What happens in Washington gets a lot of attention. You probably also follow what's going on in your own state. But it's very hard to know what's happening at states across the country.

In an effort to get a better sense of that, I've explored state activity on climate change and energy in a series of posts. This wasn't a fifty-state survey, or even a statistically valid random sample. But it does indicate what's happening in a range of states, some Republican and some Democratic, some on the coasts and others in the heartland.

Overall, I was struck by two main points. First, there's a lot going on in Blue States and states with mixed party control. It's certainly not just California that's taken action, even though it gets a lot of the publicity. But places like Hawaii and Massachusetts have also been very active, and there has been significant progress in Virginia and Illinois.

Second, there are some important developments even in states under firm Republican control. Some archconservative states like Oklahoma and Kansas nevertheless have gone all-in on-wind power. And Republican governors in Ohio and Michigan have helped block conservative rollbacks of renewable energy laws by their legislatures. What's driving developments in those states seems to be economics, including a desire to attract firms that want access to clean energy. But there are probably other factors at work, such as general public support for renewables.

The survey below starts in the far West with Hawaii and then works eastward until we get to Massachusetts and Virginia. Along the way, it touches on the Plains states, the Midwest, and coal country.

The Pacific Region

Hawaii

In June, Hawaii adopted a law endorsing the goals of the Paris Agreement and reinforcing its efforts to deal with climate change. Until that law made the news, I'm embarrassed to say that I hadn't paid any attention to Hawaii's impressive record in this area.

In fact, Hawaii may get the prize for passing the most laws on the subject. In 2012, NOAA published a summary of the state's climate-related laws, beginning with a 2007 law to reduce emissions to 1990 levels by 2020. Hawaii has adopted a goal of 70% renewable energy by 2030. Hawaii also has strong mandates to increase energy efficiency and promote

electric vehicles, as well as laws dealing with biofuels, taxing imported petroleum, and requiring climate change adaptation planning. Altogether, the 2012 summary lists ten laws relating to climate change mitigation or adaptation. Since then, the state has not only endorsed the Paris Agreement's goals but also set a goal of 100% renewable energy by 2045.

E&E has published a detailed description of Hawaii's renewable portfolio standard, Hawaii counts a wide range of energy sources as renewable: solar, wind, hydroelectric, biofuels, geothermal, rooftop solar, biomass crops, agricultural and animal residues and wastes, and municipal solid waste. In addition "allows part of a sector known as combined heat and power. A commercial business can use a generator — powered by a mixture of liquefied natural gas and synthetic natural gas — to make electricity, for example."

Hawaii has its work cut out for it. As of 2015 it got 70% of its electricity from oil and another 13% from coal. The good news is that use of renewable energy has increased rapidly, from 950 GWhs to about 2500 GWhs between 2010 and 2016. According to the Energy Information Agency, Hawaii has the highest electricity production from distributed solar, and solar energy generated 35% of Hawaii's renewable electricity. It also has the fourth-lowest per capita energy use in the nation. But obviously, there is a lot more work to do.

Hawaii has good reason to be concerned about climate change. The same 2012 report by NOAA listed climate changes that Hawaii is already experiencing:

- Increases in air temperature, especially at high altitudes;
- Decreased stream base flow
- Decreases in rainfall and rain intensity, with longer periods of days without rain;
- Rising sea levels;
- Ocean acidification; and
- Increased sea surface temperature, leading to more frequent and severe coral bleaching events.

One interesting approach to adaptation has been taken by Kauai County. It established a building setback based on the average annual erosion rate and a planning period of 70 to 100 years, plus a buffer of 40 feet. With some exceptions, development within the setback line is prohibited.

Hawaii's total contribution to global carbon emissions is small. But if it succeeds in moving away from its heavy dependence, it will be forging a path for others to follow.

Washington.

Rather than using cap-and-trade, Washington State has adopted the "trade" but not the "cap." In contrast to California, Washington State has adopted a distinctive hybrid of conventional regulation and emissions trading. The state's Clean Air Rule went into effect in January 2017. The rule requires major emitters of greenhouse gasses to limit and reduce carbon pollution and incentivizes investments to reduce fossil fuel use and accelerate use of clean energy. Unlike California, the state didn't set a statewide cap on emissions. Instead, each facility is assigned its own emission reduction pathway, using its average baseline emissions in 2012-2016 as a baseline. Thereafter emissions must decrease at a rate of 1.7% per year. Every three years, a facility must demonstrate that it met its reduction goals or face penalties. There is also a reserve of emission reduction units (ERUs) to accommodate new facilities. (In effect, the emissions ceiling is the sum of the targets for all individual plants still in operation plus the ERUs used from the reserve fund, but the state itself never sets an explicit target for statewide emissions.) The state allows trading of ERUs and says that trading will also be allowed with out-of-state programs when those are approved.

The Washington State scheme imposes lower costs on laggard firms that had high emissions in the baseline period, correspondingly penalizing those that had already started cutting emissions. On the other hand, because it is more focused on cuts at individual facilities, the Washington approach may be more appealing to environmental justice advocates than California's more conventional cap-and-trade system.

The Plains: Texas, Iowa, Kansas and Oklahoma

You might find this a bit surprising, but wind power has a solid political base in key Republican states. It's a case of economics outweighing politics. Here are the top five states for wind power:

Rank	*State*	*Installed Capacity**
1	Texas	20,320
2	Iowa	6,911
3	Oklahoma	6,645
4	California	5,656
5	Kansas	4451

*In megawatts.

You might not have expected to see the four deep-Red States on this list. But there's a geographic reason they're on the list: the corridor that runs from West Texas all the way up the Dakotas where winds are strongest. It's no wonder that wind power is a big deal in the states along the corridor.

Wind power generation is continuing to grow in those high-wind states. Midwestern Energy News reports:

"Wind power represents more than 80 percent of the new electricity generating capacity built in the Midwest and Great Plains states over the past five years as the industry continues to grow. . .

"The American Wind Energy Association's annual 2016 report notes that two states in the region generate more than 30 percent of their electricity needs from wind – Iowa (35 percent) and South Dakota (30 percent). North Dakota, Oklahoma and Kansas produce more than 20 percent of their electricity demand from wind.

"Not surprising, the Midwest/Great Plains nexus – combined with Texas — captured 89 percent of all investment in wind last year.

"For instance, in July, two corporations announced "they're building a 2,000-megawatt wind project in the Oklahoma panhandle, which, upon completion, could hold the title of second-largest wind farm in the world."

Unless you're in the industry or live in or near those states, the importance of wind power on the Great Plains may not seem to have much to do with your life. But it makes a real difference in terms of energy politics. Here are the wordsof no less a personage than Senator James Inhofe, Climate Denier and Fossil Fuel Advocate *Extraordinaire*:

"I also agree . . . that wind energy must play an increasing role in our nation's energy future. With 689 megawatts (MW) of production, Oklahoma ranks as one of the top states in wind energy production. To help spur wind development in Oklahoma, I worked to include a provision in the Energy Policy Act of 2005 (EPACT) to increase private sector investment in high voltage lines by decreasing the depreciation period for these lines to 15 years."

Or consider Senator Chuck Grassley of Iowa. During the campaign, he said that if Trump wanted to do away with wind power, "he'll have to get a bill through Congress, and he'll do it over my dead body." Grassley sponsored the original tax credit law for wind power, and

he came out hard against a draft report by Trump's Department of Energy that was allegedly anti-wind. Not to mention Sam Brownback, who led Kansas in its failed experiment with rightwing governance:

"Speaking at the American Council on Renewable Energy's (ACORE) recent Renewable Energy Finance Forum, Gov. Brownback said he believes generating half of Kansas's electricity using wind is 'doable' and he expects it to happen. He noted that Kanas is 'going to be aggressively recruiting and working with [wind] companies,' and working on transmission build-out to better enable the wind industry to grow even faster."

These are important, mostly hard-line conservative politicians. If you're Mitch McConnell or Paul Ryan – or for that matter, the Secretary of Energy – you can't afford to ignore the views of Republicans like these. That's why I feel comfortable saying, despite Trump's personal antipathy toward wind power, that it will not only survive his administration but continue to grow.

The Midwest.

Illinois.

It went pretty much unheralded by the national media, but in December Illinois adopted a major new energy law — and with strong bipartisan support. Each side had some things to celebrate.

The Republican Governor touted the impact of the bill on utility bills. According to the Governor, the "contains a guaranteed cap that energy prices cannot increase more than 25 cents on the average residential home, and cannot increase more than 1.3 percent on commercial and industrial users over the next ten years. Rates are projected to decrease for the first several years due to the utilities being able to amortize energy efficiency." The Governor also expressed satisfaction that the bill would allow two nuclear plants to stay open by crediting them for their zero carbon emissions.

Environmentalists also saw much to celebrate. According to the Sierra Club, the new law will "open the door for more clean energy development across the state, create tens of thousands of jobs, and provide Illinois with a strong path forward in moving beyond dirty and expensive fossil fuels." The Environmental Defense Fund went into more detail about the law. The law will require the state's largest utilities to "significantly reduce their energy use by 2030." It also improves Illinois's Renewable Portfolio Standard, " directly leading to

the development of – at a minimum – 3,000 MW of solar and 1,300 MW of wind power, or enough to power almost 1 million homes.. It also create a community solar system, allowing "those who can't or don't want to install solar panels on their roof – like home renters or apartment dwellers – to 'subscribe' to a solar project at a local church." school, or business. Finally, the bill allocates "$25 million per year to help low-income homes become more energy-efficient, saving money and energy" and creates "a comprehensive low-income solar deployment and job training program."

Bipartisanship seems to be an endangered species in Washington, D.C. But what happened in Illinois may give us hope that things could change in Washington.

Indiana.

Coal accounts for about three-quarters of Indiana's power generation, with about two-thirds of the remainder coming from natural gas and one-third from renewables. The state has a 10% renewable portfolio standard. Indiana gets about 1900 MW from large-scale wind farms. It also gets 4.5 MW from small-scale wind, which receives some preferential state tax treatment. Solar gets similar tax treatment. In addition, five of the state's utilities offer net metering. 143 MW of solar are connected to the grid. In 2015, about 870 Indiana customers used net metering.

In May, Governor Holcombe signed Senate Bill 309, which phases down support for solar. According to the Journal Gazette:

"Under the final version, anyone who installs solar panels or wind turbines by the end of this year will get the higher retail rate for their excess energy for 30 years. This grandfathering is meant to allow people to recoup the investment cost of the equipment."

"Those who install solar or wind devices in the next five years will get the full retail rate for up to 15 years, but the longer people wait, the fewer number of years they will have at that rate. After 2022, anyone who installs the technology will receive a lower wholesale rate plus a premium of 25 percent."

Why is Indiana so much less receptive to renewables than Ohio and Indiana? No doubt there are ore complicated explanations, but raw politics must have something to do with it. Trump won close victories in Michigan and Ohio with margins below 2%, but he carried Indiana by nearly 20%. Thus, the Republican grasp on Indiana is stronger, and there is correspondingly less need for conservatives to compromise with Democrats or moderate Republicans.

Michigan. Rick Snyder, the governor of Michigan, has been more evasive regarding his views on climate change. But in February, 2016, he joined a group of 16 other governors (including Jerry Brown) to endorse renewable energy, energy efficiency, vehicle options such as biofuels and electric cars, and grid improvements. Michigan's reliance on coal has dropped quickly. According to the EIA, coal provided half of the state's electricity in 2014, but by 2016 coal's share was done to about a third.

At the end of 2016, he brokered a deal to raise Michigan's renewable portfolio standard from 10% to !5%. (The 10% mandate was established by Gov. Jennifer Granholm, who now teaches at Berkeley's public policy school.) Snyder applauded the plan as "a statewide energy policy that will save Michigan residents millions of dollars on their electricity bills, alleviate concerns about having enough capacity to power the daily activities of 10 million and find new ways to use our existing energy grid more effectively."

Minnesota.

Minnesota has had climate change legislation on the books since 2007, when the Next Generation Energy Act was signed by Republican Governor Tim Pawlenty. The 2007 law called for the state to reduce its emissions 15 percent by 2015 and 80 percent by 2050. At the time, Pawlenty saluted the bill, saying,"The nation has been asleep at the switch, but here in Minnesota we are kick-starting the future by increasing our nation-leading per capita renewable fuel use, boosting cost-saving measures and tackling greenhouse gas emissions." Pawlenty dropped that position quickly when he started to have national political ambitions, but his willingness to sign the bill in the first place was noteworthy. Of course, this was before GOP backlash to the Obama presidency made it unthinkable for most Republicans to acknowledge the need to address climate change.

The 2007 statute sets ambitious goals for reducing greenhouse gases, but its operative provisions seem to focus almost entirely on increasing energy efficiency and the use of renewable energy in the electricity sector, including the use of a carbon price in resource planning decisions. Provisions dealing more generally with climate change are limited. The statute calls for creation of a state climate change plan, mandates cooperation with other states to the extent possible, and directs the government to explore interest in a regional cap-and-trade system by other states. It also bans construction of new coal-fired plants in the state and attempts to limit purchases of electricity from such plants outside the state. The provisions dealing with out-of-state sources were struck down in a poorly reasoned opinion by the Eighth Circuit. But none of the provisions about new coal plants turned out to have much significance since none have been built or seem likely to be built anyway, due to the falling price of natural gas and renewable energy.

The state has been fairly successful in dealing with the electricity sector. According to a state report:

"Renewable energy now accounts for 21% of the Minnesota's in-state electricity generation, up from 4% in 2000. Wind energy alone provides over 17% of our state's electricity– equal to the total electricity use in one in six homes, businesses, and community institutions."

Emissions have plateaued a bit below their 2005 level. But this is below what the state was hoping for. It recently reported that it had badly missed its 2015 target fro greenhouse gases, cutting 2005 emissions by only 4% rather than the 15% target.

Further progress does seem likely, even without a big push from regulators. According to Minnesota Public Radio, the changing economics of the energy industry are pushing utilities away from coal and toward natural gas and wind power:

"The plans of Minnesota Power, Otter Tail Power and Xcel Energy — the state's three investor-owned utilities — to embrace more wind energy will mean less coal arriving on trains from Wyoming and Montana. . . .Minnesota Power aims to generate a third of its energy from coal, a third from renewables and a third from natural gas by 2030. As recently as two years ago, coal was generating 75 percent of the utility's power."

As a result, MPR says, the state will meet its targets under Obama's Clean Power Plan even if the Plan itself is rescinded by Trump.

Transportation emissions seem to be a more difficult problem than power plant emissions. As I noted earlier, the 2007 Act doesn't provide tools for dealing with transportation emissions, so perhaps it's not surprising that so little progress has been made. The Twin Cities are great places to live in part because there's so much nice, near-in single-family housing. But this also translates into a lot of sprawl, because the low density in the core cities pushes development out further. So the state's greatest need is to bring down its transportation emissions. The government is looking to the same regulatory toolkit as other states: policies to increase housing density, expand mass transit, and promote electric vehicles. The state might also do well to consider adopting the California standards for tailpipe emissions, as have around a dozen other states. But existing legislation doesn't mandate these policies, so agencies would have to use existing discretionary authority.

As always, politics will have a major impact on future climate policy. The governor is a Democrat. Republicans have only a one-vote margin in the state senate, but they control the state house 77-57. Minnesota has been a Democratic stronghold in presidential elections,

but Clinton carried it by under 2%. (Interestingly, Green Party candidate Jill Stein wasn't much of a factor. She came in below the Libertarian candidate and independent Evan McMullin, which might be a sign of Republican defections.) The upcoming midterm election may be a different matter, depending on whether Democrats turn out in substantially greater numbers than Republicans. The current Democratic governor isn't running again, but his 62% approval rating may be a good sign for the party. (As I recall from my years living there, he isn't exactly a charismatic personality.) If the Dems do take control of state government, there may be a chance for further legislation on climate change.

The state does have some strong motivations to take further action. According to the report quoted earlier:

"We have experienced four 1,000-year rainfalls since 2002 .We have watched our spruce, fir, aspen, and birch forests retreat northward . And air pollution related to greenhouse gas emissions annually costs us more than $800 million in increased health care costs."

It remains to be seen, as with so many things, which direction politics drives climate policy in Minnesota in the next few years.

Ohio.

Kasich's support for renewable energy may seem least surprising, since he is as close as the Republican Party comes to having a moderate these days, with the possible exception of Senator Susan Collins. Kasich issued a strong statement condemning Trump's withdrawal from the Paris agreement. He admitted to having some problems with the treaty as currently drafted. "But," he continued, "I know that climate change is real. It is a global issue and will need a global agreement to address. And we could have negotiated that agreement in ways that would not needlessly destroy jobs." He added:

"A properly negotiated agreement could actually have ended up driving innovation and creating jobs. By withdrawing from the agreement, the Administration has passed up an opportunity both to expand U.S leadership in clean energy technology and to create well-paid American jobs with a future."

Ohio's grid is heavily dependent on fossil fuels, according to the EIA, with almost 60% coming from coal, 24% from natural gas, and 14% from nuclear. If you do the math, that leaves about 2% for renewables. Ohio has a weak renewable portfolio standard. Utilities are required to obtain a percentage of their energy from renewable sources, with amounts rising steadily from less than 1% when the law was passed to 12.5% in 2026. Apparently,

these percentages were still too high to suit the Ohio legislature, which passed a bill to freeze the standards.

Kasich vetoed the law. Kasich "credited Ohio's "wide range of energy generation options" with helping to grow jobs in the state over the past six years." The bill risked "undermining this progress by taking away some of those energy generation options, particularly the very options most prized by the companies poised to create many jobs in Ohio in the coming years, such as high technology firms."

Coal Country: Kentucky, West Virginia, and Wyoming

A sign of the times: Fox News has reported, without comment, that the Kentucky Coal Museum is installing solar panels to save money. This is part of a larger trend.

On Saturday, the NY Times reported on shifts in power production in states like West Virginia and Kentucky. For instance, Appalachian Power has "closed three coal-fired plants and converted two others to gas, reducing its dependence on coal to 61 percent last year, down from 74 percent in 2012." In response to an inquiry from the Governor, the company said it has no plans to build another coal plant. In Kentucky, the Public Utility Commission has advised companies about offering renewable energy packages in order to attract large corporations, many of whom have strong green energy programs.

Similarly, in Wyoming, Microsoft made a deal to get wind power for its new data center. In fact, according to the Energy Information Agency, Wyoming gets nearly 10% of its power from wind, making it 15th in the nation.

Corporate pressure has made a difference beyond these states, according to the *Times*:

Last year, utilities made deals with corporate customers through rate arrangements known as green tariffs for 220 megawatts of power, enough to run about 40,000 average American homes. Thus far this year, there have been 360 megawatts worth of agreements, with an additional 465 megawatts under negotiation.

It seems that efforts at corporate sustainability, which I've posted about previously, are actually having some tangible impacts.

The coal-producing states are still heavily dependent on coal for power. And the political pressure to stick with coal is strong. Nonetheless, coal is slowly losing ground, even in the places where it is most prized.

The East

Massachusetts.

Even in 2006, it was clear that climate change is a serious threat to Massachusetts. That year, in its path-breaking decision on climate change, the Supreme Court gave Massachusetts standing to challenge the Bush Administration's refusal to regulate greenhouse gases. The basis for standing was impact of sea level rise on the state. It now seems that the estimates back then may have been too cautious. According to a report by the state five years later:

"Assuming that sea level continues to increase at its current rate, because land in Massachusetts is naturally subsiding, by the end of the century, it is expected to rise by another one foot. . . . By the end of this century, under the IPCC high emissions scenario with ice melt, it has been suggested that sea level rise resulting from all these factors could reach six feet."

The report added that, "[s]ince a large percentage of the state's population, development, and infrastructure is located along the coast, the impact of this change will be significant, putting the Massachusetts economy, health, natural resources, and way of life at risk." Of course, there will be other impacts, too. Boston's website warns that "[c]ompared to the period from 1971 to 2000, when an average of 11 days per year were over 90 degrees, there may be as many as 40 days over 90 degrees by 2030 and 90 days by 2070—nearly the entire summer."

In the aftermath of Trump's announcement that he intended to withdraw from the Paris Agreement, the State's Republican governor pushed back: "As the Commonwealth reiterates its commitment to exceed the emission reduction targets of the Paris Climate Agreement, today we join the U.S. Climate Alliance to expand on our efforts while partnering with other states to combat climate change."

On August 11, the Massachusetts Department of Environmental Protection (MassDEP), issued regulationsestablishing an allowance trading program for CO2 emissions from electricity. The regulation "sets a sector-wide, annually declining limit on aggregate CO_2 emissions from 21 large fossil fuel-fired power plants in Massachusetts, from 8.96 million metric tons of CO_2 in 2018 down to 1.8 million metric tons in 2050." Other new rules "require metropolitan planning organizations and the Massachusetts Department of Transportation (MassDOT) to incorporate greenhouse gas emissions evaluation, tracking

and reduction into regional transit plans and mass transit improvement projects." The Sierra Club rightly says that much more needs to be done regarding transportation and heating emissions. But Massachusetts does seem to be heading in the right direction, even under a GOP governor.

That's not entirely the doing of the Governor and legislature. In a pathbreaking, May 2016 opinion, the state's highest court held that the state was failing to meet the emission reduction targets established in a 2008 statute. The court turned up the heat on the state government:

"Although the department's cited regulatory initiatives are important to the Commonwealth's overall scheme of reducing greenhouse gas emissions over time, they do not fulfil the specific requirements of § 3 (d). The purpose of G. L. c. 21N is to attain actual, measurable, and permanent emissions reductions in the Commonwealth, and the Legislature included § 3 (d) in the statute to ensure that legally mandated reductions are realized by the 2020 deadline. Accordingly, we vacate the judgment of the Superior Court and remand the matter for entry of a judgment declaring that G. L. c. 21N, § 3 (d), requires the department to promulgate regulations that address multiple sources or categories of sources of greenhouse gas emissions, impose a limit on emissions that may be released, limit the aggregate emissions released from each group of regulated sources or categories of sources, set emission limits for each year, and set limits that decline on an annual basis." The opinion was written by Justice Cordy, who stepped down later that year. A Republican appointee, he was apparently considered one of the court's more conservative justices.

Virginia.

Conventionally, carbon pricing takes place when the government either creates a cap-and-trade scheme or a carbon tax. But we've begun to see carbon prices popping up in other interesting ways. The idea of putting a price on carbon seems to have influence well outside of the classic tax-or-trade models.

Virginia's governor recently ordered the state's environmental agency to come up with a plan to limit power plant emissions that "includes provisions to ensure that Virginia's regulation is 'trading-ready' to allow for the use of market-based mechanisms and the trading of carbon dioxide allowances through a multi-state trading program."