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Solar Siting Authority Across the United States

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Solar Siting Authority Across the United States

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Executive Summary

This report aims to understand the policy and regulatory landscape surrounding solar siting in the United States in the past, present and looking towards the future. The scope of this analysis includes siting for photovoltaic (PV) solar projects at utility-scale for the U.S. local, state, and federal levels. For the purposes of this report, utility-scale solar is defined as electricity produced by solar generation that is fed directly into the U.S. grid rather than directly used for on-site electricity demand. The background section comprises of a literature review, case studies on state narratives related to U.S. solar siting, an analysis of state-specific interviews, and a glossary of current U.S. state policies for siting solar with a discussion of the glossary's findings and trends. Policy reviewed found that some states' siting policies refer to energy projects or general transmission and siting, which by extension applies to solar. Therefore, solar siting authority is often consistent with current literature on wind siting authority, but some key differences exist across states.

Literature Review

Methods

An analysis on available literature was conducted to survey current information on siting for solar. As stated in the executive summary, the scope of this project and subsequent literature review includes siting in the United States for photovoltaic solar projects at utility-scale at the federal, state, and local levels. Please note that concentrated solar power (CSP) solar technology is not included in the scope. Methods included using the online database Scopus and ScienceDirect to collect literature using keywords related to solar siting. Similar to solar, a wind siting study, *Planning for Wind Energy* (Rynne et al., 2011), was used to collect keywords related to siting that would be applied to the solar siting literature review. The terms "solar" and "siting" were coded into Scopus that resulted in 366 related articles. From these 366 results, literature was narrowed down to 28 articles by selecting articles related to key phrases that are shown in Table 1 in the appendix section of this report. The titles and abstracts of the 28 articles were imported into the software VOSviewer to see how popular keywords in the literature abstracts connected to each other (Figure 1). From there, the abstracts of each of the 28 articles were read to narrow down the literature to 11 article results, which forms the foundation of the literature review based on relevance to the scope of this report.

From the 11 articles found in the literature review, common themes emerged when discussing solar siting in the United States which can be grouped into the two large categories of 1) community concerns and 2) land-use concerns. Both community concerns and land-use concerns affect the policy that is created at all levels of government and also the actual execution of siting for solar projects.

Community Concerns

When evaluating solar in the United States, a major consideration is public opinion and concern for new solar development in the local communities where projects are sited (Carlisle et al., 2014; Carlisle et al., 2015; Carlisle et al., 2016; Moore & Hackett, 2016; Pasqualetti & Schwartz, 2013). In the past when there was public opposition for solar projects, whether regarding siting or other concerns, NIMBY (Not In My Backyard) was used to describe this behavior from the community. NIMBY refers to opposition from local communities based on proximity to development projects (Carlisle et al., 2014). NIMBY-ism is often used as a pejorative term to describe locals as uninformed, irrational, and having homogeneous concerns (Carlisle et al., 2014; Carlisle et al., 2015; Carlisle et al., 2016; Moore & Hackett, 2016). Further research has surveyed local communities and shown that local opposition to siting projects is often well-informed, rational, and justified (Carlisle et al., 2014). In order to understand why renewable energy projects, specifically PV solar, are sometimes not successful, it is important to understand the role that public opinion and local concern plays. As the literature states that NIMBY does not accurately depict why local communities oppose solar projects, other considerations such as public perception of the project, the stakeholders involved, and place attachment can play a role in support or opposition for siting solar in a particular community.

Public perception of siting solar projects can differ for different types of local communities, such as rural communities (Pasqualetti & Schwartz, 2013). Results in the articles analyzed had conflicting results for public perception and acceptance of siting solar. For example, siting for a solar project in Gila Bend, AZ proved a failure in understanding public value, which is used to describe the normative consensus that the public should or should not have on issues (Pasqualetti & Schwartz, 2013). While on the other hand, research by Carlisle et al. states that large scale solar projects are viewed positively in California because of the economic benefits, yet the study did not focus on any one locus or project (2014).

Stakeholder engagement in a project can be the determining factor between success and failure. Positive public perception of siting a solar project in a local community will increase with public engagement. It is stated that for a renewable energy development project to be successful, public input is essential (Carlisle et al., 2014; Carlisle et al., 2015; Carlisle et al., 2016; Moore & Hackett, 2016; Pasqualetti & Schwartz, 2013) and also community buy-in is essential (Carlisle et al., 2015). Engagement at various levels of government can show the intersectional nature of siting solar in the U.S., where multiple stakeholders have a voice in the project development. For solar siting in California through the Desert Renewable Energy Conservation Plan (DRECP), stakeholders that would be integral to the project's success include: governance cooperation (California Energy Commission and California Department of Fish and Game), multi-level government collaboration (local government, Californian agencies, US Bureau of Land Management, and U.S. Fish and Wildlife Service), input from the public sector (agencies and county governments), input from the private sector (utilities, renewables

developer), and the broader community (citizens, indigenous communities, and nonprofits) (Köppel et al., 2014).

Finally, place attachment plays a role in where a PV solar project is sited and also if it will be approved for permits and development. Place attachment is defined by Carlisle et al. as "a collective orientation that describes the process of becoming attached to an environmental setting" (2016). Place attachment is often a larger oppositional force for siting solar for natural areas versus developed areas (ibid). The idea of "place" can be felt through sense or emotion spatially, temporally, or politically (Moore & Hackett, 2016). Carlisle et al. found that place attachment, which can be measured by length of residence, does not play a significant role in the perception of siting solar in California (2014). However, the same author found that visual impacts of large solar facilities play an important role in garnering public support for the approval of siting solar projects in certain communities (2016).

Land-Use Concerns

Land concerns that play a role in solar siting in the U.S. include the type of land sited, land-use considerations and risks, and the examination of biodiversity, wildlife, and natural areas. In the United States, permits for solar energy siting have been approved in large on federal lands and on privately-owned land (Stoms et al., 2013). The authors note that private lands generally are more degraded than federally owned land, which makes them more viable for siting (ibid).

Land-use implications of siting solar is a large portion of understanding how successful PV solar development projects will be when discussing solar siting policy (Hernandez et al., 2015; Moore & Hackett, 2016; Stoms et al., 2013; Trainor et al., 2016; Wu et al., 2015). When siting solar, land is scoped to ideally increase land-use efficiency and minimize land area cover, such as on areas that already contain constructed infrastructure like parking lots or rooftops (Hernandez et al., 2015). The reasoning behind minimizing land area cover and maximizing land-use efficiency is to preserve biodiversity and also respect land scarcity concerns (ibid). Additionally, the cultural and historical value of land needs to be taken into consideration when siting solar development (Köppel et al., 2014). However, Hernandez et al. notes that most of the solar projects sited in California are in natural areas (2015). Recommendations for siting solar, particularly in the Southwest U.S. and California, are to be sited on degraded lands with co-location benefits, near existing infrastructure, and on land with low conservation values (Hernandez et al. 2015; Stoms et al., 2015; Trainor et al., 2016, Wu et al., 2015). Co-location benefits include (but are not limited to) agriculture or growing, animal grazing, or building-integrated PV solar systems (ibid).

Siting solar needs to take into consideration the locational impacts on natural lands, on local biodiversity, and also on wildlife (Carlisle et al., 2015; Carlisle et al., 2016; Hernandez et al., 2015; Köppel et al., 2014; Stoms et al., 2015; Trainor et al., 2016). Solar sited in the desert has the potential to affect rare desert plants and animals (Carlisle et al., 2015, Stoms et al., 2015).

More so, solar projects overtime could create biodiversity loss and habitat fragmentation (Trainor et al., 2016). To mitigate these affects, Carlisle et al. found that local communities prefer when there is a buffer zone between solar siting facilities and wildlife migration routes (2016). Adaptive planning approaches allow for solar developers to site utility scale projects to mitigate infringement in the natural world through “preventative action, exploring alternatives, shifting the burden of proof to proponents, and increasing public participation” (Köppel et al., 2014).

This literature review showed that there is little to no documentation published in academic journals related to the actual construction of solar siting policy across U.S. states at multiple levels of government. This report aims to understand the fabric of solar siting across the U.S. through this literature review on community concerns and land-use concerns when siting solar, specific case studies of solar siting in key U.S. states, and also a provided glossary of current solar siting policy by state.

Analysis of Newspaper Articles

Numerous solar projects across the country have elicited different responses. In municipalities, projects get approved "despite neighbor concerns" (Mews, 2019) or even in the midst of an ignited "town-wide debate" (Summersby, 2020). In some areas, progress towards drafting and implementing siting policy moves forward at a state-wide level with the introduction of siting offices (Abbass, 2020) and in other areas progress is stalled by state policies that deprioritize investments in solar in favor of "clean" coal and nuclear (Foehringer Merchant, 2019). In the past year, numerous differences emerged between movements to site and expand solar projects in the United States. In an effort to capture these local distinctions in policy and progress, two states with numerous local projects that exemplify that divide were chosen as a closer look into solar siting projects.

New York

New York has multiple solar development projects across the state that each bring their own, unique challenges. Siting centralization occured due to an update in Governor Cuomo’s green energy goals: 70 percent renewable by 2030; 100 percent venerable by 2040 (Abbass and Wolf, 2020). Thus, legislation passed in the 2021 state budget, The Accelerated Renewable Energy Growth and Community Benefit Act, streamlined the process to approve renewable energy projects (Abbass, 2020). This change in policy removed the existing Article X of the state Public Service Law's Public Service Department to create the Office of Renewable Energy Siting. This change in policy also allows the state to override local laws "if they are unreasonably burdensome” but allows municipalities to hold a public hearing if the requirements submitted by the siting office do not meet local laws. This transition, while applicable to all renewable siting in the state for projects producing 25 to 200 megawatts of power, creates a centralization of power unlike past municipality-focused policies.

Local grievances to this change are wide-reaching and differ across the numerous active solar siting projects in New York. Cambria, New York is a small town in upstate New York, 40 minutes away from Niagara Falls. Currently, Cambria is in the process of leasing 900 acres of land to the developer Cypress Creek Renewables for a 100-megawatt hour solar project (Hoffman, 2020). This project, known as Bear Ridge Solar, was caught in numerous Article X legal challenges over a requirement to appoint residents as an ad hoc member of a state-wide appointing board who oversaw changes in "large scale energy generating facilities." As there were no members of the Town of Cambria on this state-wide board, the city worried that the board's views did not reflect the needs of the community. The town requested a stay on the project until the siting board was updated -- which was an ask that the town supervisor, Wright Ellis, said he was "not at all optimistic" of the board change.

However, as is seen in the replacement of Article X regulations, state policy is able to circumvent these legal challenges. On October 4th, the State of New York released their drafted regulations for siting Bear Ridge Solar (Joe, 2020). While some citizens, such as farm owner Jeremy Verratti who is the host for Ridge View Solar, see the regulation changes as a welcome change to streamline processes and protect landowners and developers, local officials, such as Ellis, worry about the threat to home rule and find the changes to diminish the role of municipalities' voices.

Bear Ridge Solar is only one of many active siting projects in New York. However, other municipalities feel similarly about their loss of control. In Harland, local assembly member Michael Norris rejected the bill on the grounds of NIMBYism and local control, stating

> " It is critically important to the character of that community for them (local residents) to determine whether or not they want to have a massive, large wind turbine factory in their community, or a massive solar energy facility in their community" (Joe, 2020).

In Copake, similar fears arose as uncertainty increased around their numerous developing solar farms and facilities (Mishanec, 2020). The worries are the same: Copake Town Supervisor Jeanne Mettler said "The new law would further accelerate the process of review and further tilt the process against the town." Even as New York seeks to unify siting processes and create state-wide regulation, opposition is still clear.

Ohio

In July, 2019 Ohio signed into law House Bill 6, (HB6) which bailed out nuclear and offered subsidies to coal and solar (Pelzer, 2020). However, HB6 also did something damaging for Ohio’s renewable energy goals: it cut them. In the name of cutting consumer costs, HB6 repealed the 2008 law that required that utilities must gain 12.5 percent of their power from renewables by 2027 and ended the state’s energy-efficiency mandate. While the legislature is trying to repeal HB6 due to a bribery scandal, the bill still reflects the general feelings around renewable energy in the state (Pelzer, 2020).

It is these types of roadblocks that allow the state to repetitively block solar projects. In November, Ohio regulators deferred consideration on the plan from American Electric Power's Ohio subsidiary to build the state's largest solar project because "the power isn't needed in the state" (Foehringer Merchant, 2019). This delay was only one of many projects that the siting board delayed in late 2019. In October, the board deferred consideration of an 80-megawatt solar project in southwestern Ohio due to a lack of a landscaping or lighting plan and the environmental risks that the project had on storm water, farm land, and the Kirtland snake -- an endangered species (Williams, 2019). The board unanimously agreed in this dissent and environmental advocates overwhelmingly agreed that this policy shift was unpredicted and "another example of unequal treatment for renewable projects."

The siting board eventually approved some of the projects that were halted in 2019 in April of 2020 once they were comfortable that the projects had been "more thoroughly vetted" (Funk, 2020). Unlike New York, Ohio's Siting Board has slowed down the development of certain solar projects, thus decreasing developer confidence as other non-renewable projects are approved by the board. The passage of HB6 exemplifies how siting boards can be impacted by changes in state renewable energy goals thus altering the impact of their authority.

State Expert Interviews

Interviews were conducted to gain insight into states that presented interesting or unclear siting authority. Three states were covered: Alabama, Illinois, and Nebraska. These three were selected to fill gaps in research insight, and while their stories cannot be considered directly transferable to other states, the situations described below are indicative of how siting authority may operate beyond the clear boundaries of "state" versus "local." State energy experts and an energy journalist were consulted in phone interviews in November of 2020.

Expert insight into Alabama was desired because its siting authority information was particularly difficult to find from online resources, similar to the extreme cases of ambiguity around siting authority in numerous other states. Illinois was evaluated as one of the states that may be undergoing changes to its siting policy in the near future. Meanwhile, solar energy in Nebraska requires dual authorization at the state and local levels. Because dual authority has the potential to delay development, more information was desired to discern the solar energy regulatory climate in the state.

Alabama

Alabama has not made substantial progress regarding solar energy facilities. Up until 2018, Alabama has consistently been ranked 49th in the country for solar power, according to the Solar Energy Industries Association, with only 29,688 homes powered by solar energy (Bruggers, 2020). The climate Alabama fosters for solar siting, in combination with the state's policy ambiguity, makes it difficult to categorize their siting authority. In order to better understand the state's renewable energy decisions, one interview was conducted with a

subject-matter expert who analyzed ratepaying across Alabama's utilities in 2015. The interview solidified what was obvious in the data: renewable siting in Alabama is opaque and is not explicitly addressed. This mirrors past research findings that Alabama's Public Service Commission, who is in theory in charge of siting, has processes that do not undergo public review or public comment, creating vague or non-existing regulations that differ from the rest of the region's utilities (Schlissel, 2015). Upon review of the literature surrounding Alabama's renewable siting potential, the state is recognized as having the 13th best solar potential in the nation, yet fails to adapt guidance to create this energy market (Cox, 2019). Renewable siting, but especially solar siting, is lagging in Alabama, and thus is preventing renewable progress and energy freedom in the state.

The National Conference of State Legislature (NCSL) published a report in September 2020 that accounted for various state's approaches to wind facility siting. Because of this report, we know that Alabama has written local zoning laws for Baldwin, Cherokee, Dekalb, and Etowah counties to give explicit wind siting power. External to this, the Code of Alabama only mentions siting in eleven statutes, none of which address state-wide energy siting. Thus, we maintain our original conclusion that Alabama's solar siting authority is unclear, given that there is no explicit or comprehensive siting process for any energy facilities. While the Alabama Public Service Commission has given counties wind siting power, it could be implied that the Commission is in charge of determining if a project can be sited, but too little information that supports this claim exists to make it a plausible hypothesis.

Illinois

In August, 2020, the office of Illinois Governor Jay B. Pritzker published a memo outlining how the state planned to address utility corruption concerns and push for more stringent renewable energy targets (O'Connor, 2020). The Governor's office aspires to a clearer, more stable renewable energy development landscape in Illinois. Among other things, the document, which outlines Pritzker's "8 Principles for a Clean & Renewable Illinois Economy," discusses how local zoning blocked many wind energy projects in Illinois. To meet a target of net-zero-carbon emissions by 2050, the Governor's team hopes to facilitate more solar and wind development while maintaining local authority (Office of Governor JB Pritzker, 2020). The 8 Principles document calls for legislators to remove barriers to renewable energy development in the Illinois Power Agency (IPA) energy procurement process and to encourage more guidance for local siting for wind and solar with new statewide standards as backstop for siting (Office of Governor JB Pritzker, 2020). It also discusses realigning Illinois law for more solar developer certainty around net-energy metering practices.

Two interviews were conducted with different stakeholders in Illinois's energy industry. One interviewee is employed at the Illinois Power Agency, while the other works at one of the main investor-owned utilities (IOUs) operating in the state, CommonWealth Edison (ComEd). Both professionals work on solar and broader Illinois energy policy, but neither directly engage

in the siting process. Together, they explained how the state might approach the Governor's aims of getting to net-zero emissions, and how siting might be impacted. The IPA is the state agency responsible for procuring energy for ComEd and other IOUs; due to Illinois's deregulated energy market, ComEd's main electricity responsibility is delivery, not generation. Illinois has a few IOUs as well as many consumer-owned utilities with which renewable energy developers can coordinate. The state also has two independent system operators (ISO) controlling the grid in its borders, Midcontinent Independent System Operator (MISO) and PJM Interconnection. PJM covers the northern area around Chicago, while the rest of Illinois, which is more rural, is on MISO's grid (Federal Energy Regulatory Commission, 2020).

The IPA interviewee noted that the Solar Energy Industries Association's data on installed solar in the state (approximately 300 MW) was not reflective of how much solar energy capacity is under development in Illinois (close to 1,800 MW by their estimate) (Solar Energy Industries Association, 2020). They credited Illinois's 2016 Future Energy Jobs Act (FEJA) for the growth in solar. FEJA restructured Illinois's renewable energy credit (REC) market, revised the state's renewable portfolio standard (RPS), and has been immensely facilitative of solar (Maloney, 2018). According to the IPA employee, under 90 MW of solar were in the state prior to 2017. Both interviewees noted that most solar energy to-date has been installed on greenfields in Illinois. Both also indicated that, unfortunately, the progress under FEJA will slow without increased funding access. The IPA contact speculated that the renewable energy industry (particularly wind) may have pushed Pritzker's office for statewide backstops due to the variations in siting policy across the state and as reinforcement against NIMBYism. The ComEd interviewee reflected on seeing signs against solar farms/panels in rural areas due to concerns over loss of farmland. To facilitate further renewable energy development, the interviewees hope that future legislation creates a more reliable, self-sustaining market for the long-term. They anticipate that legislation will be driven by industry desires and guided by emissions targets. The IPA interviewee noted that Illinois policy needs better consideration for the complications that arise due to two regional transmission organizations operating in the state with different requirements. Developers working in Illinois must currently deal with different requirements depending on which ISO services the land on which they are interested in siting a project. During the IPA interview they emphasized their hope for an energy development "Policy 2.0" that thinks beyond decarbonization with a focus on equity and participation across all demographics.

Nebraska

An interview was conducted on November 18th, 2020 with a stakeholder from the Nebraska power sector. The interviewee is currently the director of the Nebraska Power Review Board (PRB). This engagement was used to understand the vague language surrounding solar siting on official government websites of Nebraska. To understand siting authority for solar in eck Nebraska, it is important to understand the current landscape of the technology in the state currently. As of quarter 2 (Q2) of 2020, the total installed capacity for solar in the state is an

estimated 61.93 MW. This translates to the state ranking 46th in the nation for installed solar capacity (Nebraska Solar, 2020). Additionally, the state currently has no RPS or renewable energy targets (NCSL, 2020).

The state of Nebraska, by the listed classifications below, has dual siting authority for solar. While the state does not differentiate between solar and other electricity generation facilities, all assets in this category undergo the same process for siting approval. Local authority decides siting with no limits on generation nameplate capacity for siting authority, while the state Power Review Board (PRB) must approve a project before construction begins. The PRB is an elected board at the state level that approves permits for new electric generating facilities, fossil fuels or renewables based on 3 requirements: 1) there is public necessity for the new generation, 2) the project is economically feasible and, 3) the project is additive. This board is a different entity from the Public Service Commission (PSC) in Nebraska. The PRB is an elected board at the state level that manages permits for electricity generation, while the PSC regulates the safety code for electricity utilities and also regulates other industries in the state such as railroads, telephone companies, and more.

Local authorities in Nebraska assess proposed solar generation facilities with the approval from the state's PRB. Local approval for a new generation facility in the community must be put in the local newspaper and if the project is of a significant size (over 100 MW) then a local hearing is held to discuss the potential project. It is important to note that if a generation facility is self-developed, meaning that the electricity produced will be used on-site, then no approval from the PRB for permitting is needed.

This dual siting authority is a two-step process for the overall approval of new solar generation facilities in the state of Nebraska. The dual authority of local government involvement and the state's PRB contextualizes the role that government plays in approving new solar projects in the state of Nebraska as a balance between local and state control.

Analysis

One of the primary objectives of this research was to compile a list of state approaches to solar energy siting. The findings are assembled in a glossary in the Appendix. Legislation and news articles covering siting authority in each state were consulted to build this resource. For each state, siting authority was classified as "state," "local," "hybrid," "dual," or "unclear." An explanation of how these labels were defined can be found in the table below (see Table 2).

Table 2. Solar authority definitions used to define solar and wind authorities in the U.S.

Classification	Definition
State	State has final say on the siting of a utility-scale solar energy project.
Local	No explicit state authority (but local ordinances apply), or the state granted

	local authority on the siting of a utility-scale solar energy project.
Hybrid	Either party (state or local) has authority over solar energy, depending on the capacity scale of the project.
Dual	Clearly designated dual authority; both the state and local government must authorize a utility-scale solar energy project.
Unclear	State is either intentionally vague about siting authority or no resources could be found to confirm who has siting authority in the state.

This report modeled its analysis and reporting after two studies of wind energy siting, the "State Approaches to Wind Facility Siting" resource created in September, 2020 for the National Conference of State Legislatures (NCSL), and the "Planning for Wind Energy" report published by the American Planning Association in 2011. The interactive website version of NCSL's report was consulted to compare this study's findings on solar energy siting to state approaches to siting wind. The NCSL findings on wind are included in the comprehensive siting authority table in this report's Appendix for a side-by-side comparison. This report's classifications differ slightly from the ones describing siting authority in the wind studies, so NCSL designations of wind siting authority inconsistent with this study's classifications of siting authority have been re-labeled for consistency and ease of comparison.[1] In some hybrid states, especially low or high cutoffs delineating between state and local (or dual) siting authority indicate that projects may commonly default to one siting authority or another. This report designated cutoffs and other scale rules in the "Scale Rules & Notes" column of the Appendix glossary. Note that consumer-owned utilities are not subject to the same oversight as Investor Owned Utilities (IOUs) - like that of public service commissions - in every state. This report focused on the solar siting governance that controlled the dominant energy developers in each state, which are generally IOUs.

Discussion

Understanding Renewable Siting and Energy Timelines

Siting for wind and solar in the United States can vary by the level of government that has the ultimate control of authority. One reason that solar and wind siting authorities can differ within a single state is due to the energy timelines. The wind boom in the United States launched before the solar boom due to the rate of development of each of the renewable technologies. Because of this, there is specific guidance for wind siting in more states than for solar siting.

[1] For example, NCSL would label states that operate under "dual" siting according to this report as "hybrid," (Kahn & Shields, 2020).

Additionally, wind energy has historically been integrated with agriculture in the United States to co-use the land. This can be seen in grain belt states in the United States. Another cause for the wind boom to supersede the solar boom is tax policy at the federal level. Federal tax incentives have helped to generate growth in the renewables market. The wind Production Tax Credit (PTC) was established in 1992 and applied to facilities built in 1993 (AWEA, n.d.). Constrastingly, the solar Investment Tax Credit (ITC) was first established in 2005 as a part of the federal Energy Policy Act (SEIA, 2012). The cause behind the implementation of established wind siting authorities for states before having established solar siting or joint renewables siting authorities could be due the nature of the introduction of the solar ITC over a decade after the wind PTC.

States With Differing Wind/Solar Siting Authority

As is consistent with original findings in the literature review, solar siting in some states is consistent with wind siting, but in others differs from other energy and renewable siting regulations. While this occurs for numerous reasons, some of which are not accounted for in the literature review, differences in authority could reflect what stage a state is in for scaling up renewable energy, political constraints, or grid and energy constraints. Further research is necessary to determine why siting policy differs within a state.

For some states, it is clear that siting differs when a state has written specific regulations for an energy type. This is evident in California, where wind is sited like all other energy sources, but solar energy has specified siting guidelines. In California, the constitution specifies that solar siting is seen as an essential piece to implement consistent, statewide standards to scale solar energy systems, thus explicitly stating that solar siting is "not a municipal affair." This pattern, however, is seen more commonly with wind energy being specified in regulations, but not solar energy. In North Carolina, solar energy is sited at the local level, while wind siting occurs at the state level, which requires a permitting process through the Department of Environment and Natural Resources. Other states, like Oregon and Wisconsin give the state solar siting authority, while providing a hybrid authority for wind projects. While this project did not analyze state renewable portfolio standards or the existing renewable mixes within each state, the move away from state-wide energy to a more flexible, hybrid model in some instances could serve as a catalyst for developing wind projects with a greater ease, unless otherwise specified by the scope. In other states, such as Tennessee, North Carolina, and Wyoming, energy siting authority normally occurs at local levels, but wind siting is a state or hybrid authority, thus altering the siting process, while potentially constricting localities ability to site wind energy with ease or predictability.

While every state has differing energy siting rules, differences between wind and solar siting within a state can question a state's motives for renewable siting. Specifically, the way that a state sites specific types of renewable energy can be a reflection on how beneficial or harmful

they see that energy source to be, thus impacting the state's work towards investing in renewable energy.

States With State Solar Authority

Alaska, Connecticut, Kansas, Louisiana, Maine, Maryland, New Jersey, Oregon, Vermont, and Wisconsin were identified as states with state-level siting authority. Many others (19 states) are hybrids that engage state oversight for larger projects. California, Kentucky, and New York do not have pure state authority legislated, but these hybrid states are more likely than other hybrid states to require state-level authorization due to the scale rules these states have; their lower-MW capacity cutoffs make it more likely that solar projects will cross the scale threshold into needing state approval. Requiring state involvement in siting allows for state leaders to guide development that meets state renewables targets, but could lead to more paperwork/ superfluous bureaucracy in practice. Meanwhile, Colorado, Delaware, and Nebraska are the three states that operate under dual authority, and in Iowa, solar projects over 25 MW are also subject to dual authorization. The dual structure allows for more oversight but is inherently more arduous than simply dealing with one authority.

Also due to capacity restrictions, North Dakota and Tennessee are essentially leveraging state control over wind projects. Legislators in these states could potentially copy this approach with solar in the future as the solar industry grows. Similarly, Virginia currently has dual siting authority in place for wind power through the Virginia State Corporation Commission, so the local solar authority could move towards dual control in the future.

While there are advantages and disadvantages to each form of siting authority, it is important to realize that explicit and sole local authority could lead to projects being stalled or experiencing backlash. This response is not mutually exclusive to dual/hybrid/state authorities, which risk the same impact. However, the credibility and experience of policymakers and regulators at state-wide levels are able to divert and disperse local backlash, while also preventing developers from taking advantage of local communities with less experience in renewable energy development.

States With Published Solar Siting Guidance

Though solar generation facilities are found in all 50 U.S. states, there is not necessarily published solar siting guidance for each state (Solar State by State, 2020). Guidance is defined here as both explicit documentation of who is authorized to site solar energy in the state, and documentation outlining siting expectations/standards. Without clear siting authority and due process for solar in all states, there is a gap between policy guidance for solar authority for some states and implemented solar generation facilities. Additionally, this lack of published solar siting guidance could create a delay in the implementation of new solar facilities due to confusion around permitting authority and process. Guidance on siting coming from the state level in states with local authority can also facilitate uniformity across localities. It aids

developers in setting expectations when scoping new projects in their state, helps inform local governments on how to negotiate with developers, and can prevent localities from over-restricting their siting expectations. Ultimately, guidelines around siting facilitate renewable energy development. Out of the 50 U.S. states that were analyzed for solar siting authority, only 20 currently have guidance or have solar siting guidance under development, which translates to 40% of total states.

Conclusion

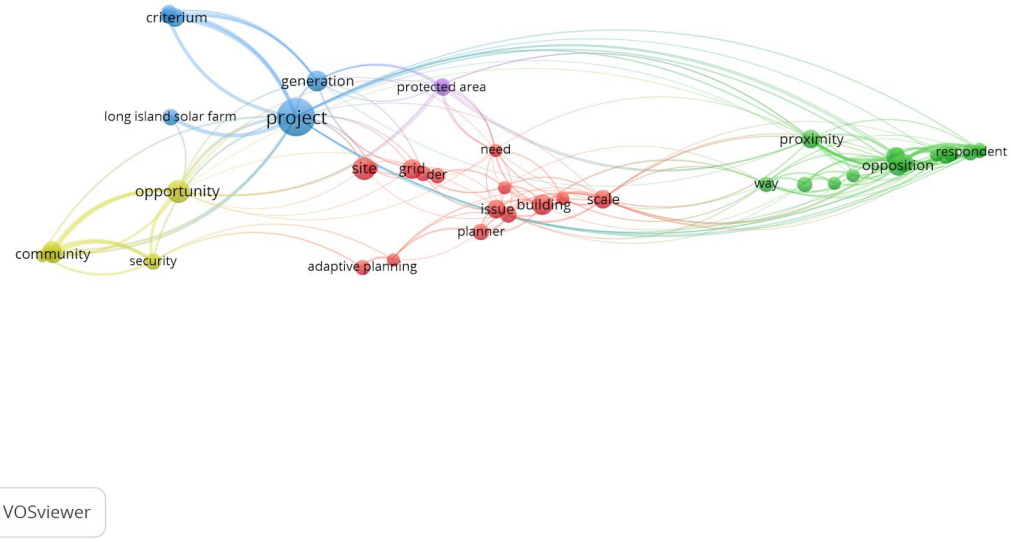
Solar siting is distinct across U.S. states and faces numerous challenges. While some states are making an effort to make siting easier, constituents are still upset by the community and the land impacts. In areas where municipalities lead projects, states can threaten their longevity and scope. Solar siting authority can differ within one state from other energy siting authorities. Causes could be due to wind generation facilities being more established than solar generation facilities in the past in the country. When creating PV projects, numerous stakeholder opinions and policies must be taken into account, which exemplifies one thing: literature around solar siting is not nuanced enough and there is not enough data outlining the impact siting has on solar projects. In an effort to understand what this looks like across the nation, more localized and state-specific research needs to be done to answer the questions about siting, how it differs from wind siting authorities by state, and how viable the projects are in communities.

Appendix

Table 1: Keywords and Phrases Related to Solar Siting used in Scopus for the Literature Review

- Siting authority/governance model (local government controlling siting vs state regulators or dual)
    - Exclusive or split control/jurisdiction
    - Need for clear responsibility/control, as well as "rules, standards and procedures"
- Land-use planning, regulation (State land use commission, U.S. Bureau of Land Management)
- Zoning and local ordinances
- Utility siting board
- Public utility commission/ public service commission
- Siting legislation
- Permitting
- Promoting local interests
- Construction, operation, decommissioning; development
- "Certificate of need"
- Transmission siting that may impact generation facility siting
- Environmental impact review requirements
- State-defined constraints on local government actions (eg Nevada's laws preventing ordinances that unreasonably restrict end user systems or California not letting local ordinances be any more restrictive than conditions specified in law)
- Distribution capacity to siting sites
- Co-location benefits of solar siting
- Constraints due to water rights
- Public versus private land use
- Setback or other requirements based on projects over/under a certain size threshold
- Types of solar: rooftop PV, community solar, ground-mounted, solar carports, utility-scale, etc.
- Land types: urban, rural, agricultural, conservation
- Federal Energy Regulatory Commission (FERC)

Figure 1: VOSviewer results of the title and abstracts for the 28 article in the literature review



Glossary								
	Solar				Wind			
					Based on NCSL's State Approaches to Wind Facility Siting (Kahn & Shields, 2020)			
State	**Published Solar Siting Guidelines (Y/N)**	**Authority (State, Local, Hybrid, Dual, Unclear)**	**Solar Approach**	**Scale Rules & Notes**	**Authority (State, Local, Hybrid, Dual, Unclear)**	**Wind Approach**	**Scale Rules & Notes**	**Citations**
ALABAMA	N	Unclear	Little transparency in resource planning and solar development, which is allowed by the state Public Service Commission.	N/A. Solar not promising based on noncommittal Intergrated Resource Plans like that of Alabama Power.	Local/Unclear	There is no statuatory authority for statewide wind energy siting. Four counties have beeen given explicit wind siting authority by the state.	N/A	(Schlissel, 2015; Spector, 2016)
ALASKA	N	State	3 utility scale solar PV projects in place to-date coordinated by Alaska Energy Authority (AEA), but little state guidance from the Regulatory Commission of Alaska. May be subject to local ordinances.	N/A	State	Developers must posses a Certificate of Conveniencee and Necessity from the Regulatory Commission of Alaska to operatee as a utility.	N/A	(Center For Economic Development, 2018; Regulatory and Permitting Information Desktop Toolkit, 2018)
ARIZONA	Y	Hybrid	Arizona Corporation Commission via the Arizona Power Plant and Transmission Line Siting Committee have authority. In addition to the commission, local zoning and the "Arizona State Land Department, the Bureau of Land Management, Arizona Department of Water Resources, the Arizona Department of Environmental Quality" may need to approve depending on the site.	Power plants over 100 MW and transmission lines over 115kV are subject to state Power Plant and Transmission Line Siting Law.	Hybrid	Same as solar.	Utilities over 100 MW must obtain a Ceretificate of Environmental Compatibility from the Arizona Power Plant and Transmission Line Siting Committee.	(Campbell, 2009)
ARKANSAS	Y	Hybrid	Arkansas Public Service Commission must grant a Certificate of Environmental Compatibility and Public Need for major (greater than or equal 50 MW) generating facilities and/or a Certificate of Public Convenience and Necessity depending on project scale for most larger (utility-scale) projects.	Different certificates are needed depending on scale (environmental compatibility certification only needed for plants greater than or equal to 50 MW). Small or municipal projects are exempt from the public service commission's oversight but are still subject to any local laws.	Hybrid	Same as solar.	N/A	(AR Code § 23-3-201, 2017; Regulatory and Permitting Information Desktop Toolkit, 2020)
CALIFORNIA	Y	Hybrid	Siting authority must be approved by the California Public Utilities Committions (CPUC) for power plants greater than 50 MW. The California Energy Comission does have a "Siting, Transmission, and Environmental Protection Division" team to oversee projects and conduct environmental assessments.	Applies to plants at or over 50 MW. Plants smaller than 50 MW (less relevant in this report) subject to local oversight.	Local	Land use decisions, exceept solar siting, are left to local governments but the California Environmental Quality Act requires local governments to analyze environmental impacts.	N/A	(California Energy Commission, 2019; Kahn & Shields, 2020)
COLORADO	Y	Dual	Project construction and installation must comply with local government policies. State agencies may be called upon by the local government during the siting application review period, and the Public Utilities Comission must approve new construction.	N/A	Dual	Same as solar.	N/A	(CO Rev. Stat. § 29-20-108, 2016; CO Rev. Stat. § 40-5-101, 2019; Kahn & Shields, 2020; US Departmnet of Energy, 2020)

Glossary								
	Solar				Wind			
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State	**Published Solar Siting Guidelines (Y/N)**	**Authority (State, Local, Hybrid, Dual, Unclear)**	**Solar Approach**	**Scale Rules & Notes**	**Authority (State, Local, Hybrid, Dual, Unclear)**	**Wind Approach**	**Scale Rules & Notes**	**Citations**
CONNECTICUT	Y	State	Connecticut Siting Council approves siting applications and publishes insight and best practices related to all electricity siting, and rules on petitions for solar siting projects.	N/A	State	Setback requirements through the Connecticut Siting Council impact statewide siting regulations. Siting requirements are determined by visual, noise, natural resource, height, and other impacts.	Developers seeking to construct a wind turbine 65 MW or greater are required to apply for a Certificate of Environmental Compatibility and Public Need with the Siting Council.	("Connecticut Siting Council," 2020)
DELAWARE	N	Dual	Land use and siting authority is left up to local goverments, and subject to state regulation and approval by the Energy Facilities Siting Liason Committee.	N/A	Local	State law gives authority to local governments to control siting.	When making siting decisions, local governments must not prohibit landowners from using wind systems on residential properties or establish setback requirements more restrictive than 1.0 times the turbine height.	(The Governor's Energy Advisory Council, 2009)
FLORIDA	Y	Hybrid	The Florida Department of Environmental Protection's Siting Coordination Office coordinates certificates for siting power plants greater than or equal to 75 MW. Their certifications supercede local permits, but local goverments can make siting decisions for some generation projects.	Florida Electrical Power Plant Siting Act applies to 75 MW plants and above.	Hybrid	Same as solar.	N/A	(Florida Department of Environmental Protection, 2020a, 2020b; Kahn & Shields, 2020)
GEORGIA	N	Local/Unclear	There is no designated authority for generation sites or transmission siting. Local zoning rules apply.	N/A	Local/Unclear	Same as solar.	N/A	(GA Code § 36-66-2, 2010; Regulatory and Permitting Information Desktop Toolkit, 2018b)
HAWAII	Y	Hybrid	The Renewable Energy Facility Siting Process (REFSP) is an optional, streamlined approach to the siting process. Siting goes through the Hawaii Department of Business, Economic Development, and Tourism regardless of whether solar developers go through the REFSP process.	Plants greater than or equal to 5 MW are eligible for the voluntary Renewable Energy Facility Siting Process which solar facilities greater than or equal to 200 MW are automatically entered into.	Local	Local zoning laws govern wind siting unless facilities trigger state's environmental impact laws.	N/A	(Regulatory and Permitting Information Desktop Toolkit, 2018c)
IDAHO	N	Local/Unclear	There is no designated authority for generation sites or transmission siting. Local authority applies to siting, and is subject to state-level environmental regulations.	N/A	Local/Unclear	Same as solar.	N/A	(Olson, 2006)
ILLINOIS	N	Local	There is no designated state-level authority but state law gives authority to local governments (both counties and municipalities) to control siting.	N/A	Local	Same as solar; state law grants wind siting authority to municipalities or counties for areas outside of municipal zoning.	Additional requirement that bans local governments from requiring wind setbacks greater than 1.1 times system height.	(65 ILCS 5/ Illinois Municipal Code., n.d.; HB2862 , 2019)
INDIANA	N	Local	There is no designated authority for generation sites or transmission siting. Local authority applies to siting.	N/A	Local	Same as solar.	N/A	(Environmental Resilience Institute, 2020)

Glossary								
	Solar				Wind			
					Based on NCSL's State Approaches to Wind Facility Siting (Kahn & Shields, 2020)			
State	**Published Solar Siting Guidelines (Y/N)**	**Authority (State, Local, Hybrid, Dual, Unclear)**	**Solar Approach**	**Scale Rules & Notes**	**Authority (State, Local, Hybrid, Dual, Unclear)**	**Wind Approach**	**Scale Rules & Notes**	**Citations**
IOWA	Y	Hybrid	All utility-scale solar is at the local (county) level and is influenced by local targets. Iowa Local Government Solar Toolkit exists to guide solar development.	Over 25 MW need generating certificate from Iowa Utilites Board, still need local approval.	Hybrid	Wind facilites must apply for a generating certificate prior to construction of significant alteration. County and local governments and state and federal agencies may have additional requirements.	Same as solar.	(Greene, Ross, & Wyatt, 2020)
KANSAS	N	State	Cities and counties are able to enact zoning regulations that govern siting, according to Articles 7 & 8 of Chapter 12 - Cities and Municipalities, Kansas statutes. The Kansas Corportation Commission must issue a siting permit for all utilites.	N/A	State	Same as solar.	N/A	(12-748, 2015; Kansas Office of Revisor of Statutes, 2017; Kansas Legislative Research Department, 2017)
KENTUCKY	Y	Hybrid	Kentucky State Board on Electric Generation and Transmission Siting (the Siting Board) reviews applications for generating facilities that plan to generate at least 10 MW of electricity.	Siting Board approval is required for merchant plants with a generating capacity of 10 MW or more and for non-regulated transmission lines capable of carrying 69,000 volts or more.	Hybrid	Same as solar.	Same as solar. Also, setback requirement of at least 1000 feet (from property boundary) and 2000 feet from residential areas for any facilities with exhaust stacks or wind turbines.	(Kentucky Public Service Commission, 2020; Kentucky State Board on Electric Generation and Transmission Siting, n.d.)
LOUISIANA	N	State/Unclear	Siting authority is not well publicized but the Louisiana Public Service Commission has authority over generation and transmission.	N/A	Unclear	Same as solar.	N/A	(Southwest Power Pool, n.d.)
MAINE	N	State	Maine Department of Environmental Protection controls land development. The state has set goals of encoraging solar energy development and proper siting.	N/A	Hybrid	Same as solar.	Department of Environmental Protection has authority for wind projects that are at least 100 kW. They are required to address community benefits and impacts like viewshed, flicker and noise, and consider manufacturer recommendations for setbacks.	(Maine Department of Environmental Protection, 2019; Title 35-A, §3474, 2019)
MARYLAND	Y	State	Maryland Deparment of Planning manages a Solar Facility Siting Guidance webpage to implement the Governor's Task Force on Renewable Energy Development and Siting recommendations. The Task Force studies ways to accelerate renewable energy development and propose ways to improve the development/siting process which is the responsibility of the Public Service Comission. The commision is expected to consider local regulations when authorizing siting.	Solar greater than 2 MW is still subject to local zoning policies but only the Maryland Public Service Commission (PSC), not local government applying local land use and zoning ordinances, has the authority to approve generation facilities.	State	Same as solar.	Wind projects above 70 MW require a certificate of public necessity. Commission is required to consider local zoning.	(Maryland Department of Planning, n.d.; Maryland State Archives, 2020; MD Code, Pub. Util. § 7-207.2, 2020)

Glossary								
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					Based on NCSL's State Approaches to Wind Facility Siting (Kahn & Shields, 2020)			
State	**Published Solar Siting Guidelines (Y/N)**	**Authority (State, Local, Hybrid, Dual, Unclear)**	**Solar Approach**	**Scale Rules & Notes**	**Authority (State, Local, Hybrid, Dual, Unclear)**	**Wind Approach**	**Scale Rules & Notes**	**Citations**
MASSACHUSETTS	Y	Hybrid	Energy Facilities Siting Board has authority for projects greater than 100 MW, otherwise local government has control. Massachusetts Department of Energy Resources (DOER) developed a model solar zoning bylaw for municipalities and solar zoning guidance.	N/A	Hybrid	Same as solar.	State authority for projects greater than 100 MW.	(Department of Energy Resources Massachusetts | Executive Office of Energy and Environmental Affairs, 2014; UMass Center for Agriculture, 2020)
MICHIGAN	Y	Local	Michigan Energy Office put out a document with resources on Solar Zoning and Permitting, but it does not include formal guidance. "In Michigan, land use and siting permits for solar energy systems are granted by local governments, including cities, counties, and townships." Township can choose to regulate, or county can impose land use rules - and if no authority is established then land use permits are not required.	N/A	Local	Local units of government regulate both the development and the use of land, in accordance to the locality's zoning ordinances.	N/A	(Greene & Wyatt, 2020; Michigan Energy Office & Michigan Economic Development Corporation, 2020)
MINNESOTA	Y	Hybrid	Minnesota Public Utility Commission is in charge of siting large (greater than or qual to 50 MW) electric power facilities, except solar or wind facilitities owned by an independent power producer selling the electricity outside Minnesota.	Comission determines siting for facilities greater than or equal to 50 MW but local siting applies to smaller generation facilities.	Hybrid	Minnesota Public Utility Commission has authority over some projects and counties control the small projects. If counties develop stricter siting rules than those set by the state then the county's rules must be considered by the Commission.	Minnesota Public Utility Commission has authority for wind projects over 5 MW. Under some circumstances counties can take control for projects as large as 25 MW.	(Sec. 216B.243 MN Statutes, 2019; Sec. 216E. 01 MN Statutes, 2019; Sec. 216E. 02 MN Statutes, 2019)
MISSISSIPPI	N	Local	Land use and siting authority belongs to local goverments.	N/A	Local	Same as solar.	N/A	(Casetext, n.d.; Southwest Power Pool, n.d.)
MISSOURI	N	Local	Land use and siting authority belongs to local goverments.	N/A	Local	Same as solar.	N/A	("Revised Statutes of Missouri, RSMo Chapter 89," 2013)
MONTANA	N	Local/Unclear	There is no designated authority for transmission siting. Local authority applies to siting.	N/A	Local/Unclear	Same as solar.	N/A	("CHAPTER 8. ELECTRIC UTILITY INDUSTRY GENERATION REINTEGRATION - Title 69, MCA," 2019; "Solar Energy in Montana," 2020)
NEBRASKA	N	Dual	Siting is regulated by local governments and certification is needed from the Nebraska Power Review Board before siting new generation facilities.	N/A	Dual	Same as solar.	Projects less than 10 MW are considered special generation projects and must be approved by the board if they meet certain requirements.	(Kahn & Shields, 2020; "Statutes | Nebraska Power Review Board," 2020)

Glossary								
	Solar				Wind			
					Based on NCSL's State Approaches to Wind Facility Siting (Kahn & Shields, 2020)			
State	**Published Solar Siting Guidelines (Y/N)**	**Authority (State, Local, Hybrid, Dual, Unclear)**	**Solar Approach**	**Scale Rules & Notes**	**Authority (State, Local, Hybrid, Dual, Unclear)**	**Wind Approach**	**Scale Rules & Notes**	**Citations**
NEVADA	N	Hybrid	The Public Utilities Commission of Nevada approves projects. Local governments are required to enact zoning that is facilitative of renewable energy.	PUCN approves the construction of renewable energy projects with an output greater than 70 megawatts, even if the energy is to be exported out of state, and transmission for renewable energy greater than 200 kilovolts.	Hybrid	Same as solar.	Same as solar.	(Kahn & Shields, 2020; State of Nevada Public Utilities Commission, 2019)
NEW HAMPSHIRE	N	Hybrid	New Hampshire Site Evaluation Committee evaluates certificates for (renewable) energy facilities and monitors approved energy facilities.	30 MW or greater are considered energy facilities over which the comittee has control automatically whereas projects between 5-30 MW can opt-in. Siting of smaller plants is not covered by this process but may be subject to local policy.	Hybrid	Same as solar.	Same as solar.	("New Hampshire Statutes - CHAPTER 162-H: ENERGY FACILITY EVALUATION, SITING, CONSTRUCTION AND OPERATION," 2016)
NEW JERSEY	Y	State	New Jersey Department of Environmental Protection's Office of Permit Coordination and Environmental Review facilitates permitting. They have also released Solar Siting Analyses to inform site assessments.	A "renewable energy facility on a parcel or parcels of land comprising 20 or more contiguous acres that are owned by the same person or entity shall be a permitted use within every industrial district of a municipality." Further, "notwithstanding any law, ordinance, rule or regulation to the contrary, a solar or photovoltaic energy facility or structure constructed and operated on the site of any landfill or closed resource extraction operation, shall be a permitted use within every municipality."	State	Just like solar, wind is considered a beneficial use of land and the same approach applies. In addition, local zoning authorities cannot set wind setbacks larger than 1.5 times system height.	Like with solar, New Jersey has permits that outline various wind turbine construction projects at different scales subject to various considerations.	(Baldauf et al., 2017; DeGrezia, 2010; New Jersey Administrative Code, 2020; New Jersey Department of Environmental Protection, 2020; NJ Stat. § 40: 55D-38.1, 2009; NJ Stat. § 40: 55D-66.11, 2009; NJ Stat. § 40: 55D-66.16, 2009)
NEW MEXICO	N	Hybrid	Land use and siting authority belongs to local goverments except for large (over 300 MW) generating projects which need approval from the New Mexico Public Regulation Commission.	Local authority for projects under 300 MW.	Hybrid	Same as solar.	Same as solar.	(NM Stat. § 62-9-3, 2011)

Glossary								
	Solar				Wind			
					Based on NCSL's State Approaches to Wind Facility Siting (Kahn & Shields, 2020)			
State	**Published Solar Siting Guidelines (Y/N)**	**Authority (State, Local, Hybrid, Dual, Unclear)**	**Solar Approach**	**Scale Rules & Notes**	**Authority (State, Local, Hybrid, Dual, Unclear)**	**Wind Approach**	**Scale Rules & Notes**	**Citations**
NEW YORK	Y/ Under Development	Hybrid	The New York Department of State houses the Office of Renewable Energy Siting (Siting Office) as of April 2020. Until this point, siting was governed by New York's Siting Board under Article 10. The intent of the office is to streamline the siting process (certificates are needed for large projects). Local land use laws also apply and local consults are encouraged.	Projects greater than 25 MW require certification and those between 20-25 can opt-in.	Hybrid	The Board of Electric Generation Siting and the Environment has siting jurisdiction for projects greater than 25 MW. Local governments govern wind project development, land use, wind power provisions in municipal codes.	Projects greater than 25 MW require certification.	(Kahn & Shields, 2020; "New York State Announces Passage of Accelerated Renewable Energy Growth and Community Benefit Act as Part of 2020-2021 Enacted State Budget - NYSERDA," 2020)
NORTH CAROLINA	N	Local	Solar siting authority is left up to local goverments and is subject to zoning codes. Though the state has explored moving the authority for solar siting to the state level (wind is already at state-level) but nothing appears to have come to fruition yet.	N/A	State	Facilities with greater than 1 MW capacity must obtain a permit from the Department of Environment and Natural Resources. The department will hold a public hearing within 75 days of receiving the permit application in each impacted county. Different rules apply for projects sited near military facilities.	1 MW or greater needs permit from Department of Environment and Natural Resources	(Foley & Lardner LLP, 2016; Kahn & Shields, 2020; NC Gen Stat Chapter 143 - Article 21C, 2015)
NORTH DAKOTA	N	Hybrid	North Dakota Public Service Commission has siting authority over solar generating facilities that exceed 50 MW per the Energy Conversion and Transmission Facility Siting Act.	North Dakota Public Service Commission controls siting for non-wind energy facilities over 50 MW. For smaller projects local ordinances may still apply.	Hybrid	North Dakota Public Service Commission has siting authority for facilities producing over 0.5 MW.	Projects must comply with local regulations for zoning and land use.	(Chapter 49-22 - Energy Conversion and Transmission Facility Siting Act, 2017 Kahn & Shields, 2020)
OHIO	N	Hybrid	Ohio Power Siting Board has siting authority over major utility facilities (at least 50 MW), but local authority applies to smaller solar projects and non-major facilites are still beholden to state and local regulations.	Greater than or equal to 50 MW solar facilities are sitied pending approval at the state level.	Hybrid	Same as solar.	Wind projects greater than 50 MW are designated "major utility facilities" and subject to siting board authority. Projects smaller than 20 MW are subject to local requirements.	(Chapter 4906: POWER SITING, 2004; Kahn & Shields, 2020)
OKLAHOMA	N	Local/ Unclear	Little is publicized about energy siting for solar. Appears municipalities have jurisdiction.	N/A	Local/Unclear	Need to submit Notice of Intent to Corporate Comission and a copy to local goverment.	State government decides setback rules from hospitals, schools, and airports. Local government must provide a public hearing prior to construction.	(Ferrey, 2017; Kahn & Shields, 2020)

Glossary								
	Solar				Wind			
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State	**Published Solar Siting Guidelines (Y/N)**	**Authority (State, Local, Hybrid, Dual, Unclear)**	**Solar Approach**	**Scale Rules & Notes**	**Authority (State, Local, Hybrid, Dual, Unclear)**	**Wind Approach**	**Scale Rules & Notes**	**Citations**
OREGON	Y	State	Certificate needed from the state's Energy Facility Siting Council before construction. Non-qualifying solar facitilties are still subject to local goverment approval.	Applies to solar PV facilities that require more than 160 acres of high-value farmland or 1,280 acres "located on land that is predominantly cultivated or that, if not cultivated, is predominantly composed of soils that are in capability classes I to IV, as specified by the National Cooperative Soil Survey operated by the Natural Resources Conservation Service of the United States Department of Agriculture; or 1,920 acres (three square miles) located on any other land."	Hybrid	The Energy Siting Facility Council of Oregon has siting authority for wind projects greater than 50 MW. Siting for facilites less than 50 MW is regulated by local governments or project developers can elect to use the state siting approval process.	Project developers must obtain a site certificate prior to construction.	(Kahn & Shields, 2020; “State of Oregon: Facilities - Council Jurisdiction,” n. d.)
PENNSYLVANIA	N	Local	Land use and siting authority belongs to local goverments.	N/A	Local	Same as solar.	N/A	(53 PaCS - Municipalities Generally, n.d.; Kahn & Shields, 2020)
RHODE ISLAND	Y	Hybrid	The State's Energy Facility Siting Board has siting authority on energy facilities generating at least 40 MW. Below that, local land use policies still apply. Rhode Island Department of Administration's Office of Energy Resources (OER) and Division of Statewide Planning created solar siting information materials to guide municipalities on solar siting.	State siting board has authority over projects that are ≥ 40 MW.	Hybrid	The Energy Siting Facility Board of Rhode Island licesnses wind generation facilities greater than 40 MW. Local governments regulate siting of smaller facilities.	N/A	(Kahn & Shields, 2020; McCarthy, 2002; Office of Energy Resources, 2020)
SOUTH CAROLINA	N	Hybrid	Public Service Commission controls siting for energy facilities generating 75 or more MW. Local siting authority for smaller projects.	Public Service Commission has authority over projects that are greater than or equal to 75 MW.	Hybrid	Same as solar.	N/A	(Kahn & Shields, 2020; Title 58 - Chapter 33 - Utility Facility Siting And Environmental Protection, n.d.)
SOUTH DAKOTA	Y	Hybrid	South Dakota Public Utility Commission must grant a permit for a solar facility of 100 MW or more. Local governments govern siting for smaller facilities.	Public utility comission has authority over projects that are greater than or equal to100 MW.	Hybrid	Same as solar.	Any construction of wind projects greater than 5 MW must give notice to South Dakota's Public Utility Commission for the facility's size, local, and interconnection. For projects greater than 100 MW, construction cannot begin until a permit is obtained from the Public Utility Commission.	(Kahn & Shields, 2020; SDLRC - Codified Law 49-41B-2, 2019; SDLRC - Codified Law 49-41B-25, 2019)

Glossary								
	Solar				Wind			
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State	**Published Solar Siting Guidelines (Y/N)**	**Authority (State, Local, Hybrid, Dual, Unclear)**	**Solar Approach**	**Scale Rules & Notes**	**Authority (State, Local, Hybrid, Dual, Unclear)**	**Wind Approach**	**Scale Rules & Notes**	**Citations**
TENNESSEE	N	Local/Unclear	Little is publicized about siting for solar. It appears local laws tied to construction and zoning dictate siting.	N/A	Hybrid	Projects that are greater than 1 MW or taller than 200 feet must obtain a Certification of Public Convenience and Necessity from the Public Utility Commission and obtain local approval.	Local governments set local rules to regulate the construction of wind siting facilities.	(Kahn & Shields, 2020; "Tennessee Solar | SEIA," 2020)
TEXAS	Y	Local	There is no established state authority. Ordinance Framework for Solar Photovoltaic Installations in Texas was created to guide municipalities on solar siting in which local and state regulations apply.	N/A	Local	All siting and zoning is determined by local governments.	N/A	(Kahn & Shields, 2020; North Central Texas Council of Governments & State Energy Conservation Office, 2016; Stoel Rives LLP, 2017)
UTAH	N	Local/Unclear	Little is publicized about siting for solar. It appears that municipalities have jurisdiction.	N/A	Local	All siting and zoning is determined by local governments.	N/A	(Ferrey, 2017; Kahn & Shields, 2020)
VERMONT	Y/Under Development	State	Vermont Public Utility Commission must grant a Section 248 permit to allow solar facility development. Vermont has a Solar Siting Task Force to evaluate solar siting in the state and make proposals.	N/A	State	Project developers must obtain a Certificate of Public Good from Vermont's Public Service Board to initiate site preperation for the facility. State law establishes the requirements for how municipalities regulate heights of renewable energy projects. Local governments are provided notice for nearby potential projects and project developers are required to submit a local impact assessment.	The Certificate of Public Good from the Vermint Public Service Board does not apply if the energy produced by the generation facility is for on-site use.	(Kahn & Shields, 2020; MSK Attorneys, 2019; State of Vermont, 2020)
VIRGINIA	N	Local	Local siting authority is granted by the state. Localities are constrained by state siting legislation and municipalities are required to negotiate with solar developers interested in developing more than 5 MW on "opportunity zones" and other areas designated as economically disadvantaged.	Over 5 MW	Dual	State law sets rules for local ordinances that regulate siting of renewable energy. Project developers must obtain a Certificate of Public Convenience and Necessity from the Virginia State Corporation Commission prior to starting to develop a project.	N/A	(Code of Virginia Code - Chapter 22. Planning, Subdivision of Land and Zoning, 2010; Kahn & Shields, 2020)
WASHINGTON	N	Hybrid	Large solar facilities or those that opt-in are under the authority of the State's Energy Facility Site Evaluation Council, while smaller projects and those that did not engage in the Council's review process are subject to local siting governance.	State siting council has authority over projects that are over 350 MW.	Hybrid	Same as solar.	N/A	(Chapter 80.50 RCW: ENERGY FACILITIES—SITE LOCATIONS, 2018; Kahn & Shields, 2020)
WEST VIRGINIA	N	State	Generation is controlled by the West Virginia Public Service Commission. The Commission must grant a certificate in order to site a project.	N/A	State	Same as solar.	Project developers must obtain a siting certificate from the commission before initiating construction.	(Kahn & Shields, 2020; WV Code § 24-2-11, 2016)

Glossary								
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					Based on NCSL's State Approaches to Wind Facility Siting (Kahn & Shields, 2020)			
State	**Published Solar Siting Guidelines (Y/N)**	**Authority (State, Local, Hybrid, Dual, Unclear)**	**Solar Approach**	**Scale Rules & Notes**	**Authority (State, Local, Hybrid, Dual, Unclear)**	**Wind Approach**	**Scale Rules & Notes**	**Citations**
WISCONSIN	N	State	Wisconsin Public Service Commission must authorize generation.	Certain cost thresholds apply.	Hybrid	For wind generating facilities greater than 100 MW, the Wisconsin Public Service Commission has exclusive siting authority. Local govermnets, as established by state policy, are able to establish wind siting ordinances for projects smaller than 100 MW. These local wind ordinances must not be more restrictive than the commission's requirements.	N/A	(Chapter PSC 112, 2016; Kahn & Shields, 2020)
WYOMING	N	Local	Local siting authorityis granted by the state and application is given to the board of county commissioners. The guidelines for permitting are outlined by state legislation, where zoning and setback requirements are specified.	Over 0.5 MW are subject to the state legislation that outlines local siting authority.	Hybrid	For projects greater than 0.5 MW, project developers need local approval prior to construction according to state law. Large wind facilites, i.e. greater than 20 turbines, must obtain a permit from the state Industrial Siting Council.	N/A	(Kahn & Shields, 2020; Wyoming Statutes | Article 5 - WIND AND SOLAR ENERGY FACILITIES, 2013; Wyo. Stat. § 18-5-503, 2020)

Note that consumer-owned utilities are not subject to the oversight of public service commissions in every state.

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