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U.S. West: The Next Energy Nexus

Abstract: Federal and state policies have historically privileged fossil fuel development in the western US. Presently, these abundant conventional energy sources remain important economic contributors to western state and federal coffers but rising energy demand, calls for energy independence, and climate change concerns bring conventional energy into conflict with next generation renewable energy. In the open policy terrain afforded by federalism, western states are leading the way through this intercurrency, or intervening time, when politics simultaneously promote conventional and renewable energy policies. Our central research goal is to chronicle and explain this energy policy intercurrency through the conceptual lenses of resource abundance, path dependence, and federalism. The state of western US energy policy will remain in flux as the intercurrency of two energy policy paradigms plays out through the first half of the 21st century and western states remain at the policy nexus.

Keywords: energy policy; fossil fuel; next generation energy policy; renewable energy; western states.

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1 Introduction

Long-standing state and federal policies promoting development of the U.S. West's abundant energy resources drive the political institutions and attendant energy policies down a conventional, predominately fossil fuel, path. Presently, these conventional energy sources remain important economic contributors to western state and federal treasuries but rising energy demand, calls for energy independence, and climate change concerns bring conventional energy into conflict with next generation renewable energy. Next generation energy policies like state-level renewable portfolio standards (RPS) and executive driven wind and solar projects on public lands encourage development of these abundant western renewable energy sources. These new energy policies rest uneasily upon

conventional energy policies, resulting in conflict between goals of new energy interests and institutions and older arrangements benefiting fossil fuels. In the open policy terrain afforded by federalism and in an attempt to redefine solutions that address 21st century challenges, western states are leading the way through this energy policy intercurrency. This intercurrency is defined as the intervening and somewhat awkward time when conventional energy policies continue to advance while next generation energy policies gain institutional traction. Our central research goal is to chronicle and explain this present and future energy policy intercurrency through the conceptual lenses of resource abundance, path dependence, and federalism.

The West continues to serve as the “energy breadbasket” for the region and the nation. Abundant coal, oil, natural gas, and uranium powers transportation, generates electricity, fuels manufacturing, stimulates economic growth, and supports federal and state budgets. This energy resource abundance, from conventional to next-generation renewable sources, places the West at the nexus of energy production and policymaking both historically and likely through the remainder of the 21st century. Energy resource abundance, however, is just one predictor of future energy policies and degree of resource utilization. A host of factors affect if, how, when, and to what extent these energy resources are developed including energy cost, technological developments such as hydraulic fracturing and horizontal drilling, infrastructure needs, consumer demand, land-use conflicts, economic costs and benefits, environmental issues, status quo policies, etc. We acknowledge these complicating factors but focus more specifically on how resource abundance, path dependence, and politics influence this energy paradigm confluence.

Energy policy is technically complex, increasingly contentious, no longer defined by the policy monopolies or iron triangle politics of the past, and extraordinarily fragmented (Eisner et al. 2006). Past and present western energy resource development is enabled by numerous state and federal energy policies tailored for specific energy sources on a fuel-by-fuel basis (Eisner et al. 2006). No comprehensive energy policy exists. The variety of energy policies is further complicated by federalism and the multiple energy policies enacted at the state and federal levels. This energy policy fragmentation augers against holistic energy policymaking and complicates the “all of the above” energy policies offered by President Barack Obama, Colorado Governor John Hickenlooper (D), numerous other western governors, and many state and federal legislators in both parties. The abundance of both conventional and renewable energy sources in western states complicates policymaking even further. Which energy sources do policymakers privilege? Are the choices a simple either/or, all of the above, or somewhere in the middle?

The complications of federalism and multiple energy policies coupled with the West's energy abundance tell an important but incomplete story of past and potential future energy policy trends. Klyza and Sousa (2013) provide two key insights that help explain this unfolding policy plot. They assert that, "congressional gridlock has pushed environmental policymaking onto new paths" that include policy riders, executive politics and rulemaking, judicial policymaking, and state, local, and public-private sector efforts (Klyza and Sousa 2013). Not only are new strategies being used to affect environmental and energy policymaking, but "modern environmental policy choices are being made within frameworks set by the policy legacies of the 1960s and the 1970s and by even deeper legacies stretching back to choices made in the late 19th century and early years of the 20th century" (Klyza and Sousa 2013). While Klyza and Sousa support this path dependent thesis through environmental policy case studies, we apply it to western state and federal energy policies to test its utility.

It is a mischaracterization to assert that next generation energy policy is replacing traditional energy, but rather the actors and policies are grinding against each other like a glacier scours a mountain. Past energy resource development has been encouraged and developed by a traditional alliance of powerful elected officials and organized political interests using self-reinforcing or path dependent processes to make policy beneficial to the fossil fuel energy industry (Pierson 2000). As the next generation energy policy movement struggles to promote new agendas, policies, and institutions, the traditional energy values, interests, and institutions remain entrenched. This energy intercurrency spurs increased competition within institutions and between policies, stymies comprehensive reforms sought by next energy advocates, and brings actors from traditional and next energy into increased conflict. Thus, next generation energy policies are limited by this pre-existing policy reality.

We present this energy policy research as follows. To provide greater context regarding this intercurrency, we first document the state-level status of western energy abundance and production. Next, we detail how federalism and multiple energy policies create a fragmented, convoluted, and increasingly conflicted policy arena that further enables conventional energy policies while opening venues and opportunities for next generation energy policymaking. We also demonstrate how new energy policies and institutions are being forged uneasily over the conventional energy policies, sometimes creating conflict and uncertainty, as Klyza and Sousa (2013) observe in their environmental policy cases. We conclude with a "state" of western state energy policy summarizing the constraints and future energy paths for the region.

2 Western Energy Resource Abundance and Production

The sheer magnitude of western energy resources plays an important role in western and US economies. One measure of western energy resource abundance is the size of proven reserves of fuels such as petroleum, natural gas, and coal. Alaska, California, Colorado, New Mexico, and Wyoming have substantial reserves of fossil fuels. Wyoming, for example, has more than 35% of all US proven coal reserves. When combined, energy supplies in the 13 western states (AK, AZ, CA, CO, HI, ID, MT, NV, NM, OR, UT, WA, and WY) provide a sizeable proportion of the total US proven reserves for oil (42.1%), natural gas (30.9%), and coal (45.2%) (U.S. DOE EIA 2012f; U.S. DOE EIA n.d.). In addition, federal public lands, with abundant energy resources, comprise substantial proportions of the area of western states: over half in Nevada, Utah, Alaska and Idaho, 47.7 to 34.7% in California, Arizona, Colorado and New Mexico and <30% in Montana, Washington and Hawaii (U.S. CRS 2012b). Abundant fossil fuel resources as well as established political interests, policies and institutions constrain but do not prevent the expansion of renewable energy. Western states also have sizeable sources of solar, wind, geothermal, biomass, wave and tidal power. They are experiencing increased economic and political pressure to more fully develop these resources. Table 1 illustrates the western states' conventional and renewable energy production for 2010.

2.1 Coal

Coal supplies in western states are abundant, provide a cheap energy source, and enable the US to be a net exporter. Western coal is prized because it contains low levels of sulfur that result in less air pollution and because it is close to the earth's surface making it more easily extracted using strip-mining techniques. Beginning in the early 1970s, surface coal mining surpassed underground mining as the dominant mining method and that trend continues (U.S. DOE EIA 2012b). Wyoming is the nation's largest coal producing state with nine of the top 10 producing mines in the country (U.S. DOE EIA 2012c). Although coal powers more electricity than any other fuel, its use is declining. From 2001 to 2008, 48% to 51% of electricity was generated by coal. However, from November 2012 to March 2013, its use decreased to 40% and is expected to remain at that level through 2013 (U.S. DOE EIA 2013b). Despite this recent drop in both production and consumption, the western states' coal production grew from a little more than 60 million

Table 1: Western States' Fossil, Nuclear, and Renewable Energy Production, 2010.

State	Coal	Natural Gas	Crude Oil	Nuclear Electricity	Renewables	Total Energy
Alaska	33.6	420.8	1273.3		15.4	1743.0
Arizona	167.9	0.2	0.2	326.1	93.4	587.8
California		318.9	1168.0	336.3	701.5	2525.0
Colorado	551.8	1741.7	188.7		77.9	2560.2
Hawaii					16.3	16.3
Idaho					136.5	136.5
Montana	797.0	91.0	146.9		117.3	1152.2
Nevada	–	0.05	2.5		49.4	51.9
New Mexico	381.4	1460.6	379.2		36.1	2257.6
Oregon	–	1.5	–		388.8	390.3
Utah	445.7	466.8	143.0		18.6	1074.1
Washington	–	–	–	96.6	807.9	904.5
Wyoming	7658.3	2520.5	308.9		45.5	10,533.2
US Total	21,831.2	24,632.5	11,607.8	8434.4	8091.9	74,597.9

Source: U.S. Department of Energy, Energy Information Administration. Table P5. Energy Production Estimates in Trillion Btu, Ranked by State, 2010. <http://www.eia.gov/state/seds-prod/pdf/P5/pdf>. Accessed January 18, 2013.

short tons (MMst) in 1973 (U.S. DOE EIA 2011b) to 559 MMST in 2011 (U.S. DOE EIA 2011a). This recent decline is driven in part by low natural gas prices, electric utilities' increased use of renewable energy as well as pressures to reduce traditional air and greenhouse gas pollution. Coal will likely remain a significant energy source, both domestically and as an export to quickly expanding economies like China, through the next several decades if not longer. Coal still remains king and the western states, especially Wyoming, sit upon the throne (Table 1).

2.2 Oil

When considering Alaska and California, western states are major producers of onshore oil (Table 1). In several western states (CA, MT, NM, and WY), however, oil production has declined from the late 1970s through 2010. Alaska reached its highest production in 1988 and has since declined (U.S. DOE EIA 2012e). This rise in western onshore oil production is due, in part, to the application of advanced recovery and drilling methods, including hydraulic fracturing and horizontal drilling, in oil shale basins. Over the period from February 2010 to February 2013, oil production increased substantially in Colorado (46%), New Mexico (46%), Utah (45%) and Wyoming (23%). Both oil production and use are important to

western states. Considering the large and remote land areas of the region, oil is a major factor in the ability of citizens to travel across the region. Likewise, farmers, ranchers and others need gasoline to deliver their products to markets (U.S. DOE EIA 2013a).

2.3 Natural Gas

Natural gas is often found along with oil and, for many years, was flared because it was considered a nuisance. Since the 1940s, however, energy companies have been able to capture and sell natural gas as a separate fuel. From the early 1980s through 2008, natural gas development has risen steadily in the Rocky Mountain West and continues to expand.¹ Wyoming, Colorado, New Mexico, Utah, and Alaska also rank in the top ten for natural gas production with Wyoming ranking second nationally (behind Texas) (U.S. DOE EIA 2012a). Furthermore, these states have substantial reserves for the future. In the West, natural gas production has trended upward during the past 30 years and will likely continue to grow (U.S. DOE EIA 2012e).

Unconventional natural gas production, that includes shale gas, tight sands, and coalbed methane, increased in recent years and accounts for 60% of the onshore reserves (U.S. DOE OFE & NETL 2009). Although natural gas comes from both vertical and horizontal wells, horizontal wells are increasingly used because the drilling transects more of the producing formation and optimizes gas recovery. Hydraulic fracturing also increases gas production when water, sand, and chemicals are forced into a relatively impermeable formation to create fractures that release gas (U.S. DOE OFE & NETL 2009). The Rocky Mountain states (NM, CO, UT, WY, ID, and MT), replete with unconventional natural gas, are experiencing another boom since the late 1990s. This unconventional natural gas boom exacerbates the conflict and transition from traditional to new energy production. Unconventional natural gas development creates land-use conflicts and the fracking procedure is controversial due to its potential effects on water quality, quantity, and availability problems in addition to related human health and ecosystem degradation concerns. Despite the intense political conflict surrounding unconventional natural gas development, its continued production remains central to long-standing state and federal energy policies and statutes.

¹ Montana, Idaho, Utah, Wyoming, Colorado and New Mexico comprise the Rocky Mountain West.

2.4 Nuclear Power

Nuclear energy remains controversial both in terms of nuclear generation of electricity and uranium mining. Although approximately 20% of the electricity generated in the US comes from nuclear power plants (U.S. DOE 2011), most of it is generated in the eastern half of the country. The reactors in Arizona, California, and Washington produce only 7.14% of the total nuclear electricity in the US (WNA 2010). Accidents such as the one at Three Mile Island, increasing construction costs, closer environmental scrutiny and lengthy licensing processes stopped the construction of nuclear generating plants for nearly three decades (Goodman 2006). The accident at Fukushima and low natural gas prices undercut the rationale for the proposed plants. Recently there was a brief window when the nuclear industry planned to expand. As of March, 2012, utilities submitted 18 Combined License Applications for new reactors, none of which are located in a western state. In 2013, five new reactors are under construction but another four plants closed and a fifth is scheduled for closure in early 2014 (Northey 2013). Like the past, western states continue to remain little interested² in the construction of new plants (U.S. NRC 2013; U.S. NRC n.d.).

2.5 Renewable Energy

Most western states are working to develop their ample renewable energy resources. Among western states, Washington, Oregon, and California produce the most hydroelectric power. States that produce the largest percentage of non-hydro renewable power are California, Oregon, Idaho, Colorado, and Hawaii (Table 2).

Hydroelectric and wind energy are the most common forms of renewable energy in western states and both have been in use for the past century. Hydropower is often touted as the least expensive source of renewable energy, but a number of factors are likely to inhibit the construction of new hydropower dams and they include: harm to fish (U.S. DOE EERE n.d.), environmental demands (Lowry 2003), and the fact that many of the best physical locations for dams and reservoirs have already been built (Reisner 1993). Western states' renewable wind

² A nuclear reactor proposed in Utah met with opposition from environmental groups that opposed its water permit. A state judge approved the permit on 4 December, 2013, but considered only whether the plant was financially viable. If the nuclear reactor proceeds, the Nuclear Regulatory Commission would evaluate it the basis of the National Environmental Policy Act. It is unclear whether the reactor will be built (Greenwire 2013).

Table 2: Total Renewable Market Share of Net Generation by State, 2012 (Gigawatt/Hours).

State	Hydro Conventional ¹	Biomass ^{2,a}	Geothermal ³	Solar Thermal/ PV ^a	Wind ^a	% Renewable Energy ^b	% Non-hydro Renewable Energy ^c
Alaska	1575	3			37	23.3	0.6
Arizona	6717	211		955	532	7.6	1.5
California	26,837	6311	12,519	1382	5754	28.5	15.0
Colorado	1497	58		165	5961	14.6	11.8
Hawaii	115	281	261	5	378	9.9	8.8
Idaho	10,940	549	75		1891	86.8	16.2
Montana	11,283				1262	45.1	4.5
Nevada	2440	19	2347	473	129	15.4	8.4
New Mexico	223	14		334	2226	7.6	7.0
Oregon	39,410	832	26	6	6343	76.5	11.8
Utah	748	60	335	2	704	4.7	2.8
WA	89,464	1164		1	6600	83.6	7.0
Wyoming	893				4369	10.6	8.8
US Total	276,240	57,671	15,562	4327	140,822	12.2	5.4

^aIncludes landfill gas and municipal solid waste (paper and paper board, wood, food, leather, textiles and yard trimmings); agricultural byproducts/crops, sludge waste and other biomass solids, liquids and gases; black liquor and wood/wood waste solids and liquids.

¹U.S. Department of Energy, Energy Information Administration. Electric Power Annual. Tables 3.13, 3.17, 3.18, 3.19 and 3.20. <http://www.eia.gov/electricity/annual/>.

²U.S. Department of Energy, Energy Information Administration. Electric Power Annual. % Renewable Energy=[Hydro (Table 3.13)+Renewable Energy Excluding Hydro (Table 3.14)]/Total Electricity×100 (Table 3.6). <http://www.eia.gov/electricity/annual/>.

³U.S. Department of Energy, Energy Information Administration. Electric Power Annual. % Non-Hydro Renewable Energy=[Renewable Energy Excluding Hydro (Table 3.14)]/Total Electricity×100 (Table 3.6). <http://www.eia.gov/electricity/annual/>.

energy production is second only to hydroelectric power (Table 2). Wind generators are the largest source of new electricity capacity in 2008 and 2009. In 2012, wind energy accounts for 13.2 gigawatts or 43% of the newly added electricity for the year (U.S. DOE EERE 2013a). Today large wind turbines dot the western landscape, especially in California, Washington, Colorado, and Wyoming (Table 2).

Other common renewable energy sources are biomass, geothermal, and solar energy. Biomass may be produced by burning wood, manure and some garbage for heat, producing biofuels such as ethanol and biodiesel, and capturing methane gas released from landfills (Western 2004). Unlike wind and solar energy, biopower is available whenever it is needed. The US traditionally depended on biomass to provide heat, but more recently it is used to produce electricity (U.S. DOE EERE 2011). Geothermal steam and hot water inside the earth can be tapped to produce electricity and heat. Western states are particularly good sources because their underground reservoirs of steam, hot rocks, and hot water lie close to the earth's surface. Approximately 90% of known geothermal sources are on western public lands. California leads western states in the production of geothermal energy. Solar energy production is thriving because of consumer demands, government incentives, and the declining price of electricity created by photovoltaics (Sherwood 2012). Energy produced by photovoltaic (PV) cells may be used both onsite (not requiring transmission lines) as well as transmitted via an electric grid. California far surpasses other western states in photovoltaic solar production (1563.6 MW) while Arizona ranks number two (397.6 MW) and Colorado places third (196.7 MW) (Sherwood 2012).

Western state conventional and renewable energy abundance and production numbers illustrate the importance of all types of fuels in meeting increasing US energy demands. While resource abundance and entrenched political actors, institutions and policies work to the benefit of fossil fuels, renewable energy production increases, fostered by state-led RPSs, climate change statutes, and economic incentives. The juxtaposed energy paradigms co-exist uneasily, and this intercurrency, fostered in part by conventional and next generation energy abundance, is further controlled by numerous state and federal energy policies.

3 Federalism, Fragmentation, and Energy Policies

Policymaking in the US political system occurs across multiple venues, at different levels of government, and is fragmented. Such a pluralist system enhances the opportunities for traditional and renewable proponents to both compete and bargain. Not only does federalism complicate energy policy, but energy policy

has also been plagued by a lack of coherence. There are nuclear energy, natural gas, oil, and wind energy policies, but no comprehensive energy policy. Typically, these individual energy policies are characterized by high technical complexity, generally low public salience, and insular policy monopoly control (Eisner et al. 2006). The fragmentation from federalism coupled with individualized governance of each energy source makes holistic energy policy creation and regulation both difficult and complex. Although federalism allows for policy competition, existing political institutions and policies geared toward traditional energy frustrate attempts to establish next generation policy.

Policies favoring fossil fuel development date back to the colonization of the American West and remain largely intact today. In the early years of the republic, the federal government encouraged settlement and economic development of the western territories by providing land to settlers and railroads, building water projects to help farmers, and providing opportunities for mining companies to extract minerals on federal public lands. In 1848, legislation creating the Department of Interior tasked the agency with a mission to produce energy and minerals. In 1920, Congress passed the Mineral Leasing Act that allowed private companies to mine coal, oil, oil shale and natural gas on federal public lands, established a severance tax program as well as codified federal ownership of minerals. Importantly, this act established the split-estate that legally separated surface land ownership from subsurface mineral ownership. With over 60 million split-estate acres in the western US, the land-use conflicts surrounding the split-estate exacerbate the existing problems between traditional and renewable energy coalitions and further complicate more recent energy policymaking.

Federal conventional energy policies evolved throughout the remainder of the 20th century in response to market and geopolitical issues. For example, the oil shortages and supply bottlenecks of the 1970s drove the passage of many new energy laws. The Mining and Mineral Policy Act of 1970 charged the Department of Interior to develop domestic minerals to promote economic development (Rosenbaum 1987). Congress and President Ford passed the 1975 Energy Policy and Conservation Act that created the Strategic Petroleum Reserve, established the first automobile fuel efficiency standards, and extended oil price controls. Subsequent energy initiatives such as the 1978 National Energy Act included a host of statutes related to natural gas policy, taxation, public utility regulation, and energy efficiency standards. This statute pushed utilities to use more coal for electricity generation, and as previously noted, western coal production rose dramatically.

Traditional energy resource development continues according to past state and federal policies but renewable energy advocates are challenging this status quo. As Klyza and Sousa (2013) posit, environmental policy does not replace pre-existing laws; rather, intercurrency occurs as the number of privileged interests

and level of conflict increase, reform policy is limited by the realities of existing policy and the new policy sits uneasily atop the old. This struggle is well illustrated by recent federal legislation. The 2005 Energy Policy Act (2005 EPAct) is a massive bill that addresses most of the energy sectors and provides some support for competing policy visions. The act includes energy conservation and efficiency provisions and support for production of renewable energy, but it lacks next generation provisions such as vehicle fuel efficiency standards and regulation of greenhouse gases. It also promotes new coal-powered plants, expedited leasing, and permitting for conventional and unconventional fuels (Rosenbaum 2013). Support for coal is consistent with traditional energy policy that coexists with provisions for energy efficiency and renewable fuels. Likewise, 2005 Energy Policy Act distributes approximately 38.6% of tax subsidies for fossil fuels and 31.0% to renewable energy sources (UCS n.d.), privileging both renewable and traditional energy.

Following the Energy Policy Act, the Energy Independence and Security Act (2007) clearly privileges next generation energy efficiency, green building standards, biofuel production, reductions in federal fossil fuel consumption, and the first increase in corporate average fuel economy (CAFE) standards to 35 miles per gallon since 1975. Notably, the law excludes a national RPS and retains tax subsidies for the oil and gas industry.

The 2009 American Recovery and Reinvestment Act continues this next generation energy trend by injecting over \$100 billion into renewable energy funding (PERI 2009). With federal policies providing more support for the “New Energy Economy” under the Obama administration, the western US with abundant renewable energy sources is well positioned to take advantage of this federal policy change. Despite these next generation policies, the 112th Congress (2011–2012) considered but did not pass bills pertaining to mineral leasing reforms on federal land and increased EPA regulatory power over fracking and coal emissions (U.S. CRS 2012a), reflecting the gridlock that often exists in Congress. Congressional gridlock continues to push energy policymaking in new directions through federal agencies, presidential decisions, and state policymaking but the paths will not automatically result in next generation policy adoption (Bryner and Duffy 2012). Additional decision-making venues outside Congress allow well-funded and organized interests opportunity to undermine policy alternatives and enables fossil fuel retrenchment.

4 Federal Agencies

Federal agencies also play a central role in the development of regulations and the implementation of federal energy policies on public and private land. Admit-

tedly, an analysis of recent federal agency energy policy implementation merits greater attention than we have space for here and could be the focus for future research. Instead, we highlight a few key examples to illustrate the variegated energy policies promoted by federal agencies. Some agencies align themselves with traditional energy development and others with efficiency and renewable energy, although it should be noted that their positions vary somewhat according to the current presidential administration. Several agencies are now briefly described ranging from those more sympathetic of conventional energy to those more allied with next generation policy.

Because substantial portions of many western states are federally owned lands, agencies such as the Department of Interior's Bureau of Land Management (U.S. DOI BLM 2012) manage large tracts of land. BLM is guided by multiple use and sustained yield principles that provide for energy development, grazing and protection of wilderness, recreation, wildlife and cultural artifacts. BLM has authority from the Minerals Leasing Act of 1920, Mining and Mineral Policy Act of 1970 and the Energy Policy Act of 2005 (US CRS 2012a) to both lease public lands for oil, gas and coal development, and help insure sound environmental management. The Bureau of Ocean Energy Management, Regulation, and Enforcement issues permits for mineral production of oil and natural gas found on the outer continental shelf. It also conducts environmental studies and collects revenues from both offshore and onshore mineral leases (U.S. MMS n.d.). Although these agencies have a mixed mission, many of their functions and policy decisions are consistent with the development of fossil fuel energy.

Some agencies, including the Department of Energy (DOE) and Federal Energy Regulatory Commission (FERC), have a more nuanced energy-related mission. The DOE performs a facilitative rather than management or regulatory role. It promotes increasing energy supplies, optimizing energy usage, and protecting the environment via basic research (U.S. DOE n.d.). The DOE is uniquely situated to facilitate both conventional and next generation energy development and actively works on both agendas, especially during the Obama presidency. For example the DOE National Renewable Energy Laboratory (NREL) has an active research agenda relating to wind energy integration and transmission, solar energy development, energy efficiency, geothermal, and hydroelectric power. FERC is an independent agency that regulates the transmission of electricity, natural gas and oil; reviews proposals to build liquefied natural gas (LNG) terminals and natural gas pipelines; licenses hydropower projects; investigates energy markets; and oversees matters related to energy and environmental issues (U.S. FERC 2013). FERC's most recent top initiatives, spurred by the 2007 Energy Independence and Security Act, include developing a smart grid, integrating renewables, and evaluating effective electricity demand responses. Policies and

practices implemented by the DOE and FERC exemplify this conventional and next generation energy intercurrency.

Other agencies are more closely allied with next generation policy. Beginning in the 1960s, Congress passed many environmental and natural resource protection policies that authorized agencies to implement policies more consistent with next generation ideals. The U.S. Fish and Wildlife Service and National Marine Fisheries Service issue permits to protect threatened or endangered species from energy projects (Kraft 2014). The Environmental Protection Agency (EPA) implements most of the environmental regulatory policy such as air quality, water quality, and hazardous waste policy that can impinge on the production and use of energy. EPA shares many of its responsibilities with the states that do much of the day-to-day administration of programs. While agencies and officials clash over energy policy, it is typical to find disputes between the policy coalitions that have members from all government levels plus private participants.

The importance of agency decisions is illustrated by current attempts by the U.S. EPA to regulate carbon dioxide (CO₂) emissions from coal-fired power plants. In April 2012, the EPA issued draft regulations limiting CO₂ emissions that coal-fired plants would find difficult to meet. In July 2013, the agency sent a revised regulation to the White House for approval which will be evaluated by industry, environmentalists and other stakeholders during the fall of 2013 (Chemnick 2013). Since 40% of man-made carbon (Chemnick 2013) and 33% of greenhouse gases (Stecker 2013) are emitted from power plants, these proposed carbon reductions from electricity generation would be a major breakthrough in climate change policy (Bryner and Duffy 2012). EPA hopes to create regulations reducing carbon emissions from existing and new power plants by 2015 although court challenges could delay the decisions beyond the 2016 presidential election. While it is not clear if the regulations will be approved and implemented, federally mandated greenhouse gas reductions of this magnitude are unlikely to occur in the foreseeable future unless they are put in place by federal agencies.

There are numerous energy regulations that are or will soon be considered by federal agencies. The EPA plans to promulgate rules pertaining to coal ash produced by power plants, requiring cooling towers on all power plants, limiting sulfur dioxide emissions, and requiring biomass power plants to obtain greenhouse permitting (Stecker 2013). The Interior Department will consider regulations pertaining to oil and gas drilling in the Arctic Ocean, flaring and venting methane from oil and gas wells on public lands, and strengthening blowout preventers on oil and gas wells. Agencies will also examine competitive leasing of wind and solar energy on public lands, regulation of hydraulic fracturing (fracking), and the royalty for oil shale. Thus, federal agencies are integrally involved in energy policy creation and administration. Their unique missions place them

at varying points on the continuum between conventional and next generation energy policy implementation.

5 Presidential Energy Policy Leadership

The implementation of federal energy policies often depends on the current occupant of the White House. Arguably, federal energy policies from the Reagan through the Obama administrations continue to advance western US fossil fuel development in order to meet American energy demands. With few exceptions, modern presidential administrations have sided with conventional energy advocates. This sustained and assertive development of fossil fuels on western public lands is a function of federal laws and presidential (i.e., administrative) policy implementation. Additionally, energy prices, corporate decision-making, and technological advances also play a role. Clearly, the confluence of these factors has further strengthened the pro-development conventional energy policy path. This fossil fuel path dependence, however, is not immutable and next generation energy policies are gaining executive favor, especially by the Obama administration.

To the delight of traditional energy supporters, the George W. Bush administration aggressively implemented the fossil fuel-related provisions of the 2005 Energy Policy Act and previous statutes resulting in significant increases of oil and gas applications for permits to drill (APD), wells drilled, leases, and producing acres on federal and split-estate lands. Between 2001 and 2008 APDs rise from 3439 to 6617, wells drilled rise from 3448 to 5044, acres leased range between 3.9 and 2.6 million per year, and total number of producing acres on federal lands rise from 11.4 to 14.5 million (U.S. DOI BLM 2012). From 2003 to 2011, onshore federal public land oil production remains fairly consistent at around 100 million barrels per year and onshore natural gas production and sales increase from 2274 billion cubic feet (bcf) to around 3000 bcf during that same time (U.S. DOE EIA 2012d).

Despite industry and partisan complaints to the contrary, the Barack Obama administration continues this federal support for coal, oil, and natural gas production. From the George W. Bush through the first Obama administration, coal production from western public lands consistently accounts for over 43% of total US output, onshore oil production numbers remain over 100 million barrels/year, and onshore natural gas production peaks at 3.17 trillion cubic feet in 2009 (U.S. DOE EIA 2012d). Between 2009 and 2012, the Obama administration consistently permits over 4000 oil and gas wells/year, leases nearly 2 million acres/year, and

maintains over 12 million producing acres (U.S. DOI BLM 2012). While offshore and onshore natural gas production on federal property dropped from 35% to 21% of total US production between 2003 and 2011. This decline resulted from significant drops in offshore production, rapid increases in unconventional onshore (i.e., non-federal) natural gas development, and falling natural gas prices (U.S. DOE EIA 2012d). Conventional energy data from the George W. Bush and Barack Obama administrations further support this fossil fuel path dependency and stubborn retrenchment of the status quo. Despite this fossil fuel retrenchment, President Obama is also actively working on a next generation renewable energy policy agenda.

In an attempt to navigate this intercurrency of conventional and renewable energy policy paradigms, President Obama promotes an “all-of-the-above strategy.” In March 2012, Obama asserted that, “Yes, develop as much oil and gas as we can, but also develop wind power and solar power and biofuels. Make our buildings more fuel-efficient. Make our homes more fuel-efficient. Make our cars and trucks more fuel-efficient so they get more miles for the gallon” (U.S. White House OPS 2012).

With respect to also promoting next generation energy policies, President Obama’s administrative action follows the rhetoric. Between 2009 and 2011 Department of Interior Secretary Ken Salazar, implementing the requirements of the 2005 Energy Policy Act at the direction of President Obama, authorized 33 renewable energy projects on public lands that when built will provide more than 10,000 MW of power (Taylor 2012). In late 2012, the Obama administration finalized a plan to fast-track commercial solar development projects on over 285,000 public acres in western states that could yield nearly 24,000 MW of solar energy supplying electricity to 7 million Americans (Streater 2012). The Obama administration further promoted next generation energy ideals by raising corporate average fuel economy standards to 54.5 mpg by 2025 (US White House 2011). Similarly, administrative and budgetary requests for energy efficiency and renewable energy loan programs increased throughout the first Obama term. The Obama administration advanced a more balanced set of energy policies at the same time it articulated ambitious goals to reduce greenhouse gases (Bryner and Duffy 2012). Overall, these next generation energy policies do not supplant but sit uneasily beside existing fossil fuel policies.

Presidential leadership is an additional path that can be utilized to change policy, but a president’s leadership can be limited by the ability of organized interests to delay or kill presidential proposals. A president’s policy made via executive order may be overturned by future presidents. Delays may actually derail policy proposals if a president leaves office before his policies are adopted. As previously noted, EPA is moving forward with presidential support to reduce

carbon dioxide emissions from power plants, but regulations will have to withstand court reviews and other delays that may extend beyond President Obama's second term in office. A president's limited tenure and the possibility of his decisions being overturned after he leaves office result in the creation of short-term policy that creates uncertainty for energy projects that may need 20 to 30 years to plan, secure investment, and begin energy production (Anderson 2012). Just as Congress experiences gridlock, presidential attempts to make policy and navigate this intercurrency may be obstructed by political conflict, and this allows room for state-level energy policymaking.

6 Western State Leadership

Conventional and renewable energy coalitions remain important influences on state-level energy policy and join forces with non-western interests to influence federal policy. Current federal policies may influence states by providing research funds, subsidies, tax credits, and other provisions. Federal energy policy is also important to western states because federal agencies manage over 635 million acres and the BLM controls the development of 700 million subsurface acres of mineral resources throughout the west (U.S. CRS 2012b). Federalism provides a broader environment in which state policies are made but states have their own constitutionally provided authority and wide latitude in which to make policies. Traditionally, states choose to pass energy policy that is often similar to federal policy. As discussed in the next section some western states are establishing a greater commitment to clean energy policy than the federal government through renewable portfolio standards, energy efficiency laws, and land-use and zoning ordinances. For example, California is a leader with public benefit laws to support rebates and loans for the purchase of efficient appliances and equipment; renewable portfolio standards; net metering that allows owners of renewable energy systems to sell excess electricity back to the utility; access laws that give renewable energy system owners the right to install and operate their equipment; appliance efficiency standards; energy efficient building codes; and specific efficiency standards for public buildings. With the exception of appliance efficiency standards, Hawaii has adopted the same programs as California while Nevada has all the same programs except for public benefits funding (DSIRE n.d.a, n.d.b).

State energy policy parallels federal policy in important respects. First, state politicians, like their federal counterparts, often support conventional values of energy development and production because of abundant energy supplies, energy royalties and taxes that contribute to state and federal revenues, job

creation, local economic booms, and energy security. State energy laws reflect the pervasive political, economic, cultural, and expansionist values held nationally and regionally during the time of their formation. Historically, states have been energy policy leaders formulating natural gas, oil, and fuel mineral “conservation” statutes during the early to mid 20th century and establishing the regulatory agencies and institutions promoting conventional energy sources. These state-level conventional energy policies and institutions remain in place today and production numbers verify the continuing strength of the fossil fuel status quo. While the states with abundant energy resources reap the most benefits from fossil fuel production, all western states find that a plentiful and stable supply of energy is a boon to their economies and citizens (Timney 2004).

Support for conventional energy production continues throughout the late-20th and early 21st century. For example, the 1980 federal tax credit encouraging the domestic production of unconventional fossil fuels was extended in 2002. This tax break coupled with recent technological advances has been instrumental in the exponential development of unconventional natural gas deposits throughout the western US. The conventional energy coalition continues to support fossil-fuel-status-quo federal and state policies while the next generation energy coalition seeks similar incentives for renewable fuels.

Second, states also respond to cyclical political, economic, and energy issues. For example, in the 1990s, deregulation became an important political issue. In 1992, the federal government passed the National Energy Act under which states could deregulate electric utilities, allowing a competitive national electricity market in which consumers could choose among electricity providers in order to pay lower prices. Between 1996 and 2003, 24 states adopted some form of deregulation; this trend, however, stalled after California experienced electricity shortages and high prices in 2001 (Bryner 2002; Timney 2004).

Although some western states are becoming more economically, demographically, and politically diverse, the political institutions promoting conventional energy development policies remain entrenched. State and federal policy-makers experiencing pressure from traditional and next energy coalitions are attempting to balance energy development of all types with other competing land uses like tourism and housing. The energy policy battle is essentially one of values. Citizens, organized interests and officials are left to decide how growing populations will use and conserve the natural resources of the American West.

States have good reasons to seek an energy policy balance. Despite the benefits from fossil fuel production, state support of renewable energy helps them cope with state constitutional and economic constraints. States are constitutionally required to balance their budgets and need revenues that can be generated from renewable energy production. Also, states compete with each other to attract

Table 3: Western States' Renewable Portfolio Standards (RPS).

State	RPS % by Date (for major utilities)
Alaska	No RPS
Arizona	15% by 2025
California	33% by 2020
Colorado	30% by 2020
Hawaii	40% by 2030
Idaho	No RPS
Montana	15% by 2025
Nevada	25% by 2025
New Mexico	20% by 2020
Oregon	25% by 2025
Utah	20% by 2025 (Goal)
Washington	15% by 2020
Wyoming	No RPS

Source: U.S. Department of Energy and the North Carolina Solar Center, Database of State Incentives for Renewables and Efficiency (DSIRE). <http://www.dsireusa.org/>. Accessed 1 December, 2013.

companies and jobs desired by individual constituents and the business community (Peterson 1995; Baumgartner and Jones 2009). Many states hope that clean energy jobs will boost their economies, particularly in rural areas where many of the new manufacturing plants, transmission lines, wind farms, and biofuel production are likely to be located.

In policy areas such as renewable portfolio standards (RPS) and net metering, the lack of federal policy provides an open terrain in which western states can provide clean energy leadership by adopting policies to promote renewable energy (Bryner 2007). Through direct democracy and/or state legislative action, 9 of the 13 western states³ have adopted RPS policies that require a specified percentage of electricity be generated from renewable fuels (Table 3).

The Western Electricity Coordinating Council, the California Energy Commission, and the Western Governors' Association developed the Western Renewable Energy Generation Information System (WREGIS) in 2007. WREGIS is designed to coordinate, track, and monitor state compliance with their respective RPSs. This newly formed institution and attendant RPS standards demonstrate a serious commitment to next generation renewable and efficiency policies. California, an energy efficiency and renewable leader, has raised its standard three times since

³ Arizona, California, Colorado, Hawaii, Montana, Nevada, New Mexico, Oregon, Utah and Washington have adopted Renewable Portfolio Standards (RPSs) while Alaska, Idaho and Wyoming lack the standards (DSIRE n.d.b).

2002 while Hawaii boasts the nation's most aggressive RPS rates requiring that 40% energy be renewable by 2030.

States and/or utilities provide net metering in all western states except Alaska, allowing customers that generate their own electricity to send excess energy back to the utility, offsetting what they would have had to purchase. All western states except Wyoming have established access laws to protect the ability of citizens to install and operate solar or wind systems (DSIRE n.d.). States also adopt transportation policies to promote energy efficiency. Western states have programs, incentives and regulations for technology, fuel and clean vehicles such as California's rebate for fleet customers who purchase more than 500 gallons of biodiesel and E85 fuels a month or Washington's renewable fuel standard that requires at least 2% of all diesel fuel be renewable. Similarly, many states provide incentives to promote hybrid and electric vehicles (U.S. DOE EERE 2013b). California adopted strict vehicular greenhouse gas emission standards in 2009 and was joined by Arizona, New Mexico, Oregon, Washington and nine other states, although New Mexico subsequently delayed implementation and Arizona repealed the standards (CCC n.d.).⁴ Other programs include land use policies to limit the number of miles driven, investment of at least \$50 per capita in mass transit funds, and requirements to improve the fuel efficiency of public fleet vehicles (Eldridge et al. 2007).

Although critics question the effectiveness of recent energy programs promoting efficiency and renewable energy, these decisions tell us about energy and political goals that are important to western states. First, some states may pursue a more reliable energy supply to avoid dependence on foreign oil. Because renewable energy systems are smaller and more dispersed, they are less vulnerable to embargoes and attacks (Hopkins 2003; Rabe 2006). Second, state officials may seek to reduce both traditional air pollution and greenhouse gas emissions (Rabe

⁴ In 2008, under Former Governor Janet Napolitano (D), Arizona adopted the Clean Car Program which required car manufacturers to reduce air pollution and greenhouse gas emissions, dropping a requirement for zero emission vehicles. After review, Republican Governor Jane Brewer's (R) Regulatory Review Council voted to repeal the program in January of 2012. While environmentalists objected the repeal would result in worsened air quality, the director of the Arizona Department of Environmental Quality indicated that the repeal was responsive to the Legislature's objection to state environmental standards that were more stringent than those of the federal government (Testa 2012). A similar situation occurred in New Mexico. Democratic Governor Bill Richardson succeeded in using an executive order and appointments to reduce greenhouse gas emissions in the state, including Clean Cars emission standards. After Governor Suzanna Martinez (R) was elected in 2010, the state repealed its greenhouse gas cap and trade program and delayed Clean Car standards for model years 2011–2016 (NM's cap and trade 2012). Both Arizona and New Mexico now follow federal government vehicle standards (CCC n.d.).

2006). Finally, state actions reflect the belief that renewable energy is good for the economy because energy sources are more likely to be local, creating local employment, and higher tax revenue.

Despite the incentives to support clean energy, western states adopt different sets of energy policy goals because they are quite diverse in their politics, demographics, economic-drivers, and natural resource reserves. Each state will produce a unique set of energy policies even though conventional vs. next energy coalition strength and political context are significant influences. The next generation energy coalition is stronger in some states such as California and increasingly in Colorado but the conventional energy coalition remains influential in states such as Wyoming, Alaska, Idaho, and New Mexico. We acknowledge that party control of state governments, citizen party affiliation, and political context are influential but assert that drawing conclusions from red, blue, and purple state classifications regarding energy policy direction is an oversimplification. The intransigence of conventional energy path dependent policies constrains even the “greener” states and in some instances, the fossil fuel development mantra is pervasive.

For example, from the late 1990s through the present, natural gas development is booming in Wyoming, Colorado, New Mexico, and Utah – states representing the red, blue, and purple. Each western state varies in the authority and regulatory jurisdiction provided to their respective oil and gas commissions, support for fossil fuel development continues to empower these state regulators with the authority to facilitate production. Although Colorado remains a major natural gas producer, the legislature passed three major statutes in 2007 that: give surface landowners more protection in natural gas development; increase non-energy representation on the Colorado Oil and Gas Conservation Commission; provide for wildlife protection; increase environmental safeguards; and promote human health⁵ (CDPHE 2013). These natural gas policy shifts, however, have not slowed down production. During this natural gas boom, Colorado voters passed an RPS in 2004 that was subsequently amended in 2013 to 30% by 2020. This case demonstrates the nuance, complexity, and path dependence of fossil fuel policy and how difficult it is to alter the status quo, even for states like Colorado where next energy advocates and renewable policies are increasingly influential.

Although western state energy development and policy is unique in that large portions of many states include energy resources on federally managed lands, the region is similar to the remainder of the country in a number of respects.

⁵ The three statutes are the Land Owners Protection Act (HB – 1252), the Colorado Habitation Stewardship Act (HB – 1298) and HB – 1341 which provided more diverse representation of stakeholders on the Colorado Oil and Gas Commission (CDPHE 2013).

First, western and nonwestern states vary tremendously in their wealth of energy reserves. Second, there are significant policy differences from one state to the next across the breadth of fossil fuel (coal, natural gas and oil) and renewable energy policies. Third, innovative technology such as hydraulic fracturing and horizontal drilling has created new policy challenges for states with oil and natural gas resources. Most important, however, is the influence of well-established fossil fuel policies that constrain state initiatives to develop renewable resources. Through a diversity of fossil fuel and renewable energy policies, western states continue to demonstrate leadership through this intercurrency.

7 Conclusion: The “State” of Western U.S. Energy Policy

Western states, uniquely positioned to address the energy policy challenges of the 21st century, face political constraints and promising opportunities. A combination of abundant energy resources, fossil fuel path dependence, conventional and renewable energy coalition competition, and federal structure shape energy policymaking. Abundant conventional and next generation energy resources gifted by geology and geography ensure the regions' primacy in supplying increasing US energy demands and in energy policy, writ large. Pragmatic state energy policy decision-making rooted in economic benefits, political context, and conventional energy path dependent policies will remain the norm. However, this policy intransigence is not immutable. Multiple venues offered by federalism, congressional gridlock, and policy fragmentation open political space for innovative policymaking at the state and federal levels. Federalism remains a significant stricture on state policymaking especially as the executive branch exerts greater administrative control over public lands and the federal mineral estate and as Congress occasionally adds to the nation's energy policies.

Comprehensive energy policy will prove elusive as states create divergent policies responsive to short-term demands for less expensive energy that depends on existing infrastructure as opposed to renewable fuels that will reduce air pollution and greenhouse gas emissions over the long-term but require additional development and delivery systems. Despite the lack of consistent federal leadership and holistic policymaking, both of which are highly improbable given the present hyper-partisanship and past energy policy fragmentation, western states are addressing this energy policy intercurrency. The intercurrency of conventional and next generation energy policies, while constrained by past fossil fuel policies and institutions, will continue to show increased policy movement

and conflict. State-level RPSs, energy efficiency programs, transportation initiatives, land-use controls, and climate change laws facilitate the movement toward a more balanced energy portfolio and set of policies. Western states will continue to innovate and likely implement next generation energy policies at an increasing pace along side their continued advancement of economically important and institutionally privileged conventional energy policies. The state of western US energy policy will remain in flux as the intercurrency of two energy policy paradigms plays out through the first half of the 21st century and western states remain at the policy nexus.

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