Community Perspectives in the Renewable Energy Transition: Utility-Scale Solar in Virginia.

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RESEARCH PROBLEM

The Commonwealth of Virginia produces less than half of the energy it consumes, importing over 50 million MWh annually from neighboring states through the regional transmission organization's (RTO) transmission grid. This amount accounts for 36 percent of the state's total electricity use, driven largely by Northern Virginia's rapidly expanding data center load (Harnish, 2024). Additionally, the state introduced the Virginia Clean Economy Act (VCEA) in 2020, requiring all power providers to source one hundred percent renewable energy by 2050 (VCEA, 2020). To meet rising demands, renewable energy goals, and energy production deficits, developers and power providers have turned to utility-scale solar. From 2015 to 2025 in Virginia, approved or by-right solar projects grew from 8 in 2015 to a peak of 55 in 2022 (University of Virginia, 2025). Furthermore, photovoltaic costs have fallen by more than 75 percent since 2010, making solar one of the most feasible near-term options to meet the state's growing energy demand (LAZARD, 2025). Solar is the most cost-effective and rapidly deployable option for developers and utilities to meet the state's growing demand (Utility Developer Interview, personal communication, 2025).

However, Virginia's rapid expansion of utility-scale solar in response to energy demand, policy mandates, and declining costs are highly concentrated in rural and agricultural regions (Reinsel, 2025). As deployment accelerates, concerns about land use, community involvement, rural landscapes, and political decision-making have become critical components for how these projects are implemented.

The site selection for utility-scale solar typically prioritizes technical and economic criteria, including proximity to transmission infrastructure, minimal topographic variation, and access to large tracts of undeveloped land. In practice, these criteria frequently align with rural and agricultural land uses. Empirical evidence from New York State illustrates this pattern, with approximately 40 percent of existing utility-scale solar capacity located on agricultural land and 84 percent of land identified as suitable for future development classified as agricultural (Katkar et al., 2021).

While these criteria maximize technical and economic feasibility, they also concentrate development in rural and agricultural communities where local land-use priorities and community concerns may conflict with statewide renewable energy goals. Recent research suggests that this technically driven approach is not socially or politically neutral (Susskind et al., 2022). A national review of utility-scale wind, solar, and geothermal projects found that nearly half of proposed developments were canceled and more than one-third experienced significant delays due to local opposition rather than technical infeasibility. These conflicts most often arise from concerns

related to land value, environmental impacts, and limited opportunities for public input. As a result, site selection processes that rely primarily on physical suitability can create tension between statewide energy goals and local land-use priorities, complicating project delivery and extending implementation timelines.

Virginia reflects these broader trends, particularly in rural counties where multiple projects have faced organized opposition. In Charlotte County, a community known for its rural character, residents have raised concerns about the conversion of farmland, impacts on neighboring property values, and changes to landscapes and viewsheds (The Charlotte Gazette, 2021). Despite sustained opposition, the Board of Supervisors has continued to approve utility-scale solar projects (McLaughlin, 2024).

Furthermore, Virginia explicitly grants localities the authority to make their own land-use decisions per Virginia Code § 15.2-2280 (Virginia Legislative Information System, LIS, 2026). These powers allow counties to establish zoning ordinances that regulate how land and buildings may be used. Most Virginia localities classify utility-scale solar developments as special uses within their zoning ordinances, requiring projects to obtain Special Use Permits (SUPs) or Conditional Use Permits (CUPs). These proposals are reviewed by local officials and the county board of supervisors and undergo a public hearing process before ultimately relying on approval from the county board of supervisors. These approval meetings serve as key points of interaction where community members, developers, and county officials intersect throughout the decision-making process.

These cases suggest that opposition to utility-scale solar in rural Virginia is not solely related to renewable energy development itself, but also to how siting decisions are made, communicated, influenced, and governed. Institutional sequencing in this context refers to the ordered process through which projects move from local zoning review to public hearings and final approval by county boards of supervisors. These governance structures involve interactions between state-level renewable energy policy, county-level zoning authority, developers, and local communities. While the VCEA emphasizes the rapid expansion of renewable energy, many rural residents and stakeholder groups perceive these projects as creating land-use changes, inequities, and limited opportunities for meaningful political and economic influence. This study therefore aims to analyze how governance structures, procedural sequencing, and information asymmetries shape perceptions of procedural fairness among stakeholders involved in utility-scale solar development in Virginia. Grounded in participatory governance literature, the study focuses on how institutional approval processes and public participation shape stakeholder perceptions of influence, transparency, and fairness during local siting decisions (Arnstein, 1969; Heyik et al., 2024).

METHODS

Data Collection & Analysis

This study is on-going and currently conducting structured interviews with underrepresented stakeholders until theoretical saturation is met (S.Lewis-Beck et al., 2004). These

interviews include county residents and local opposition organization representatives who possess limited decision-making authority and receive minimal economic benefit from utility-scale solar development. Interview participants were identified through online research of opposition groups and participation in local county public hearings to capture perspectives from individuals directly involved in the approval process. Organizational leaders and designated media representatives were interviewed to provide stakeholder perspectives and broader insight into the concerns of the communities they represented. Interview transcripts are being coded and analyzed, using an inductive approach. The preliminary findings highlight two perspectives that have been transcribed and coded. One interviewee is a rural resident opposing utility-scale solar development on agricultural land in their county, and the other is a state-level policy advocate involved in efforts to repeal the Virginia Clean Economy Act (VCEA). Interviews with distinct stakeholder perspectives are also being supplemented by a collection of Virginia citizen emails sent to opposition groups discussing utility-scale solar developments. Together, these materials provide new insight into the current underrepresented perspectives within Virginia's renewable-energy transition.

KEY FINDINGS

Preliminary findings from interviews indicate that opposition to utility-scale solar development in rural Virginia is less about resistance to renewable energy and more about perceived inequities in the project approval processes, institutional power and access, and land-use and environmental impacts.

Project Approval Process

The rural Virginia resident interviewee and citizen emails indicate that the project approval process frequently lacks transparency and timely information for community members. In the interview, the interviewee described becoming involved in opposition to utility-scale solar after learning of a proposed 1,800-acre project adjacent to their farmed property. The interviewee highlighted that there was no notice of this project until it was formally proposed by entering the local approval process. The project proposal also revealed that earlier approvals had occurred in 2018, including a separate 1,000-acre project located within five miles of the interviewee's property. The interviewee was not aware of these approved projects and was shocked given the close proximity to their property. This resident felt "caught off-guard" and slighted by developers coordinating with county officials before project applications become public. The interviewee felt there was little to no opportunity for community members to review project materials, organize collectively, or meaningfully participate before key decisions were made. Emphasizing that they felt this experience was not isolated, noting they had received similar messages from residents across the state. With community members often learning of projects only days before hearings asking, "There's a hearing in a week… what do we do?"

Institutional Power and Access

The findings presented here represent participant perceptions of institutional power and decision-making processes, rather than empirically verified evaluations of policy outcomes or technical performance.

One interviewee involved with repealing the VCEA described energy policy decision making as highly centralized and politically driven. From this perspective, renewable energy mandates were perceived as prioritizing legislative objectives over technical consideration related to affordability, reliability, and system planning, particularly as electricity demand is expected to increase. The participant expressed skepticism toward the legitimacy of current governance structures and described decision making authority as concentrated among state legislators and large utilities, rather than technical regulators or local stakeholders. Alternative energy pathways, such as nuclear and natural gas, were viewed by the participant as more dependable options within this framework.

This perspective reflects a broader perception that technical expertise and regulatory oversight have limited influence over renewable energy planning compared to political mandates. The participant emphasized that institutions such as the State Corporation Commission were viewed as having constrained authority within the current political environment, contributing to a sense that energy decisions are made with limited transparency and limited access for both technical regulators and affected communities.

Perceptions of institutional power imbalance were also evident at the local level. The rural resident interview and citizen emails highlighted disparities in access to legal, technical, and financial resources between developers and community members. The interviewee explained that even when communities are given a reasonable amount of time to respond, residents struggle to compete with developers who have access to "endless resources for attorneys and consultants." These perceived asymmetries contributed to a belief that local input carries limited influence within the approval process, reinforcing concerns about fairness and exclusion in utility-scale solar development.

Land-Use and Environmental Impacts

The rural resident emphasized that community concerns surrounding utility-scale solar also include threats to rural character and land use. The interviewee explained that projects spanning thousands of acres would "fundamentally change the character of our community," noting that Virginia's rolling terrain makes it difficult to mitigate viewshed impacts associated with large arrays and industrial fencing. As the interviewee stated, "It's not a farm; it's a power plant." Similar concerns were mirrored in emails from residents across the Commonwealth, including Pittsylvania, Greensville, and Buckingham counties, where solar expansion was described as "destroying farmland" and perceived as "dividing communities." Collectively, these perspectives suggest that large-scale solar development is perceived as a threat to the cultural identity of rural Virginia.

In addition to land-use impacts, the interviewee expressed concern about environmental risks associated with large-scale solar construction. Drawing on examples from other projects

across the Commonwealth, the interviewee referenced cases such as Louisa County, where erosion and sediment control failures reportedly followed construction. As stated during the interview, “There’s a project in Louisa where the community is suing the developer and Dominion for $15 million because of stormwater erosion to a local lake.” Inadequate stormwater management and land disturbance from one project has become talking points for concerns about future projects and the justification of sustainability goals.

The interviewee stated that their opposition to utility-scale solar was not opposition to renewable energy itself, but to where and how projects are sited. Alternative locations such as rooftops, brownfields, and industrial zones were provided as possible alternatives by the interviewee. They did not understand why alternative options were not being pursued to not displace productive farmland or alter rural landscapes. The interviewee also emphasized that they use small-scale solar technology on their own farm to power electric fencing. Reiterating their support for solar when they believe it is deployed appropriately. This perspective reflects a broader desire among rural communities for an approach to clean energy development but with additional justification and more stringent evaluations when development is proposed for farmland rather than, in their opinion, more suitable sites like brownfields and rooftops.

IMPLICATIONS

These findings suggest that utility-scale renewable energy development is being interpreted by some rural communities as politically motivated, insufficiently transparent, and misaligned with local land-use priorities. Participants described large-scale solar as a potential threat to agricultural land, rural character, and community identity, and expressed concern that decisions are driven by state-level mandates rather than local context or technical deliberation. These perceptions shape how renewable energy projects are received, regardless of their stated sustainability goals or technical merits.

More broadly, the findings indicate that limited community involvement in approval processes may contribute to growing opposition and uneven impacts across rural regions. When residents feel excluded from decision-making or perceive that institutional power is concentrated among developers and policymakers, trust can erode, and resistance can intensify. These dynamics suggest that future renewable energy projects may face increased pushback and may disproportionately burden rural communities if procedural concerns and land-use impacts are not more fully addressed.

The goal of this study is to promote renewable energy development by identifying how governance structures and siting processes shape community responses to utility-scale solar projects. Expanding siting evaluations to include social and governance considerations, while increasing transparency and earlier community engagement, may improve trust, reduce conflict, and support more effective renewable energy deployment timelines in Virginia.

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