750 Mw of additional renewable generation by 2025.[179]

Figure 8: RPS by State



VI. CONCLUSION

The law must adapt, and legal policy must be altered, to solve the still-unresolved legal challenge of "leaving it in the ground." Law is not yet structured to accommodate the required system to accomplish this transition. While able to control use of fossil fuel energy for electric power, there is an inability to store intermittent solar or wind power cost-effectively. Unlike every other form of energy we use, electricity production must match, second-by-second, the demand for electric power, or the entire electric grid collapses, as happened in the eastern U.S. on August 14, 2003,[180] and has happened more than once recently as Texas shifted to more wind power.[181] Regulatory law has not adapted yet to accommodate a change to intermittent power production.

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[179] Brad Plummer, *The Biggest Fight Over Renewable Energy is Now in the States*, WASH. POST, Mar. 25, 2013.
[180] Matthew L. Wald, Richard Perez-Pena, & Neela Banerjee, "The Blackout: What Went Wrong; Experts Asking Why Problems Spread So Far," N.Y. TIMES, Aug. 16, 2003, at A1 (examining cause of 2003 blackout across northeastern United States).
[181] Rebecca Smith, *Texas to Probe Rolling Blackouts: State Wants to Determine if Generators Gamed Prices as Power Failed in Storm*, WALL ST. J. (Feb. 7, 2011, 12:01 AM), http://online.wsj.com/articles/SB10001424052748703989504576128493806692106; Richard Cohen & Gerry Khermouch, *How Renewables Can Be Undermined by Intermittency*, ELEC. J. 5, 6 (June 2008).

Forty-four states at one time or another have fostered leaving it in the ground by promoting renewable energy technologies through net metering[182] and 29 states which have promoted it through RPS Renewable Portfolio Standards.[183] However, 2016 Supreme Court and other federal decisions underscore that states have no, or limited, power to control the increasingly dominant wholesale market through which power is now sold by new renewable and fossil fuel energy producers. In the brave new technological world, the federal government, not states, has control passed to it. And it remains to be seen, whether federal actors will favor leaving resources in the ground.

The challenge to 'leaving it in the ground' is not technological; it is legal. There is alternative solar technology that is available to traditional fossil fuels.[184] Wind and solar power technologies both are intermittent and provide comparatively unreliable electric power output for the U.S. electric system that must have reliable supply to not collapse.[185] Solar and wind require more 'ramping' of our back-up power which now is fossil-fired power generation. As this fossil power generation is ordered by dispatch authorities to switch to a 'ramping' back-stop mode, it produces notably more pollution than designed to do,[186] which state regulators have not yet fully considered. Therefore, if not carefully done, leaving it in the ground can result in greater pollution per effective unit of energy delivered from what is still extracted from the ground.

Storage of intermittent power generation (not as electricity, which is not possible, but transformed to chemical or other kinetic energy) is not yet cost-effective. Environmental goals

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[182] See supra., at Section III D.
[183] See supra., at Setion V E.
[184] See Steven Ferrey, "Torquing the Levers of International Power," 15 Washington University Global Studies Law Review 255 (2016); Steven Ferrey, "Alternative Energy in a Spaghetti Western," 32 University of Utah Environmental Law Journal 279 (2012).
[185] *See* STEVEN FERREY, ENVIRONMENTAL LAW: EXAMPLES & EXPLANATIONS, SUPRA., 586 .
[186] J. Nicholas Puga, "The Importance of Combined Cycle Generating Plants in Integrating Large Levels of Wind Power Generation," 23 Electricity Journal 33 (Aug.-Sept. 2010).

pay a heretofore unappreciated price as fossil fuel is extracted and used to ‘ramp‘ as a backup for intermittent renewables. However, there are ways to mitigate this phenomenon as we “leave it in the ground:”

- Development of more “baseload” renewable power supply using renewable hydro, biomass, and geothermal renewable resources which are not intermittent, are not extracted from the ground, and can supply backup power
- New technologies could make storage of intermittent renewable energy technology cost-effective
- Regulatory techniques (net metering and renewable portfolio standards) are still within state authority to implement, which provide incentives for renewable power development, although not directly requiring that fossil resources be left in the ground

2016 was a record year for federal court decisions reconfiguring the contours of what is legally possible within our constitutional system. Not so much because the challenged proposals would extract more fossil resources and not leave them in the ground, but more on whether the state had any authority to take certain actions affecting the energy sector, there were key judicial and FERC decisions:

- Maryland sought to favor in-state fossil generation affecting use of “in ground” resources, and the Supreme Court in *Hughes* unanimously found state authority crossed the prohibited “bright line” and was Constitutional preempted[187]
- Ohio attempted to extend the life of certain coal-fired fossil-fuel generating assets and pull more fossil resources from the ground, using ISO wholesale markets as part of a cross-subsidy of these older plants; FERC in two matters blocked this as constitutionally preempted[188]

[187] See supra, Section V A.
[188] See supra, Section V B.

- Minnesota sought to force out-of-state coal to be left in the ground, and was found by the Eighth Circuit to be both constitutionally preempted and to violate the dormant Commerce Clause[189]

- The Seventh Circuit articulated that states cannot discriminate against out-of-state renewable energy without violating the dormant Commerce Clause[190]

The news is that renewable technologies are proven as an alternative mechanism for power production and their costs are rapidly decreasing. This allows U.S. states to enact regulation deliberately to leave climate-changing fossil fuels in the ground. However, the scope of authority of state regulatory agencies (PUCs) is now much more limited. This is not because of recent decisions *per se*, but because of the Supremacy Clause of the Constitution. States' attempts to 'leave it in the ground' confront diminished power after they cause their regulated utilities to divest their power generation facilities to a competitive market and engage in wholesale sales to re-purchase needed power. These ensuing wholesale sales of power are totally beyond any state authority. States are preempted. Thus, states discover that there remain fewer legal 'tools' in the regulatory toolbox for states to cost-effectively steer the transition in power.

In the legislative arena, the federal regulatory initiatives of the Clean Power Plan and MATs both have been enjoined in the interim by the Supreme Court.[191] Even if eventually freed and not withdrawn as regulations, the Clean Power Plan has different impacts on electric power in the 13 deregulated states compared to the other three dozen traditionally regulated states, as well as other differences in that half of the states which participate in Independent System Operators for wholesale power transactions. Even apart from constitutional restrictions on state

[189] See supra, Section V C.
[190] See supra, Section V D.
[191] C. Boyden Gray & Sam Kazman, *It's Judgment Day for the EPA's Clean Power Plan, America*, FOX NEWS (Sept. 27, 2016), http://www.foxnews.com/opinion/2016/09/27/its-judgment-day-for-epas-clean-power-plan-america.html.

power announced by federal courts in 2016, this would create a yet-to-be-solved Rubik's cube of many combinations of uneven state energy programs and impacts as resources are left in the ground.