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Assessing the Political Feasibility of Decarbonizing the US Electricity Sector

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ABSTRACT

This working paper explores the political feasibility of clean energy policies in the US electricity sector at the federal and state level.

The electricity sector has undergone partial restructuring since the 1990s, with about 2/3rds of the market restructured. The rest, chiefly in the southeast and the mountain west, remains under traditional, local monopoly-oriented regulation. Texas is highly restructured, but additionally also independent of federal regulation due to its minimal inter-state electricity trading.

The 2020 election is critical for federal climate action. If Donald J. Trump is re-elected president in November 2020, chances of serious climate action at the federal level are essentially nil. Thus, although President Trump's re-election is still possible, the assumption at this stage will be the election of Joseph Biden as president [2]. This is also consistent with current national and battleground state polling. The state-level analysis presented below is however largely independent of the results of the election.

In terms of federal policy, we identify political feasibility for three categories of actions that have or likely will be under discussion should a Biden Administration take charge in January 2021, including mandates and standards, investments, and taxes and subsidies. Among mandates and standards, we rate the political feasibility of federal clean energy standards, climate risk disclosure, energy efficiency standards as medium with curbs on fracking to be lower. In terms of investments, we rate both inter-state transmission and research and development for clean energy innovation to be high. As for tax incentives, we rate extension of tax credits for renewables and a tax credit for carbon capture to be high with the prospects of a carbon price and storage incentives to be medium, with the reduction or elimination in fossil fuel subsidies to be more challenging.

[2] This working paper will be updated in November once the election results become clear.

FEDERAL CLIMATE ACTION

This section assesses the political feasibility of proposed policies, mostly assuming a Biden presidency and a Democratic-controlled House in 2021. Feasible policy pathways are explored through legislative and regulatory routes. The legislative route hinges on the outcome of the Senate elections, which is explored under multiple scenarios. Additionally, judicial possibilities will be explored briefly. The judiciary's role could be strongest in blocking or delaying any prospective climate action.

Due to the criticality of the US Senate to any final legislation passed, a small set of individual Senators exercise disproportionate influence – either because they represent marginal votes and/or as they occupy positions in committees key for climate legislation.

The US Congress has powers practically co-equal to the executive. Given current polling, it is a safe bet to assume that the House of Representatives will remain Democratic by a solid margin for the next term. The outcome of elections in the Senate however is highly uncertain. Therefore, we will consider the politics of the Senate in some detail.

Legislative Policy Elements

The legislative route provides the best chance for robust climate action, as compared to the regulatory route in terms of surviving any court challenges. Unless the climate law ran afoul of constitutional principles, courts would have no basis to strike it down. Congress has a well-accepted mandate to govern inter-state commerce under the constitution, and wholesale markets in the electricity sector squarely fall under this category [3]. The commerce clause therefore makes a well-designed legislation likely to survive any court challenge.

Climate ambition within the Democratic Party has increased in recent years. After serious negotiations between the Biden and Sanders factions, the Democratic Party has coalesced around a platform of what has been called the “SIJ” (Standards, Investments, and Justice) approach (Roberts, 2020). The party platform is strongly influenced by the high-ambition Green New Deal plan unveiled in 2018 by Congresswoman Alexandria Ocasio-Cortez and Senator Edward Markey (Roberts, 2019b). For his part, Biden does not support the Green New Deal, though his own proposals share analogous ideas on decarbonization and public investment, though the speed of action might be less rapid and the overall investment level might be lower, though still substantial.

[3] The exception is Texas, which is not subject to FERC regulation. However, Texas has made major progress on electricity decarbonization which is expected to accelerate going forward.

Chamber	Name of Bill	Sponsors	Key Elements	Text
Senate	Renewable Energy Standard (RES) Act	Udall-Heinrich-Whitehouse-Smith-King (Democrats and Independent)	50% renewables by 2035, asks DoE for plan for 2050	https://www.congress.gov/bill/116th-congress/senate-bill/1974/text
House	CLEAN Future Act	Energy & Commerce Committee (Democrats)	Net-zero electricity by 2050, clean is < 0.82 tonnes CO2/MWh, tougher on coal, weaker on gas, linear escalation	https://www.congress.gov/bill/116th-congress/house-bill/5221
Both	Clean Energy Standard Act	Smith-Lujan (Democrats)	Net-zero electricity by 2050, clean is < 0.4 tonnes CO2/MWh, tougher on gas, interim standard of 90% by 2040, stepped escalation, accounts for lifecycle emissions	https://www.congress.gov/bill/116th-congress/house-bill/2597
House	Clean Energy Innovation and Deployment Act of 2020	DeGette (Democrat)	Net-zero electricity by 2050, 50% clean by 2030, natural gas and CCS qualify	https://www.congress.gov/bill/116th-congress/house-bill/7516
House	Not yet introduced	McKinley-Shrader (Bipartisan)	10 years of clean innovation investments in CCS/nuclear/renewables followed by standard to reach 80% clean electricity by 2050	https://www.usatoday.com/story/opinion/2020/01/30/how-fight-climate-change-congress-needs-fuel-innovation-column/4601332002/
Both	Energy Innovation and Carbon Dividend Act of 2019	Manchin-Murkowski-Deutch (Bipartisan)	Carbon fee-and-dividend plan, initial \$15/tonne, then increasing by \$10 per year, border & regulatory adjustments	https://www.congress.gov/bill/116th-congress/house-bill/763/text
Both	Climate Risk Disclosure Act of 2019	Warren-Casten (Democrats)	Requires public companies to disclose their GHG emissions, fossil-fuel related assets, valuation changes under current policies, and risk management strategies	https://www.congress.gov/bill/116th-congress/senate-bill/2075
Both	Nuclear Energy Leadership Act	Murkowski-Luria (Bipartisan)	Two advanced nuclear reactor demonstration projects by 2025, nuclear PPAs for 40 years, fast-neutron research, low-enriched uranium fuel supply, nuclear education investments	https://www.congress.gov/bill/116th-congress/senate-bill/903
Senate	American Energy Efficiency Act of 2019	Smith-Merkley-King (Democrats and Independent)	Requires retail electric and gas utilities to achieve energy savings of 22% and 14% respectively by 2035	https://www.congress.gov/bill/116th-congress/senate-bill/2288/

Figure 1: Legislation introduced in Congress on clean electricity

Meanwhile, Democrats in the House and the Senate have released their own plans (House Select Committee, 2020; Senate Democrats, 2020). Both plans follow the SIJ template but differ from the party platform in some key respects. The House plan is more detailed and ambitious than the Senate version. Democratic candidate for president Joseph Biden has proposed his own plan (Biden, 2020).

Specific legislation has also been introduced in Congress for cleaning up the electricity sector (figure 1). Rather than examine individual legislative proposals however, we will break out individual policy elements and assess them for political feasibility.

Plausible policy elements can be divided into three main categories as laid out below, namely mandates and standards, investments, and taxes & subsidies.

Mandates and Standards

- **Federal clean energy standard** – the holy grail for progressive Democrats and those advocating strong climate action. It involves setting a mandated end-date for a net zero emissions US electricity system, proposed from anywhere between 2030 and 2050.
- **National Energy Efficiency Resource Standard (EERS)** – More than half of states have already mandated EERS for their retail utilities that requires them to achieve a certain efficiency goal by a prescribed date. Legislation on a national EERS has been previously proposed in Congress by then-Congressman Edward Markey (US Congress, 2009) and again in 2019 (US Congress, 2019d). In addition, efficiency standards for fossil fuel generation were promulgated by the EPA (EPA, 2015) and diluted in 2018 (EPA, 2018).
- **Climate risk disclosure for publicly trading companies** – Many corporations engage in business or have assets subject to climate risk. Mandating them to disclose such risk to their shareholders is seen as an important tool to push corporations to go greener and price assets correctly.
- **Curbs on hydraulic fracturing** – The Green New Deal calls for a ban on hydraulic fracturing, echoed by most climate activists. However, this runs up against the interests of the fossil fuel industry, the economies of electorally crucial states, and the US strategy of using oil and gas exports as a geopolitical tool of power and influence.

Investments

- **Inter-state transmission** – another key element of the Green New Deal, Democratic Party platform, as well as the Senate and House plans. The ARRA funded some such investments, and individual states (such as Texas) did an early revamp of their transmission systems that enabled major expansion of renewables. But given the fragmented nature of the US grid system and major regional imbalances in renewables generation and demand, a much bigger buildout is required.

- **RD&D in clean energy innovation** – funding for further nuclear and Carbon Capture and Storage (CCS) research and commercialization has strong bipartisan support, even though a major nuclear power plant was scrapped in South Carolina and another project in Georgia is facing delays and cost overruns. Two more spaces that could find support are green hydrogen and negative-emissions technologies.

Taxes and Subsidies

- **PTC/ITC extension for renewables** – currently these take the form of the production tax credit (PTC) and investment tax credit (ITC), which are due for time-bound phaseout or major reduction. These tax credits could be made permanent as well as increased to further boost the pace of renewables additions. An even more attractive policy would be direct cash infusions early in the project stage rather than a credit claimed during tax filing.
- **Carbon price (tax or cap-and-trade)** – long a favorite policy tool of mainstream economists. A major attempt to legislate carbon pricing (the Waxman-Markey bill) was attempted in 2010. Carbon pricing can either be through a tax on consumption or a more market-oriented cap-and-trade approach, as is being tried by California and several northeastern states (Regional Greenhouse Gas Initiative). Though a carbon price is usually mentioned as an alternative to clean energy standard, both can co-exist in legislation.
- **CCS tax credit extension/enhancement** – the technology remains as-yet commercially unviable but its scale-up would enable the US to continue to use fossil fuels in its energy system, therefore would make climate action much more feasible politically. CCS already enjoys special treatment in the tax code. Section 45Q, enacted in 2008, provides a tax credit eventually of \$35 per tonne of CO₂ stored via enhanced oil recovery and \$50 per tonne stored in geologic formations (Global CCS Institute, 2019). Extending these incentives would provide certainty for the technology's prospects.

- **Reduction of fossil fuel subsidies and tax breaks** – Fossil fuel industries have long enjoyed a generous taxation and support regime. But reducing these advantages is seen as important to create a more level playing field for clean energy products.
- **Storage incentives**– As it stands, storage actually increases net emissions in most cases, as generation is not sufficiently decarbonized (Hittinger & Azevedo, 2015). This situation could prevail until renewables penetration is much higher (Goteti et al., 2019). Both legislative and regulatory approaches (including taxes and subsidies) may be needed to ensure carbon neutral storage additions until renewables dominate the electricity sector. Further such measures could also accelerate cost reductions for storage.

The overall assessments for feasibility of above policies is presented in figure 2. These are assessed by considering various legislative scenarios (figure 5). Policies with likely or potential bipartisan support are rated as “High” while those with minimal support (weak even in a High-Alignment Senate scenario as outlined below) are rated “Low.” Those in between these are assessed as “Medium.” Appendix A provides a summary of the logic for these assessments, which are explained in greater detail in the following sections.

Policy Type	Policy Proposal	Political Feasibility
Mandates & Standards	Federal clean energy standard	Medium
	Climate risk disclosure for public companies	Medium
	National energy efficiency resource standard	Medium
	Curbs on hydraulic fracturing	Low
Investments	Inter-state transmission	High
	RD&D in clean energy innovation	High
Taxes and subsidies	PTC/ITC extension	High
	CCS tax credit extension/enhancement	High
	Carbon price (tax or cap-and-trade)	Medium
	Storage policy incentives	Medium
	Fossil fuel subsidies reduction or elimination	Low

Figure 2: Legislative policy feasibility assessments for clean electricity

Regulatory Policy

Certain key clean energy imperatives can be best achieved through the regulatory route and a future Biden administration is expected to use this tool extensively. Some of these tools are needed even if robust climate legislation is passed. For example, extension of life of most nuclear plants to 60 years from the current 40 has strong bipartisan backing and comes under the domain of the Nuclear Regulatory Commission. Stricter curbs of methane leakage from oil and gas wells can also be implemented through the EPA – the question will be whether to simply return to Obama-era regulation or make it more stringent. The latter is probably more consistent with robust climate action.

If climate legislation fails in Congress, it would force the Biden administration to rely entirely on regulatory tools, in effect taking us back to an Obama-era situation. Though a restored Clean Power Plan (CPP) will sit well among centrist Democrats (Feinstein, 2019), this route could face difficulties as it did in its first incarnation.

The CPP was rolled out by the Obama Administration under Section 111(d) of the Clean Air Act. This section empowers the EPA to set overall targets for curbing pollutants but provides states freedom to choose optimal pathways to get there. Unusually, the Supreme Court issued an injunction to prevent implementation of the CPP ahead of the final resolution of the matter in courts. This precedent makes it likely that would be a court challenge along these lines in the event a Biden administration pursues a retooled CPP.

A potential pathway that might stand court scrutiny better is issuing a CPP or similar plan under Section 115 of the CAA, titled “International Air Pollution” (Burger et al., 2016). This section “This provision authorizes EPA to require states to address emissions that contribute to air pollution endangering public health or welfare in other countries, if the other countries provide the US with reciprocal protections” (Burger et al., 2016). The EPA will need to make a finding that pollution from the US endangers another country, and that this country has established reciprocal arrangements to curb such pollution. The Paris Agreement, which a President Biden would immediately rejoin, could provide the basis for such a finding. If such an approach survives court challenge, it would not just be limited to power plants but could cover the entire gamut of GHG emissions in, say, a national cap-and-trade scheme governing state emissions.

The president could also take other actions that lie within his executive authority, for instance conclude negotiations and sign the WTO-sponsored Environmental Goods Agreement initiated by the US and thirteen other nations in 2014. It proposes to eliminate trade tariffs for clean energy goods such as wind turbines and solar water heaters. The agreement would not require Senate confirmation as it reduces tariffs from existing levels.

The Senate as the Swing Actor

If any climate legislation is to be passed at all, it is highly likely that the Senate will be the “swing” actor with the marginal power to shape it. According to the Cook Political Report (a credible source of election assessments), Democrats would need to win at least five of the six tossup seats for gaining control (Cook Political Report, 2020) [4]. In practice, since two independent senators, Bernard Sanders (VT) and Angus King (ME) caucus with Democrats, a net gain of four seats would be needed for safe Democratic control [5].

[4] Assuming the victory of Mark Kelly in Arizona and defeat of Sen. Douglas Jones in Alabama (both Democrats) – the report does not count these two seats as tossups.

[5] A 50-50 Senate split with Biden as president would yield Democratic control, as the Vice-President casts the tie-breaker vote under the constitution. However, given recent practice of splitting committee leadership in the wake of a 50-50 result in the 2000 election, Democratic control may be subject to major resistance by Republicans.

Three scenarios for the Senate are therefore plausible and need to be considered. Each leads to quite different political feasibility pathways. The least optimistic from the standpoint of climate action is a Republican-controlled Senate under a Biden presidency, with the House in Democratic hands. We will call it the Low-Alignment scenario.

The Senate filibuster prevented climate legislation from passage in 2010. However, ending the filibuster system for legislation (as it has been done for presidential appointees, including Supreme Court judges) requires only a simple majority vote in the Senate. If Democrats hold at least 50 Senate seats in 2021, abolishing of the filibuster is plausible, as was signaled by President Obama during the John Lewis funeral address (Snell, 2020). A Democratic-controlled Senate therefore leads to two scenarios– a “filibuster stays” scenario in which Democrats remain split on the wisdom of the filibuster, and are unable to abolish it, and another “filibuster goes” scenario, which could open the door to a much stronger climate law as 50 Senators would be sufficient. We will call these Medium-Alignment and High-Alignment scenarios respectively.

Under the High-Alignment scenario, Senate Democrats’ climate plan is likely to serve as the foundation of any new legislation, with potentially additional ambition added by the House Democrats. However, the High-Alignment scenario has its challenges. Certain battleground or Republican-leaning states with Democratic senators currently in office such as OH, PA, AZ, WV, and others will exert influence on the Democratic caucus in Congress and may generate pushback on tough climate action when it comes to actual votes (figure 4). Also, the tossup seats that Democrats need to win to gain Senate control are, almost by definition, in red or purple states such as GA, NC, MT, and IA. That, along with the likely thin margins of victory, will likely make these new Democratic senators skittish on bold climate action.

Moreover, some of these states with centrist or conservative Democratic senators, such as PA, OH, MT, and WV, are also home to (and benefit from) major fossil fuel industries in term of jobs and state tax revenues (figure 3). These interests are durable factors in climate politics regardless of party affiliation (Stokes, 2020). To conclude, even a High-alignment scenario may have ten or more Democratic senators who will seek to dilute a tough climate bill.

Such potentially skittish Democrats include Joseph Manchin (WV), Douglas Jones (AL), and Kyrsten Sinema (AZ), who opposed the Green New Deal during the Senate vote on the resolution forced by Majority Leader McConnell (Meyer, 2019) [6]. Most of these are also relatively the most conservative Democratic senators according to the Congressional tracking website Govtrack (Govtrack, 2019). Manchin’s role is particularly critical, as ranking member of the Senate’s Energy and Natural Resources committee, he will be chairman of the committee if Democrats take control of the chamber with enormous powers to shape or block legislation (figure 4).

Senator	State	Next Election	Climate Relevant Committees	Fossil Fuel Industry	LCV Lifetime Score
Joseph Manchin III	WV	2024	Energy and Natural Resources Committee (Ranking Member), Committee on Appropriations	Coal	49%
Douglas Jones	AL	2020	Subcommittee on Securities, Insurance, and Investment		82%
Krysten Sinema	AZ	2024	Subcommittee on Securities, Insurance, and Investment		77%
John Tester	MT	2024	Committee on Appropriations; Subcommittee on Securities, Insurance, and Investment	Coal	88%
Sherrod Brown	OH	2024	Committee on Banking, Housing, and Urban Affairs (Ranking Member)	Oil & Gas	94%
Robert Casey Jr.	PA	2024	Subcommittee on Rural Development and Energy	Oil & Gas	93%

Figure 3: Senate Democrats currently in office from red or purple states who may resist high-ambition climate legislation. Major fossil fuel industries in their home states and their League of Conservation Voters scores are also listed as relevant.

[6] Douglas Jones however is likely to be defeated in November.

Other Democrats who could have hesitations on high climate ambition include John Tester (MT), Sherrod Brown (OH), and Bob Casey Jr. (PA). Brown is known as strongly pro-labor and would be particularly sensitive to loss of fossil fuel jobs. All three hail from states in which fossil fuel industries are major drivers of the economy, and Ohio was the site of H.B. 6, the law widely seen as anti-clean energy and allegedly a result of outright bribery involving utilities and state politicians from both parties (Roberts, 2019a; Ohio Legislature, 2019). Sheldon Whitehouse (RI) and Dianne Feinstein among others, are known to have a strong preference for a carbon price as the core climate solution (Feinstein, 2019). The Democratic Party is making a major show of unity ahead of the upcoming election, but internal differences on climate action are likely to become sharper and more public in a High-Alignment scenario.

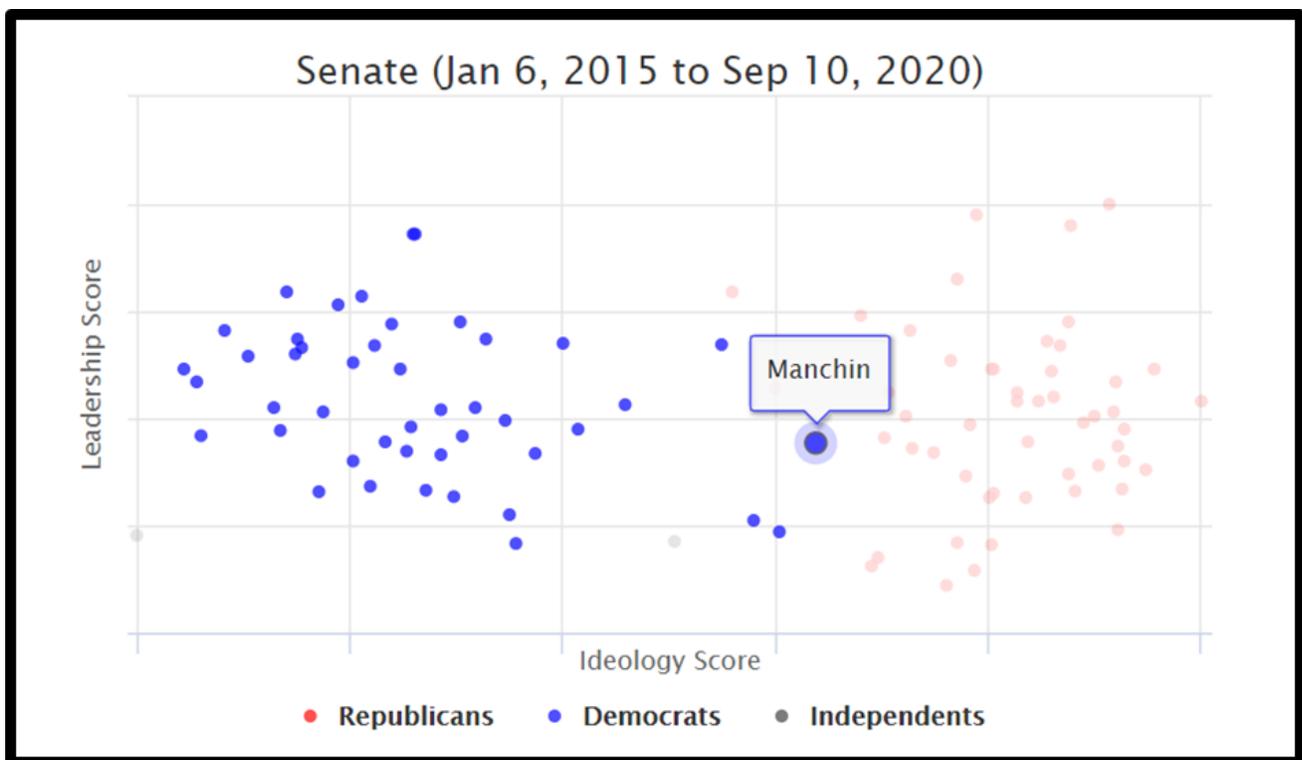


Figure 4: Joseph Manchin is among a handful of Democrats whose ideology score is aligned closer to Republicans than most Senate members of his own party. Source - Govtrack (2019)

The Biden Plan (Biden, 2020) calls for a clean energy standard with a target date of 2050 and an intermediate goal for 2025, and the establishment of a new Advanced Research Projects Agency-Climate focused enhanced RD&D in small modular nuclear reactors, CCS, cheaper grid-scale storage in the electricity sector, enhanced tax breaks for CCS. But as discussed above, the Senate will be the key gatekeeper of any final clean energy legislation.

The Medium-Alignment and Low-Alignment scenarios will require Republican support for climate legislation. A large majority of Republican senators oppose significant climate action. However, a few are conditionally supportive. These include Mike Braun (IN), Lisa Murkowski (AL), Mitt Romney (MA), Lindsey Graham (SC), and Rob Portman (OH). These Republicans are already part of an institutionalized bipartisan climate effort (Climate Solutions Caucus, undated), and could plausibly back some form of climate legislation under a Biden presidency.

Policy Feasibility in Legislative Scenarios

The Medium- and High-Alignment scenarios will likely lead to climate legislation. The Low Alignment scenario (Republican-controlled Senate) is unlikely to lead to anything more than weak climate legislation, if at all. The Senate Majority leader has the authority to not bring up a bill to vote, so in theory there may be no legislation at all in this scenario. However, a landslide Biden victory and Democratic control of the House could lead to normative and political pressure for the Senate to act or be seen to act. Congressional Republicans have recently offered their own climate proposals (Merchant, 2020; Scott & Saiyid, 2020).

A table of the policy elements that could form a part of each scenario is presented in figure 5.

Policy Type	Policy Proposal	Low-Alignment	Medium-Alignment	High-Alignment
Mandates & Standards	Federal clean energy standard			✓
	Climate risk disclosure for public companies		?	✓
	National energy efficiency resource standard		✓	✓
	Curbs on hydraulic fracturing			
Investments	Inter-state transmission	?	✓	✓
	RD&D in clean energy innovation	✓	✓	✓
Taxes and subsidies	PTC/ITC extension	?	✓	✓
	CCS tax credit extension/enhancement	✓	✓	✓
	Carbon price (tax or cap-and-trade)		?	✓
	Storage policy incentives		?	✓
	Fossil fuel subsidies reduction or elimination			?

Figure 5 – Policy elements of potential clean energy legislation in three scenarios based on 2020 Senate election outcomes, assuming a Biden presidency and Democrat-dominated House. Low-Alignment = Republican control, Medium-Alignment = Democratic control with current filibuster arrangement maintained, High-Alignment = Democratic control with filibuster abolished for all legislation. ✓ = likely, '?' = plausible. A blank cell = unlikely.

The High Alignment scenario would yield the strongest climate legislation. The grand prize for progressives is a robust clean energy standard that mandates net-zero emissions electricity sector by a specific date. However, much depends on how the standard is written into law. The end-date is critical – a 2035 or 2040 phaseout would be much more aggressive and meaningful than a 2050 date (which many states and a few IOUs have already adopted). Interim targets along the way would add further teeth. A bill on the clean energy standard has already been introduced in Congress that targets carbon-free emissions in the electricity sector by 2050 (US Congress, 2019c). There are open questions on how the clean energy standard will be implemented across the highly diverse energy economies of states.

Enhanced tax incentives for renewables is another legislative element with a higher chance of passage than an aggressive clean energy standard. There have been many supporters for the Production Tax Credit (PTC) and the Investment Tax Credit (ITC) in Congress, leading to their multiple extensions. However, they are now slated to be phased down. Creating a safe harbor for these tax credits, or even increasing their magnitude is

likely in both High-Alignment and Medium-Alignment scenarios.

An even more ambitious component would be a reduction of existing tax incentives for fossil fuels. But all these progressive priorities will face resistance even in a High-Alignment scenario, as there will still be enough centrist Democrats that can hold up passage if they wish to (not to mention the critical role of Senator Manchin as presumed Chairman of the energy committee).

The filibuster challenge in a Medium-Alignment scenario can be circumvented if Democrats are willing to use the budget reconciliation process, which requires only a majority for tax and spend elements to pass. However, using the reconciliation process is not straightforward as explained by David Roberts (Roberts, 2020b) – it can only be used once during the year and that too only for mandatory taxation and spending (i.e. entitlements, not discretionary programs). Thus, regulatory legislation (such as a clean energy standard) technically cannot be passed using reconciliation. There are creative ways of converting discretionary spending into entitlement-like programs and attaching regulatory legislation to spending (Roberts, 2020b), but ultimately these are political decisions. How much political capital would President Biden and the Democratic leadership want to spend on prioritizing climate over other issue areas such as healthcare, education, and racial justice, not to mention righting the economy in a time of a pandemic, is a key question. It would be prudent to assume there is constrained political capital to use the reconciliation process for policy elements other than direct tax and spend ones, and even here, opposition from key centrist Democrats may dilute proposed measures.

Another core priority for climate progressives is major investments in inter-state transmission (NRDC, 2020). This has potential to attract votes well beyond climate progressives, including perhaps some conservatives. After all, infrastructure has been mentioned as a priority, at least rhetorically, by President Trump and the Republican Party, and increased

spending can bring jobs to a senator's state in a time of an employment crisis. Transmission investment is also amenable to be included in a Inter-state transmission is a space where states exercise major control over project siting, and the Federal Energy Regulatory Commission (FERC) has only limited powers as we discuss below (Congressional Research Service, 2010). Except under specific circumstances as defined by the Energy Policy Act of 2005, states could block the siting of transmission lines [7]. When FERC attempted to expand its power on siting permission, the courts struck it down (FERC, 2009).

However more recently, the Department of Energy has taken a more expansive view of FERC's powers under Section 1222 of the act, which, along with the implications of the EPSA decision (discussed below), could open the door for overruling state and landowner objections to transmission line siting and buildout (Eisen, 2016; EE News, 2017). The first test case is the Plains and Eastern Clean Line transmission project (Department of Energy, undated). The policy evolution must also contend with the politics of local landowner rights and resistance that will likely continue to complicate this issue. A legislative remedy could be a suitable amendment to the Energy Policy Act, but this could run into legal challenges on state powers as defined in the Federal Powers Act.

Centrist Democrats have traditionally favored a carbon price executed through a cap-and-trade type approach. This aligns with pro-climate action Republicans, who have proposed climate solutions with a carbon price and reduced regulations as their lynchpin (Alliance for Market Solutions, undated). Progressive Democrats however see pricing carbon as insufficiently ambitious for fast decarbonization. A carbon tax was defeated twice (2016 and 2018) in referendums in the state of Washington, a Democratic party stronghold.

[7] The main condition is that states should have "withheld approval for one year" for the project.

Moderate Republicans have supported a carbon price, for example by helping draft the Energy Innovation and Carbon Dividend Act, introduced in the House by a bipartisan coalition in 2019 (US Congress, 2019). It would levy an initial tax of \$15 per tonne of CO₂, to be stepped up in the future. In a new administration and Congress, carbon pricing remains on the agenda, and has the highest chance of support as a compromise in a Medium-Alignment scenario. Being a tax or tax-equivalent, it can also more easily be passed in a budget reconciliation measure.

Enhanced support for CCS will attract the broadest support under all scenarios. House Republicans unveiled climate legislation earlier this year that focused on expanded incentives for CCS and tree-planting (Merchant, 2020; Scott & Saiyid, 2020). The biggest item on the CCS agenda is the extension of the 45Q tax credit beyond its current expiration in 2023. The tax credit could also potentially be converted into a direct pay mechanism as has been proposed in a recent bill (US Congress, 2020b).

Nuclear energy also has strong bipartisan support. Although a major ramp-up of new nuclear plants is generally seen as unlikely, extension of the lifespan of old plants would make a major contribution to clean energy goals. This however falls in the regulatory domain (below). There has been strong bipartisan support for greater RD&D investments and other incentives for new nuclear energy, particularly smaller, safer power plants (US Congress, 2019b).

Mandatory disclosure climate risk for publicly trading companies in their SEC filings has been the focus of a recent proposed law (US Congress, 2019d). It has broad support across the Democratic Party (Lefebvre & Adragna, 2019) but is opposed by almost all Republicans, and could plausibly be passed in a Medium-Alignment scenario.

Under no scenario is it likely that explicit curbs or restrictions on fossil fuel extraction would be a part of climate legislation, even in the High-Alignment scenario. This is pointedly not a part of the Senate Democrats'

plan. Candidate Biden's plan advocates a ban on new fracking on public lands but supports it on private lands and continuing existing drilling projects on public lands (Phillips, 2020). Powerful oil & gas interests in key states with Democratic senators such as Pennsylvania and Ohio will exert major influence against any curbs, as will strong bipartisan support for LNG exports as a geopolitical tool for countering Russian influence or opening new markets in Asia and Europe. Reducing fossil fuel subsidies is also unlikely to make it in any new law, though this is somewhat more feasible than drilling restrictions.

STATE-LEVEL CLIMATE ACTION

Federalism and the Electricity Sector

There is a long-standing tradition of federalism in the electricity sector, with the governing statute being the 1935 Federal Power Act (FPA). Wholesale electricity trading and inter-state transmission has always been under federal jurisdiction with FERC as the independent regulator, while states regulated the distribution and retail end independent of federal intervention. This “bright line” division of powers was relatively clear for decades.

Restructuring and technology shifts have however complicated these jurisdictions (Boyd & Carlson, 2016; Christiansen, 2016; Panfil, 2020). For one, the creation of mostly cross-state ISOs has greatly increased inter-state power sales and trading, bringing more of electricity transactions within federal purview. The end of the vertically-integrated utility model has also aided this process, with hived-off generating companies selling power to multiple states. Second, the rise of renewables and storage has changed the nature of electricity supply and demand, with electricity flowing in both directions.

Recent Supreme Court rulings such as *FERC vs EPSA* (US Supreme Court, 2015) are examples of the judiciary enabling the softening of the “bright line” judicial principle (Christiansen, 2016). The *EPSA* ruling upheld FERC’s push to regulate activities such as demand-side management and storage (which have retail implications), as long as these are directly related to wholesale markets. Regulation of actual retail rates however was affirmed by the court to be within the exclusive authority of states.

Several components of the American government have important roles in the electricity sector. This includes the federal government (comprising of executive and legislative branches and the US Supreme Court), US state governments, and in some cases, cities and local communities. A key question is which level(s) of government are the key rulemakers when it comes to transitioning generation assets away from fossil fuels.

Robust federal legislation can have far-reaching effects on climate change, given that a large majority of electricity is traded inter-state, and states can supplement this with even more ambitious targets. In non-restructured markets, most clearly the southeast, states are stronger influencers. However, since the vertically-integrated model has been mostly unbundled, utilities with cross-state presence engage in inter-state trade. In restructured markets, the federal government has more influence through its regulation of ISOs, though here again states can play a major role by influencing ratemaking at the retail end (Boyd & Carlson, 2016). The judiciary matters as well, especially in absence of federal legislation, as was demonstrated in the court challenges faced by the Obama Administration's Clean Power Plan (CPP).

State Policies

Constitutionally states are tasked with ensuring the “health and well-being” of its residents. States have used this principle to enact climate-oriented laws and regulations such as Renewable Portfolio Standards (RPS) spell out and clean energy subsidies (figure 6). 24 states are a part of the US Climate Alliance (US Climate Alliance, undated). California is a clear leader in setting norms and standards on clean energy in electricity and transport, as are states like New York and Hawai'i.

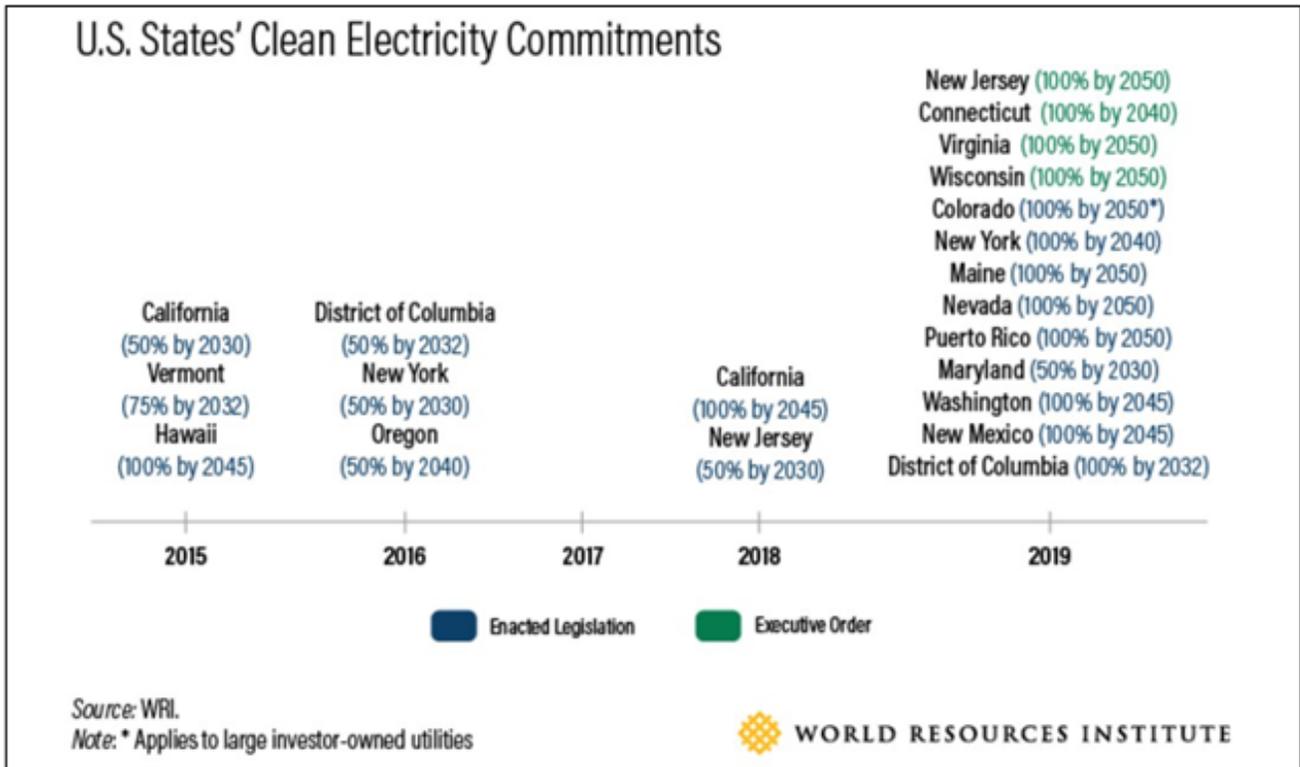


Figure 6: Summary of electricity decarbonization commitments by US states. Source (WRI, 2020)

But states have also used their powers to resist climate action, not just through inaction but also active opposition through the judicial system. A major example of this was the Obama-era CPP, issued by the Environmental Protection Agency (EPA) under powers granted to it by the Clean Air Act. The plan was challenged by a coalition of states, utilities, and fossil-fuel companies, and the US Supreme Court took the extraordinary step of staying its implementation until final resolution of all litigation. The lawsuit was partly based on an argument of federal overreach. A second example is the continuing battles over federal and state powers on transmission project siting authority (see above). Any new ambitious climate regulations by the Biden administration are likely to face similar court challenges that could hold up implementation for years [8].

[8] The landscape is more favorable on transport, where the federal government and California have long enjoyed major regulatory powers.

US states are minimally subject to the outcome of the November 2020 election and can be analyzed with greater confidence at this stage itself. State action is crucial even under a Biden presidency due to the principle of cooperative federalism and continuing state powers at the retail and distribution ends of the sector. In the scenario of a Trump re-election, climate action in the US will be almost entirely down to states and local communities.

There are clear patterns of leaders and laggards among states in electricity. Instead of analyzing each of the 50 U.S. states, this study will focus on the concentrated influencers. Three metrics can be considered for this purpose. First, larger states that have the greatest electricity footprint (demand or generation) matter more than small states. Second states with major fossil fuel interests can exercise concentrated blocking influence in national climate politics. Third, states with unusually favorable environmental constituencies can exercise concentrated leadership in shifting norms and standards in clean energy policy. (The clearest case is in transport policy, where CA exercises this role by statute.) Clearly leadership roles are more influential when the state also has a large energy footprint. However, blocking roles can be potent even if the state is small, as we have seen through the Senate – the US constitution gives small states disproportionate powers in legislation.

To understand which states have the largest electricity footprints, consider figure 7. From the figure, TX, FL, CA, PA, IL, AL, NC, NY, GA, and OH are the top ten generating states in that order, making up just below half of net US generation. All of these except CA, NY and IL have unfavorable or mixed climate politics. The top 20 states account for more than 70% of electricity generation.

Rank	State	Net summer capacity (MW)	Net generation (MWh)	Total retail sales (MWh)	Cumulative Generation (MWh)	Cumulative Generation (% of Total)
1	Texas	122,159	477,352,425	424,418,628	477,352,425	11.4
2	Florida	57,359	244,252,035	238,565,391	721,604,460	17.3
3	Pennsylvania	48,558	215,385,830	148,976,731	936,990,290	22.4
4	California	75,926	195,265,408	255,224,272	1,132,255,698	27.1
5	Illinois	45,631	188,003,357	142,654,808	1,320,259,055	31.6
6	Alabama	30,118	145,057,994	90,280,456	1,465,317,049	35.1
7	North Carolina	34,178	134,249,497	138,287,404	1,599,566,546	38.3
8	New York	41,124	132,520,501	149,929,851	1,732,087,047	41.5
9	Georgia	36,989	129,239,371	139,866,074	1,861,326,418	44.5
10	Ohio	29,142	126,184,610	152,915,167	1,987,511,028	47.6
11	Washington	30,983	116,756,729	90,005,791	2,104,267,757	50.4
12	Michigan	29,720	115,837,095	104,869,496	2,220,104,852	53.1
13	Indiana	26,696	113,459,711	104,194,376	2,333,564,563	55.9
14	Arizona	28,672	111,925,144	78,346,302	2,445,489,707	58.5
15	Louisiana	23,162	102,128,485	94,186,072	2,547,618,192	61
16	South Carolina	23,662	99,364,088	81,641,138	2,646,982,280	63.4
17	Virginia	29,635	95,509,121	118,166,348	2,742,491,401	65.6
18	Oklahoma	27,401	86,223,721	64,575,316	2,828,715,122	67.7
19	Missouri	21,078	85,095,384	82,055,835	2,913,810,506	69.7
20	Tennessee	21,349	81,554,917	102,911,183	2,995,365,423	71.7
21	Kentucky	20,120	78,804,497	76,610,636	3,074,169,920	73.6
22	New Jersey	17,403	75,033,600	76,016,762	3,149,203,520	75.4
23	Arkansas	14,763	67,999,352	49,602,708	3,217,202,872	77
24	West Virginia	14,851	67,249,025	33,646,813	3,284,451,897	78.6
25	Wisconsin	15,516	65,936,803	70,959,549	3,350,388,700	80.2
26	Oregon	16,590	64,113,560	49,325,904	3,414,502,260	81.7
27	Mississippi	14,733	63,473,771	50,390,068	3,477,976,031	83.2

28	Iowa	18,842	63,380,569	51,210,655	3,541,356,600	84.8
29	Minnesota	16,954	61,517,441	68,708,382	3,602,874,041	86.2
30	Colorado	16,590	55,386,279	56,450,480	3,658,260,320	87.6
31	Kansas	15,631	51,710,213	42,036,979	3,709,970,533	88.8
32	Wyoming	8,673	46,112,136	16,864,678	3,756,082,669	89.9
33	Maryland	14,777	43,809,648	62,086,455	3,799,892,317	90.9
34	North Dakota	8,381	42,615,321	20,669,506	3,842,507,638	92
35	Nevada	11,494	39,640,241	37,780,263	3,882,147,879	92.9
36	Connecticut	9,833	39,453,552	28,833,925	3,921,601,431	93.9
37	Utah	9,003	39,375,424	31,242,408	3,960,976,855	94.8
38	Nebraska	8,984	36,966,216	30,939,492	3,997,943,071	95.7
39	New Mexico	8,431	32,673,682	24,048,611	4,030,616,753	96.5
40	Montana	6,356	28,212,831	14,838,845	4,058,829,584	97.1
41	Massachusetts	12,875	27,172,882	53,285,029	4,086,002,466	97.8
42	Idaho	5,210	18,172,120	23,753,508	4,104,174,586	98.2
43	New Hampshire	4,469	17,087,156	11,046,284	4,121,261,742	98.6
44	South Dakota	4,169	12,616,396	12,856,938	4,133,878,138	98.9
45	Maine	4,864	11,280,700	12,354,819	4,145,158,838	99.2
46	Hawaii	2,811	9,796,773	9,337,161	4,154,955,611	99.4
47	Rhode Island	1,958	8,375,257	7,583,339	4,163,330,868	99.6
48	Alaska	2,745	6,247,359	5,972,467	4,169,578,227	99.8
49	Delaware	3,378	6,240,644	11,773,100	4,175,818,871	99.9
50	Vermont	765	2,178,915	5,530,948	4,177,997,786	100
51	District of Columbia	32	79,331	11,357,910	4,178,077,117	100
	U.S. Total	1,094,740	4,178,077,114	3,859,185,281		

Figure 7: US states ranked by electricity generation in 2018. Cumulative Generation for a state is the sum of the generation for that state and all states above. Source – EIA, 2019.

Going forward, as renewables combined with storage begin to beat natural gas (Rocky Mountain Institute, 2019) on price alone, the role of resistor or mixed states becomes critical. Based on our metrics, TX, PA, OH, GA, NC, LA, WV, OK, ND, MT, and WY are key in this category. At the other end are large energy-footprint states with clear leadership roles in the transition - CA, NY, IL, CO, VA are key here. Note the larger list of potential resistor states as compared to leaders that matter.

Figure 8 provides a sense of how far each state has to go to achieve 100% clean electricity. Cleaning up electricity generation in TX, FL, and PA will have the greatest impact followed by OH, LA, GA, AL, NC, IN, CA, NY, IL, MI, VA, and AZ. This group of 15 states represents all the top ten generating states plus IN, LA, MI, VA, and AZ. Decarbonizing electricity in these 15 states will do a lion’s share of the national task.

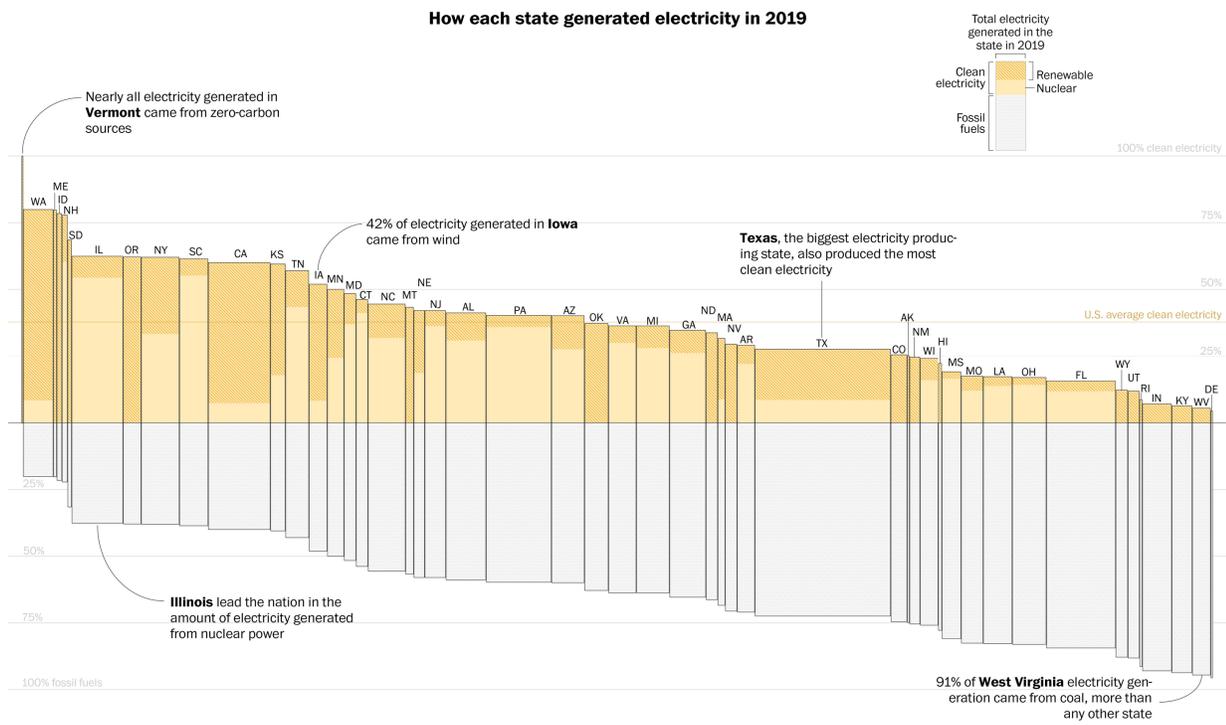


Figure 8: US states’ clean energy generation in 2019. The horizontal axis measures the amount of electricity generated, while the vertical axis denotes the fraction that is clean. The area in gray therefore is proportionate to the magnitude of fossil energy in the state. Source: John Muyskens, Washington Post

Regionally, the Southeast is probably the most intractable region for clean energy gains on electricity. A recent report laid out the challenges for a clean transition in the region (SACE, 2020). Of all states in the Southeast, AL (along with MS) appears to be the most resistant to clean electricity shift with big coal overhangs, no Integrated Resource Plans (IRP), and no renewables pickup projected. AL is disproportionately critical in terms of its contributions to the national cleanup goal (figures 7 and 8).

NC is relatively speaking the most clean energy-oriented in the region. FL is a mixed case with high gas persistence projected but major climate impacts looming on the coast and spurring activism along with proactive city governments. TN is largely hostage to what the Tennessee Valley Authority (TVA) does, but the city of Memphis could act as a driver of change.

Southern, Duke, TVA and Nextera are the biggest emitting utilities in the region in that order. Duke appears to be the most aggressive on the clean shift, with a coal phaseout commitment by 2030 and net zero by 2050. Publicly-owned corporations TVA and Nextera appear to be the least clean energy oriented in the Southeast, though it is also the nation's largest renewables energy company. The Vogtle nuclear plant, if completed as scheduled by next year, will ease Southern's high-emissions portfolio.

Large states with mixed clean energy politics are particularly interesting from the analysis standpoint. The role of TX is one such – a major wind leader, it also has a powerful fossil fuel lobby that is substantially opposed to strong methane emissions regulations, for example. PA is another example – a centrist Democratic governor faces a Republican legislature opposed to climate action. Strong support for clean energy in the eastern part of the state is countered by major gains for landowners from shale gas extraction and fossil jobs in the rural, conservative west. NC is the third example – in political transition from red to blue, it has taken solar leadership of late, but remains a preserve of unstructured, fossil fuel-friendly utilities and conservative constituencies. Similarly, FL, NC, and GA

are traditionally regulated states that have resisted clean energy, but important cities and communities such as Atlanta have pushed back and achieved some success in boosting renewables. FL, GA, and NC are also subject to major climate impacts through hurricanes and sea level rise, which makes them potentially amenable to shifts in energy and climate politics in the future.

Investor-Owned Utilities

Literature on actor influence in clean energy research has often focused on “market power,” traditionally understood as the ability to gain supra-normal revenues above those dictated by market efficiency through deliberate market distortions. One definition sees a firm as exercising market power “when it reduces its output or raises the minimum price at which it is willing to sell output (its offer price) in order to change the market price” (Borenstein, 2000). This particular form of market power in terms of influencing price and profit over the short-term in a restructured market is arguably rare in ISO territories, with market governance having greatly improved since the California crisis of 2000-2001 when the state experience a series of blackouts.

However, another way of understanding market power is the ability to pass favorable standards, regulation, and legislation - or perhaps more relevant to the green transition, the ability to block these. This can be achieved through lobbying, agenda-setting, and occasionally even outright corruption, such as the recent case in the power sector in Ohio (Stokes, 2020b), in which utilities allegedly engaged in payoffs to politicians to ensure subsidies to uneconomical coal and nuclear plants.

However, all regulation or legislation that benefits utilities or the fossil fuel industry is not necessarily evidence of regulatory capture. Lobbying is legal under US law, and legal doctrines such as Noerr-Pennington (Federal Trade Commission, 2006) allow private players to lobby for changes that

may have anti-competitive effects. Nevertheless, outright bribery (as allegedly exemplified by the Ohio case) is not legal.

But because utilities across both restructured and regulated monopoly territories are owned by holding companies, it makes sense to measure market power at the national level using a metric like CR4. CR4 is used as one measure of market power, in terms of measuring the ease and speed of the utility sector as a whole for transitioning away from fossil fuels, should the sector decide to. CR4 would also measure the impact if one or very few of the big players decided to make such a change.

An analysis at the national level of IOUs yields a value of CR4 of 0.26 and CR8 of 0.39, which indicates a fragmented market (Appendix B). However, this conclusion is heavily qualified by two factors. The first is that in some states, predominantly the unstructured states of the southeast and much of the west, regulated local monopolies are the norm, and so a national-level measure only goes so far. Second, though utilities may be fragmented, they cooperate closely through formal and informal networks, one example being the Edison Power Institute (Stokes, 2020).

Thus the role of IOUs is mixed – able to exert substantial influence to more often than not slow down the green transition, but also subject to significant regulation in restructured markets, and potentially even more in unstructured markets should the relevant states decide to take action. All this bolsters the central take-away of this paper that a climate action-aligned politics can make the greatest impacts on decarbonizing the US electricity sector.

CONCLUSIONS

The 2020 election is a critical moment for decarbonization in the electricity sector in the United States. Should Joseph Biden be elected president, there will be renewed impetus for federal action on climate change and clean energy, starting with the electricity sector where a variety of policies will be on the table from clean energy standards to transmission infrastructure investments to clean energy tax credits. Some sort of climate legislation is highly likely under a Biden presidency.

The precise content of such legislation however remains uncertain and depends critically on Congressional control. While progressive Democrats have their preferred suite of policies, a number of others such as carbon taxes and support for carbon sequestration and advanced nuclear power have hold among moderates and Republicans with an interest in clean energy. Other policies such as efforts to restrict fracking may prove more politically challenging. With a handful of Senators likely to have blocking power, whatever federal legislation that emerges may reflect their somewhat idiosyncratic bottom lines for acceptable policy.

Even if federal legislation is passed, court scrutiny is an important potential barrier in an era of more conservative courts at all levels. But even if climate legislation survives the courts, state policy will continue to be an important driver of change with the real challenge in states such as Florida and Pennsylvania that have significant electricity demand and production but patchy movement towards clean energy to date.

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APPENDIX A

Figure A1 provides assessments for clean electricity policy elements and a brief summary of the logic behind them.

Policy Type	Policy Proposal	Political Feasibility	Assessment Logic
Mandates & Standards	Federal clean energy standard	Medium	Strongly backed by progressives, but opposed by centrists and conservatives in Congress.
	Climate risk disclosure for public companies	Medium	Strongly opposed by major fossil industries, but increasing support among investors and Wall Street
	National energy efficiency resource standard	Medium	Questions on federalism for retail segment, can draw support under bipartisan rubric of energy efficiency
	Curbs on hydraulic fracturing	Low	Low bipartisan support
Investments	Inter-state transmission	High	Bipartisan support for infrastructure investments
	RD&D in clean energy innovation	High	Strong bipartisan support as demonstrated by introduced bills
Taxes and subsidies	PTC/ITC extension	High	Strong Democratic and some Republican support
	CCS tax credit extension/enhancement	High	Strong bipartisan support as demonstrated by introduced bills
	Carbon price (tax or cap-and-trade)	Medium	Could emerge as bipartisan compromise given opposition among centrists and conservatives to CES
	Storage policy incentives	Medium	Early stage policy formulation and unlikely to face major opposition
	Fossil fuel subsidies reduction or elimination	Low	Strong opposition from powerful oil & gas interest groups, purple state opposition

Figure A1: Clean electricity policy assessments and explanations.

APPENDIX B

Investor Owned Utilities – Market Concentration Calculation (CR4 and CR8)

Company	Revenue, 2018
Exelon	29.43
Duke	22.27
Southern	19.60
NextEra	16.70
AEP	16.20
PG&E	12.71
FirstEnergy	10.10
DTE	5.30
AES	4.23
Total Retail Revenue, 2018	341.09

Figure B1: US revenues of major utility companies. All values in \$ bn. CR4 and CR8 values computed by dividing sum of top four and top eight companies respectively by the net revenue figure. Non-US and non-electricity revenues of corporations have been excluded. Source – Computed by authors based on annual report filings of each corporation with Securities and Exchange Commission for 2018 and EIA, 2018