

POWER IN PARTNERSHIP

Insights for siting utility-scale renewables in Michigan



Executive Summary

In November 2023, the Michigan State Legislature passed several bills with the intention of accelerating the deployment of renewable energy to meet the 2020 MI Healthy Climate Plan targets. One key piece of this legislative package was Public Act 233 (PA 233), which established a state level siting and permitting pathway for utility-scale renewable projects. Previously, local jurisdictions managed land use approvals for solar, wind, and battery projects. With PA 233, developers may opt for state-level approval through the Michigan Public Service Commission (MPSC).

This change necessitates that MPSC, which has experience siting linear infrastructure such as transmission lines and gas pipelines, adapt to the unique social and environmental impacts of renewable technologies. With an effective date of November 29, 2024, the MPSC must develop an understanding of the novel considerations of renewables siting for efficient and effective policy implementation.

To assist in this transition, a team of graduate students in the University of Michigan's Master of Urban and Regional Planning program created this report synthesizing state- and local-level siting practices. This report also reviews best practices in community engagement and highlights key insights from interviews with various stakeholders and technical experts. The ultimate goal is to expedite MPSC's learning curve while ensuring that approved projects adhere to the best practices in design, safety, and community engagement. The report contains chapters ranging from comparison of state-level siting authorities to specific analysis of wind, solar, and battery storage projects, culminating in a comprehensive set of suggestions and takeaways for MPSC staff that map directly to PA 233 provisions. These findings are supported by academic literature, case studies, policy research, and interviews.

Acknowledgments

April 2024 | URP 603

The following report was created as part of a graduate capstone course at the University of Michigan Taubman College of Architecture and Urban Planning. The student team — all graduate candidates in the urban and regional planning program — prepared this report for their community partner, the Michigan Public Service Commission, in the Winter semester of 2024.

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Disclaimer:

Interviews conducted for this project were aggregations of several different sources and do not reflect the direct views of the individuals who worked on case study projects.

The opinions and suggestions laid out in the report are those of the researchers and though they were created with MPSC staff in mind as a client, do not represent the official views or confirmed future actions of the Michigan Public Service Commission or its staff. They are merely suggested avenues for further exploration.

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Introduction

In November of 2023, the Michigan State Legislature passed a series of bills with the goal of accelerating the deployment of renewable energy in Michigan to meet the targets laid out in the 2020 MI Healthy Climate Plan.¹ Among the package of bills was Public Act 233 (PA 233), which established a state-level siting and permitting pathway for utility-scale renewables.

Before PA 233 was passed, land use approvals for wind and solar projects of any size were approved by local jurisdictions, either at the municipal or county level. Renewable energy ordinances are unique to each locality, though neighboring jurisdictions often learn and borrow from each other. Developers of utility-scale projects can still go through the local process if they wish, but if a local government does not have a “compatible renewable energy ordinance” (CREO), they now have the option to comply with state-level requirements and have their project approved by the Michigan Public Service Commission (MPSC).

While the State of Michigan passed PA 233 to increase the deployment of utility-scale renewable energy, the legislation leaves many implementation and administrative decisions up to the MPSC. MPSC has experience siting transmission lines and natural gas pipelines, but renewable technologies have different social and environmental impacts compared to linear infrastructure and are governed by a novel regulatory framework. To be able to administer the state-level process by the intended November 29, 2024 start date, MPSC will need to become familiar with these differences and establish well-informed implementation practices.

This report, created by eight urban planning graduate students in the University of Michigan’s Urban and Regional Planning program, aims to support MPSC and its staff in the implementation of PA 233 as it applies to the siting authority of renewable energy and battery energy storage projects. The team created the report to achieve the following goals:

- 1. To increase MPSC staff’s understanding of lessons learned from other permitting authorities — effectively, to expedite the learning curve, and;**
- 2. To help ensure that projects sited under the MPSC process follow best practices with respect to project design and community engagement.**

To these ends, the team reviewed state-level siting and permitting processes for utility-scale renewables in other states; existing wind and solar siting and permitting practices where projects have successfully been sited at the local level in Michigan; and battery energy storage system siting practices in other states. The team also conducted research on community engagement best practices, which involved reviews of both broader urban planning literature as well as specific renewable energy scholarship. Other methods utilized throughout the report included interviews with state-level authorities, developers, and local officials; a review of technical reports and site plans; and a review of codes and ordinances. This research was conducted across different approving jurisdictions, states, and technology types. It is intended to provide MPSC with insight into best practices and lessons learned from a diverse array of practitioners in the utility-scale energy siting field, while emphasizing specific issues found in the state of Michigan.

This report is structured into six chapters. Chapter 1 compares five state-level siting authorities across the United States. Chapters 2 and 3 analyze existing wind and solar projects in Michigan to provide suggestions and lessons learned from local-level siting. Chapter 4 extends this analysis to battery energy storage facilities, focusing on case studies from other states and existing reports. Chapter 5 discusses the role of community engagement in the development of utility-scale projects. Finally, Chapter 6 organizes all of the suggestions and lessons learned across the other chapters into a comprehensive table that maps each one onto specific provisions in PA 233.

¹Whitmer, Gretchen. “Governor Whitmer Signs Historic Clean Energy Climate Action Package.” Governor Gretchen Whitmer, November 28, 2023. <https://www.michigan.gov/whitmer/news/press-releases/2023/11/28/governor-whitmer-signs-historic-clean-energy-climate-action-package>.



CHAPTER 1: UTILITY-SCALE RENEWABLES SITING IN OTHER STATES

Background

To contextualize Michigan’s new siting law and inform its implementation, this section of the report assembles case studies from other states with comparable regulations, geographic conditions, or bureaucratic structures. An overarching theme from this research is that no two states have the same policy — while some tenets overlap, state-by-state regulation of utility-scale renewables siting differs based on political and geographic landscapes. The takeaways at the end of this chapter synthesize commonalities across states and indicate how they might apply to Michigan.

The team identified analytical themes to address in this body of research based on current knowledge, client preferences, and prominent questions in energy planning. The themes are listed as follows: siting process, application, standards, and use of consultants; environmental review; compliance and monitoring; community engagement; and intervenor funds. Further explanation of these thematic areas is available in the following Methodology section.

The report reviews state-level siting authority and processes in California, Minnesota, New York, Ohio, and Wisconsin (Figure ST-1). Minnesota, Wisconsin, and Ohio represent comparable geographies to Michigan and provide regional context as state-siting predecessors in the upper Midwest. Enabling legislation for state-level renewables siting began in 2009 in both Minnesota and Wisconsin, a relatively long history from which the group anticipated valuable lessons learned. Furthermore, Minnesota has streamlined its interagency coordination within the siting process while Wisconsin utilizes a multidisciplinary wind siting council to embed research and development in its organizational structure.

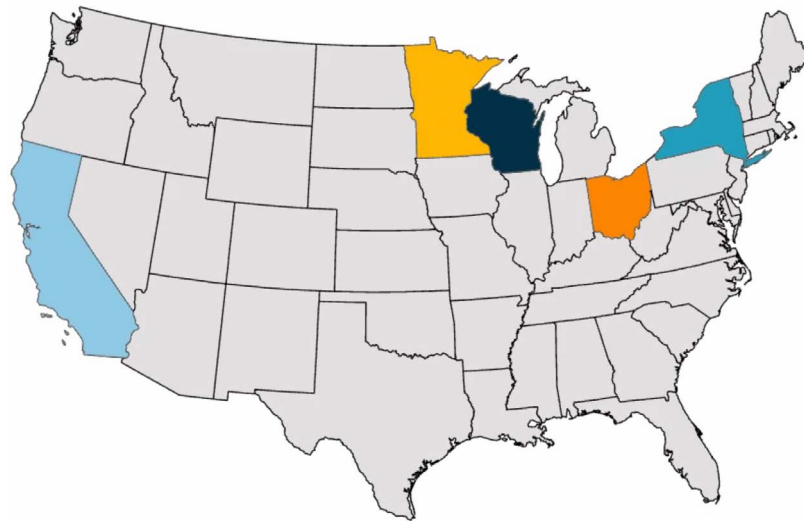


Figure ST-1: Map Highlighting States Selected for Further Research and Interviews.

The team was also eager to learn from Ohio’s broad siting authority (all wind projects >5 MW and solar >50 MW) and its pre-application community engagement process. California’s policy is relevant due to its comparable project size thresholds and its similarly structured opt-in certification. New York offered years of state-level siting experience (since 2011), which was reaffirmed and expanded in 2020 with the Accelerated Renewable Energy Growth and Community Benefit Act.

The team considered other states for case study, such as Colorado, Oregon, and Washington, but chose to limit the final list to five states due to time constraints. These case studies were forgone due to their relatively limited potential to provide lessons learned for PA 233: Colorado is in the midst of transitioning siting authority,¹ Oregon’s

¹ Sam Brasch, “Colorado Lawmakers Prep Legislation to Limit Local Power over Wind and Solar Projects,” Colorado Public Radio, February 8, 2024. <https://www.cpr.org/2024/02/08/colorado-lawmakers-prep-legislation-to-limit-local-power-over-wind->

unique-to-the-nation state-level land use regime for all types of development makes it challenging to compare with Michigan’s history of local control,² and Washington is in the early phases of implementing its state-level siting law. While these peer states each offer lessons learned for renewable energy siting, it is important to note that no two states have the same policy. This chapter aims to elevate both the similarities and differences between regulatory environments to identify cross-cutting takeaways for state-level siting.

Methodology

To get a better sense of the nuances of siting utility-scale wind, solar, and battery storage projects at the state level, the team conducted interviews with regulators in California, Minnesota, New York, Ohio, and Wisconsin. Table ST-1 lists each state’s siting authority body.

Table ST-1. Bodies holding state siting authority.

State	Siting authority body
California	California Energy Commission (CEC)
Minnesota	Minnesota Public Utilities Commission (MPUC)
New York	Office of Renewable Energy and Siting (ORES)
Ohio	Ohio Power Siting Board (OPSB) ** Interviewees included OPSB and Public Utilities Commission of Ohio (PUCO) representatives
Wisconsin	Public Service Commission of Wisconsin (PSCW) ** Interviewees included PSCW and Wisconsin Wind Siting Council (WSC) representatives

Each interview explored five topics relevant to the nuances of Michigan’s siting law: siting process and application standards, environmental review, compliance and monitoring, community engagement, and intervenor funds. Interviews took place virtually over a period of two weeks in March 2024. Questions were universal across interviews and informed by the following goals:

1. Understand the siting process in context and as applied, beyond what can be inferred from statutory text;
2. Visualize the network of state-level staff, agencies, and external consultants involved across project stages;
3. Follow the thread of the environmental review process and its findings from application to implementation;
4. Learn from community engagement successes in other states, including information on frequency, format, and reporting; and
5. Understand how other states manage intervenor compensation in terms of applicant eligibility and distribution of funds.

A full list of interview questions can be found in Appendix A.

² Alex Baumhardt, “Oregon’s First Large-Scale Solar Park and Farm Hinges on 50-Year-Old Land Use Laws,” *Oregon Capital Chronicle* (blog), November 15, 2023.

Existing Conditions in Each State

California

Overview of Energy Planning Landscape

In California, the California Energy Commission (CEC), which is separate from the California Public Utilities Commission, governs certification of eligible energy facilities. The CEC’s siting authority over renewable energy generation and energy storage facilities was granted in Assembly Bill 205 (2022) and codified in California Public Resources Code § 25545.

Prior to AB 205, siting for wind and solar photovoltaics was done at the local level, although the CEC had siting authority over all thermal power plants above 50 MW, including solar thermal and geothermal power plants as well as natural gas facilities. AB 205 expanded the CEC’s siting authority to non-thermal technologies that meet this size threshold, such as solar photovoltaic systems and terrestrial wind. It also enabled CEC siting authority for battery energy storage systems (BESS) above 200 MWh (Table ST-2).

However, much like Michigan’s siting law, developers of these projects may still choose to have projects approved at the local level rather than seek opt-in certification from the state. Unlike Michigan’s law — which requires developers to first seek local approval if the local government has a compatible renewable energy ordinance (CREO) — there is no requirement in California for developers to work with the local government before approaching the CEC. Even so, most project developers have chosen to continue seeking local, rather than state-level, approval.

As of April 2024, four projects have entered the CEC’s opt-in certification process: two combined solar and BESS projects (Darden Clean Energy³ and Perkins Renewable Energy⁴), one terrestrial wind facility (Fountain Wind⁵), and one standalone BESS project (Compass Battery Energy Storage⁶).

Table ST-2: Siting authority division among state and local governments in California

Type	Threshold (MW)	State	Local
Wind Energy Projects	< 50 MW		X
	50+ MW*	X	X
Solar Energy Projects	< 50 MW		X
	50+ MW*	X	X
Battery Energy Storage Projects	< 200 MWh		X
	200+ MWh**	X	X

* Option for developers to seek certification from the state for projects over 50 MW.

** Option for developers to seek certification from the state for projects over 200 MWh.

³ “Darden Clean Energy Project,” California Energy Commission, accessed March 28, 2024, <https://www.energy.ca.gov/powerplant/solar-photovoltaic-pv/darden-clean-energy-project>.

⁴ “Perkins Renewable Energy Project,” California Energy Commission, accessed March 28, 2024, <https://www.energy.ca.gov/powerplant/solar-photovoltaic-pv/perkins-renewable-energy-project>.

⁵ “Fountain Wind Project,” California Energy Commission, accessed March 28, 2024, <https://www.energy.ca.gov/powerplant/wind/fountain-wind-project>.

⁶ “Compass Battery Energy Storage,” California Energy Commission, accessed April 10, 2024, <https://www.energy.ca.gov/powerplant/battery-storage-system/compass-battery-energy-storage>.

Siting Process, Application, Standards, and Use of Consultants

CEC certification requirements are extensive: projects must demonstrate that there will be a net economic benefit to the community, enter into legally binding and enforceable community benefits agreements, and employ union labor, among other application requirements.

The statute does not define specific placement standards (e.g., setbacks, height restrictions, noise, etc.). For any given project, the CEC is required by statute to evaluate the project’s environmental impact — in particular, to determine whether impacts are substantial and adverse — and to ensure compliance with all applicable local laws, ordinances, regulations, and standards (LORS). The CEC is required to give due deference to any agency that would normally interpret LORS — which may include local zoning ordinances that include regulations on setbacks, noise, etc. — but if the agency finds that the project is “required for public convenience and necessity,” it does have the authority to override local LORS.⁷

The CEC has the full capability and expertise on staff to perform certification work — including air quality monitors, engineering geologists, land use and transportation experts, urban planners, geographers, biologists, anthropologists, archaeologists, architectural historians, tribal liaisons, and mechanical and civil engineers — but may hire contractors if the volume of projects exceeds staff bandwidth. The CEC generally outsources engineering work to firms to review plans and drawings for California building code compliance.

Figure ST-2 outlines intermediate steps in the CEC opt-in certification process.

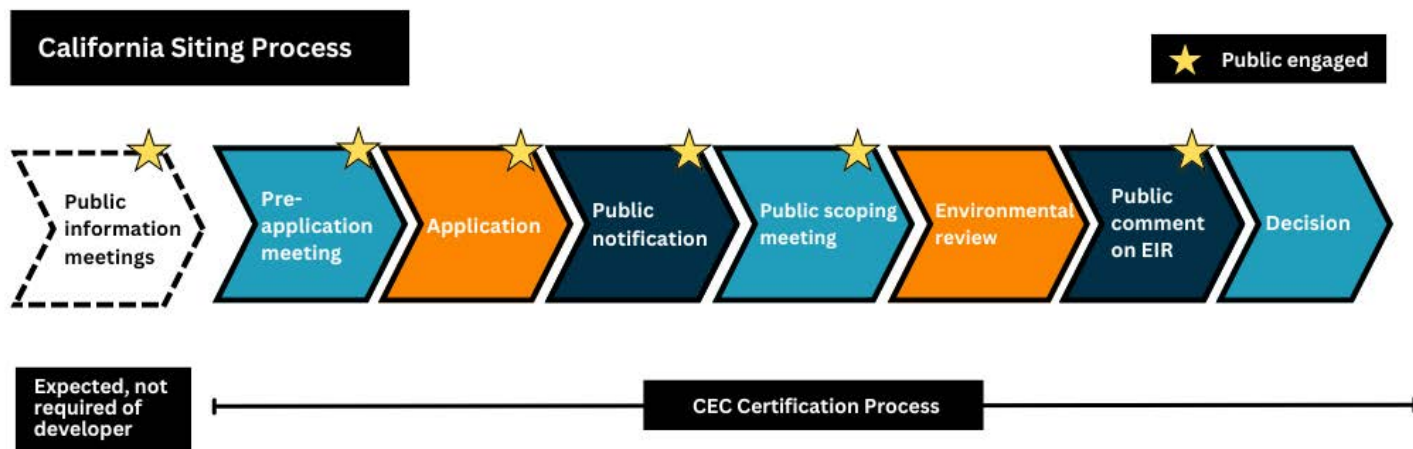


Figure ST-2: Standard California Application Process

Environmental Review

The CEC is the lead agency responsible for preparing an environmental impact report (EIR) under the California Environmental Quality Act (CEQA). By statute, the CEC must consult with the California Coastal Commission or the San Francisco Bay Conservation and Development Commission if the proposed project falls within the jurisdiction of either agency.⁸ The CEC is also required to coordinate with the Department of Fish and Wildlife regarding impacts to endangered species under the California Endangered Species Act or fish and wildlife resources.⁹

The CEC has a 270-day window to conduct environmental review, starting from the day that the agency issues a “Determination of Complete Application” notice. During the first week of environmental review, the CEC is required to issue a public notice of preparation for the EIR and invite tribal consultation. The agency holds a public scoping meeting for the EIR after 30 days.

⁷ California Energy Commission, “Power Plant Licensing: FAQ on Opt-In Certification,” accessed March 28, 2024, <https://www.energy.ca.gov/programs-and-topics/topics/power-plants/power-plant-licensing>.

⁸ Cal. Pub. Resources Code § 25545.1

⁹ Cal. Pub. Resources Code § 25545.5(a)

The draft EIR is published and available online after 150 days, which begins a 60-day public comment period. Between 30 and 60 days after publication, the CEC holds a public meeting to gather feedback on the draft EIR. This meeting is held as close in proximity as possible to the proposed development site.¹⁰ The CEC publishes the final EIR 240 days after the original Determination of Complete Application notice, and issues a decision on whether to certify the project by day 270.¹¹

If the CEC finds significant environmental impacts, the agency is required to avoid or substantially reduce those impacts through modifications to the project or mitigation measures. These modifications and mitigation measures must be found to reduce impacts to “less than significant.” In cases where there are significant impacts that cannot be mitigated, the CEC can override the EIR if it finds that the project’s benefits outweigh those impacts.

Compliance and Monitoring

When projects receive approval through the opt-in program, the CEC acts as the chief building official, as it has historically done for the other power plants under its purview. The agency ensures that the project is built according to California codes and has an in-house compliance monitoring and enforcement unit. Every certified project is assigned a compliance project manager, who serves as the point of contact for the developer and the community if there are any concerns.

During the construction and operation phases, the CEC also requires that the power plant developer hire an on-site monitor who oversees the project and observes the site for any environmental issues. This person is funded by the developer, but is accountable to the CEC. This person also has the authority to stop work on site if there is something in the way (for example, construction disturbing a bird nest buffer zone). The on-site monitor files monthly and annual compliance reports with the CEC. The CEC can take action against the developer for violation of any laws and regulations. Developers are also required to post a telephone number that community members can call in the event of noise complaints. According to CEC representatives, based on its experience from other power plants under its siting authority, community members that are the most engaged during the application process tend to be active during the operation stage as well, serving as another set of eyes and ears on the ground.

The CEC conducts routine inspections as part of its enforcement efforts. The agency’s in-house team of inspectors visits all CEC-licensed power plants on a rotating basis. As one interviewee told us, “Our M.O. is to bring people into compliance, not find stuff, but we can impose penalties if needed.”

Community Engagement

Apart from the mandatory pre-application filing meeting between the developer, officials from the applicable local government, and the CEC,¹² there is no explicit requirement that developers engage with the community before filing an application for certification with the CEC. However, the CEC application requirements ask developers to describe their plan and strategy for community benefits, implying that developers must have conducted some community engagement prior to filing.

In order to be eligible for certification, developers are required by statute to enter into at least one legally binding and enforceable agreement with a community-based organization, including local government entities, labor unions, social justice advocates, and California Native American tribes, among others.¹³ Cal. Pub. Resources Code § 25545.10 provides examples of acceptable topics and provisions that may be included in a community benefits agreement (CBA). In evaluating CBAs, the CEC looks for evidence that the project will ultimately benefit the local community.

Once an application for certification is filed, all public meetings pertaining to that project are held locally in the

¹⁰ Cal. Pub. Resources Code § 25545.7.6

¹¹ California Energy Commission, “Power Plant Licensing: Opt-In Process Timelines,” accessed March 28, 2024, <https://www.energy.ca.gov/programs-and-topics/topics/power-plants/power-plant-licensing>.

¹² California Energy Commission, “Power Plant Licensing: FAQ on Opt-In Certification.”

¹³ Cal. Pub. Resources Code § 25545.10

project area. A CEC representative is always present at those meetings. If needed, meetings may have a hybrid option (i.e., in-person and virtual options).

After an application is deemed complete, the CEC is required by statute to consult with California Native American tribes that are “culturally and traditionally associated with the geographic area of the proposed site.”¹⁴ Feedback from these consultation sessions are incorporated into the EIR.¹⁵

According to CEC staff, power plant developers in California often modify site plans and certification applications based on public comment and feedback, even after submitting their application. CEC staff findings and recommendations are also applied to projects.

Intervenor Funds

California does not have an intervenor funds program. The opt-in program is a non-adjudicative process, which means that there is no formal intervention mechanism.

In cases where the CEC requests information from a local government — for example, contributing to determining environmental impacts of a project — the local government can apply for reimbursement of associated costs.¹⁶

Minnesota

Overview of Energy Planning Landscape

Even before the widespread emergence of wind and solar, state-level energy siting was commonplace in Minnesota. In the early 1990s, most projects proposed were fossil fuel generation facilities and transmission lines. In 2005, state-level siting authority was transferred to the Minnesota Public Utilities Commission (MPUC), which inherited its standards from its predecessor, the state’s Environmental Quality Board. In the years following, the MPUC’s permitting process evolved to include utility-scale wind and solar. In 2009, wind and solar siting were formally enabled at the state level under Minnesota Administrative Rules 7854 and 7850 (2009).^{17,18}

The MPUC’s regulatory threshold for siting wind and solar projects is set at 5 MW and 50 MW respectively, with the exception that Minnesota counties can opt to assume authority for wind projects between 5 and 25 MW (Table ST-3). Counties may adopt stricter siting standards for wind projects over 5MW, which the MPUC will apply when permitting a project in that county unless it finds good cause not to apply the standards. If the local standard is not able to be applied in its original form, the MPUC will typically reach some accommodation with the local unit of government that satisfies the intent of the local standard. The MPUC is required to permit large wind facilities in a way that is compatible with environmental preservation, sustainable development, and efficient use of resources.¹⁹

As of 2022, 30 wind generation facilities and three solar projects^{20,21} have been permitted by the MPUC.

14 Cal. Pub. Resources Code § 25545.7.4(a)

15 Cal. Pub. Resources Code § 25545.7.4(c)

16 Cal. Const. art. XIII B § 6

17 Minn. Admin. Rules § 7854 (2009)

18 Minn. Admin. Rules § 7850 (2009)

19 “Wind Energy,” Minnesota Public Utilities Commission, January 12, 2024, <https://mn.gov/puc/activities/energy-facilities/wind-energy>.

20 Environmental Review of Energy Projects, “Project Search,” Minnesota Department of Commerce, accessed March 27, 2024, <https://apps.commerce.state.mn.us/eera/project-search.xhtml>.

21 US Energy Information Administration, “Form EIA-860 Detailed Data with Previous Form Data (EIA-860A/860B),” 2024, <https://www.eia.gov/electricity/data/eia860/>.

Table ST-3: Siting authority division among state and local governments in Minnesota

Type	Threshold (MW)	State	Local
Wind Energy Projects	< 5 MW		X
	5+ MW*	X	
Solar Energy Projects	< 50 MW		X
	50+ MW	X	

*Option for the hosting county to assume authority over projects between 5 and 25 MW.

Siting Process, Application, Standards, and Use of Consultants

The MPUC is responsible for issuing site permits for energy facilities, but its process does not preclude the need for obtaining permits from other state agencies. The MPUC collaborates with state and federal agencies, tribal governments, local governments, and the public during the permitting process in the form of application review and comment.

Developers proposing a large energy generation facility must demonstrate that there is a need for the power produced by submitting a certificate of need to the MPUC. There are no specific requirements (e.g., setbacks, height) for wind or solar projects in statute or rule, but the MPUC has established development standards over time through project approvals. Standards are made evident by previously approved permits, which developers often use to cross-check and improve their likelihood of approval.^{22,23,24}

Minnesota’s state-level permitting process occasionally requires the use of consultants to supplement the staff’s capacity for large-scale developments. When used, consultants are contracted with the Department of Commerce’s Energy Environmental Review and Analysis unit (EERA) to conduct environmental review for large, linear features (i.e., transmission lines, gas pipelines) that require advanced mapping and/or geospatial analysis. As described in the following section, EERA conducts the environmental review on behalf of the MPUC, while the MPUC makes the final permitting decisions.

Figure ST-3 outlines intermediate steps in the MPUC permitting process.

22 Minnesota Public Utilities Commission, “Application Guidance for Site Permitting of Large Wind Energy Conversion Systems in Minnesota,” May 2019, <https://mn.gov/puc/activities/energy-facilities/wind-energy/>.
 23 Minnesota Department of Commerce, “Application Guidance for Site Permitting of Solar Farms,” January 2024, <https://apps.commerce.state.mn.us/web/project-file/12694>.
 24 Minnesota Department of Commerce, “Guidance for Developing a Vegetation Establishment and Management Plan for Solar Facilities,” March 2021, <https://apps.commerce.state.mn.us/eera/web/project-file/11702>.

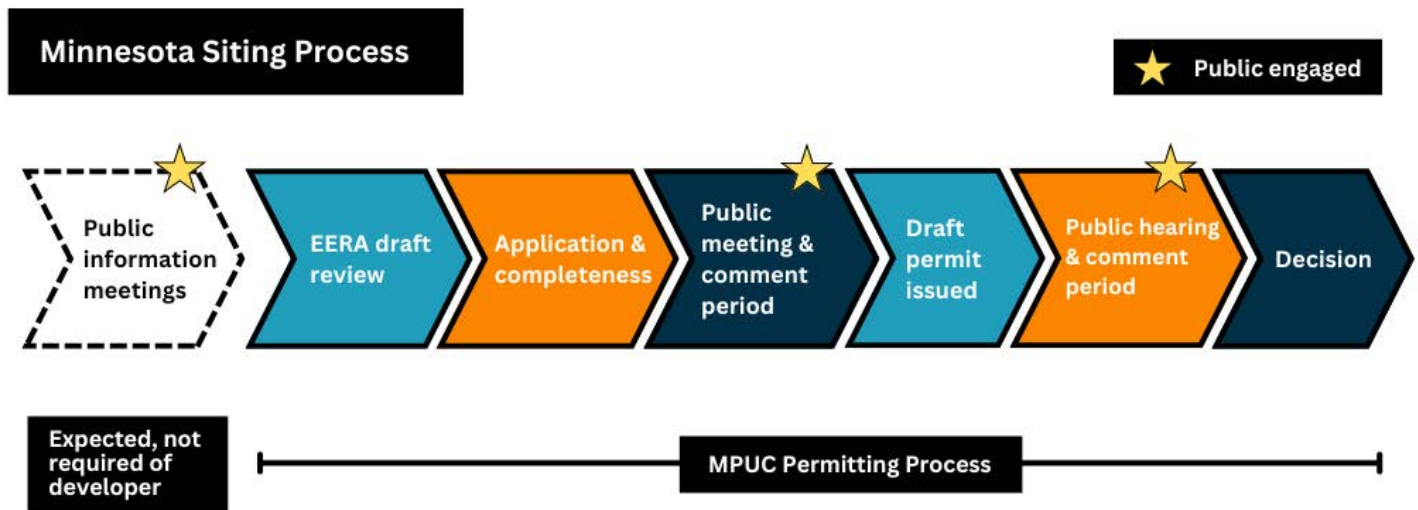


Figure ST-3: Standard Minnesota Application Process

Environmental Review

As part of the MPUC’s process, EERA serves as an independent technical staff, administering environmental review and technical analysis of siting and routing applications.

In their application to the MPUC, developers must provide an analysis of potential environmental impacts, proposed mitigation measures, and any adverse impacts that cannot be avoided in areas including, but not limited to, land-based economies, geology, wetlands, vegetation, demographics, land use and zoning, visual impacts, and cultural impacts.^{25,26} EERA recommends mitigation measures as part of its environmental review. Any of these recommendations could become permit conditions, but otherwise are not compulsory. The environmental review is included on the docket, allowing community members to give testimony during the public hearing and elevate certain concerns to a judge’s ruling.

Compliance and Monitoring

In recent years, the MPUC has formalized its compliance protocol, now requiring the permittee to fund an independent evaluator that monitors construction activities and reports to the Minnesota Department of Commerce. There is not a set fee structure for this evaluator, as the expenses are negotiated and funded by the permittee. Energy projects must submit compliance filings annually over the lifetime of the operating permit, as well as immediately file a report when there is an adverse event (e.g., following a bird strike). These operating permits are set to expire after 30 years and permit conditions can include standards for site restoration.

Community Engagement

The MPUC expects, but does not require, developers to work with local communities, landowners, tribes, and relevant agencies (e.g., the Minnesota Pollution Control Agency) prior to submitting an application. Though proactive community engagement is not enforceable by statute, there are ways that MPUC staff can encourage permittees to engage communities early enough to incorporate local input in the application. For example, as part of its environmental review, EERA requires developers to submit a draft application prior to filing with the MPUC, part of which inquires about the developer’s communications to date with local government officials and landowners. In an interview, Minnesota regulators stated that a draft application demonstrating a lack of engagement could hinder the developer’s ability to advance in the permitting process. In other words, the MPUC

²⁵ Minn. Admin. Rules § 7854.0500 (2009)

²⁶ Minn. Admin. Rules § 7850.1900 (2009)

has ways to confirm that “good developers have met with the community many times before submitting an application,” even without formal requirements, according to MPUC staff.

For both wind and solar permit applications, the review process includes a combination of public notice, comments, meetings, and hearings. The MPUC’s permitting process requires close coordination with two state agencies: the Department of Commerce and the Office of Administrative Hearings (OAH). The role of EERA’s environmental review is to analyze the potential impacts of a project and propose mitigation strategies.²⁷ This process begins by soliciting public input, which is then referenced during the impact analysis and in the MPUC’s final recommendations. The OAH oversees the public hearing wherein residents can discuss the results of the environmental review document or cite other facts and policies to make their case for project alternatives.²⁸ The results of the environmental review and the public hearing are reported to the MPUC and jointly considered in the final decision on whether and how to permit the project.

In general, there are two touchpoints for public engagement during the MPUC permitting process: (1) during public information meetings and (2) during public hearings. These meetings and hearings are coordinated by MPUC staff; project applicants are required to be present at these meetings.

From the point at which an application is accepted, the MPUC assigns a staff member to act as the project’s public advisor. This staff person is to be available to answer questions from the public about the permitting process.²⁹ After a project is built, if a member of the public has a complaint about a project, they can submit those comments directly to the MPUC who receives and reviews complaints on a monthly basis through an electronic filing system. These reports are publicly available through the docket. As complaints come in, the MPUC communicates with the project permittee so that they may resolve the issue. If they do not take action to resolve the issue, the MPUC will conduct an investigation.

Intervenor Funds

Minnesota has intervenor compensation programs for parties to participate in rate cases and Integrated Resource Planning, but none yet that apply to solar and wind siting cases or other energy infrastructure siting and routing applications. According to MPUC staff, there have been calls in Minnesota to extend intervenor compensation to siting and routing, including in the last legislative session, but so far no policies have forced the change.

New York

Overview of Energy Planning Landscape

In New York, the Office of Renewable Energy Siting (ORES) governs the permitting of eligible renewable energy projects. Mandated state-level siting authority was originally enabled in the Power New York Act of 2011 and codified in Article 10 of the Public Service Law, which extended state-level siting authority to all electricity generating facilities >25 MW, regardless of fuel source.³⁰ The critique of Article 10, however, was that it was overly “cumbersome and inefficient.”³¹ This state-level authority for renewable energy siting was later reaffirmed and expanded in the Accelerated Renewable Energy Growth and Community Benefit Act (2020)³² and codified in section 94-C of the Executive Law, which created ORES and streamlined permitting for projects above 25 MW nameplate capacity.³³ ORES certification for projects between 20 and 25 MW is optional (Table ST-4).³⁴

27 Energy Environmental Review and Analysis (EERA), “Environmental Review of Energy Projects,” Minnesota Department of Commerce, accessed March 27, 2024, <https://eera.web.commerce.state.mn.us/>.

28 EERA, “Environmental Review of Energy Projects.”

29 7854 Minn. Admin. Rules § 700 (2009)

30 New York Public Service Law (Chapter 48), Article 10

31 Thomas C. Zambito, “NY Created an Agency to OK Wind and Solar Projects Quickly. Upstate Towns Aren’t Happy,” *The Journal News*, January 11, 2023. <https://www.lohud.com/story/news/2022/10/12/upstate-ny-towns-push-back-against-wind-and-solar-projects/65411544007/>.

32 New York State Assembly Bill 2019-A9508B

33 New York Executive Law § 94-C.2(h)

34 New York Executive Law § 94-C.4(g)

Since the inception of 94-C, ORES has permitted 14 utility-scale solar facilities and one utility-scale wind facility. ORES has also permitted two BESS projects that are co-located with solar and wind facilities. Applications for 12 utility-scale solar facilities and three utility-scale wind facilities are currently under review.³⁵

Table ST-4: Siting authority division among state and local governments in New York

Type	Threshold (MW)	State	Local
Wind Energy Projects	< 25 MW*		X
	25+ MW	X	
Solar Energy Projects	< 25 MW*		X
	25+ MW	X	

* Option for developers to seek permits for projects between 20 and 25 MW.

Siting Process, Application, Standards, and Use of Consultants

Standards and conditions regarding the siting, design, construction, and operation of utility-scale wind and solar projects were developed in consultation with the New York State Energy Research and Development Authority (NYSERDA), the Department of Environmental Conservation, the Department of Public Service, and the Department of Agriculture and Markets.³⁶

While ORES has the authority to waive local laws, the agency respects local zoning placement standards and restrictions for renewables projects to the greatest extent possible. In light of New York’s Climate Leadership and Community Protection Act (CLCPA), waivers may be granted if the developer demonstrates why complying with a local law would be “overly burdensome.” In their permit application, developers must list the local laws that would apply to the project, indicate which laws they seek to waive, justify the waiver, and propose the minimum modification necessary. If the ORES legal team finds that the application adequately demonstrates that compliance with the local law would be overly burdensome, ORES grants a waiver as part of the permit. To date, ORES has included local law waivers in all granted permits. Independent of local zoning, ORES regulations mandate a setback of at least 100 feet from wetlands for all projects.³⁷ Regulations also mandate that wind projects adhere to minimum setbacks specified in statute, unless manufacturer setbacks are more stringent.³⁸ Figure ST-4 outlines intermediate steps in the ORES permitting process.

³⁵ “Permit Applications,” Office of Renewable Energy Siting, accessed April 8, 2024, <https://ores.ny.gov/permit-applications>.

³⁶ New York Executive Law § 94-C.3(b)

³⁷ Chapter XVIII, Title 19 of New York Codes, Rules, and Regulations (NYCRR) § 900-2.15(a)

³⁸ 19 NYCRR § 900-2.6(b)

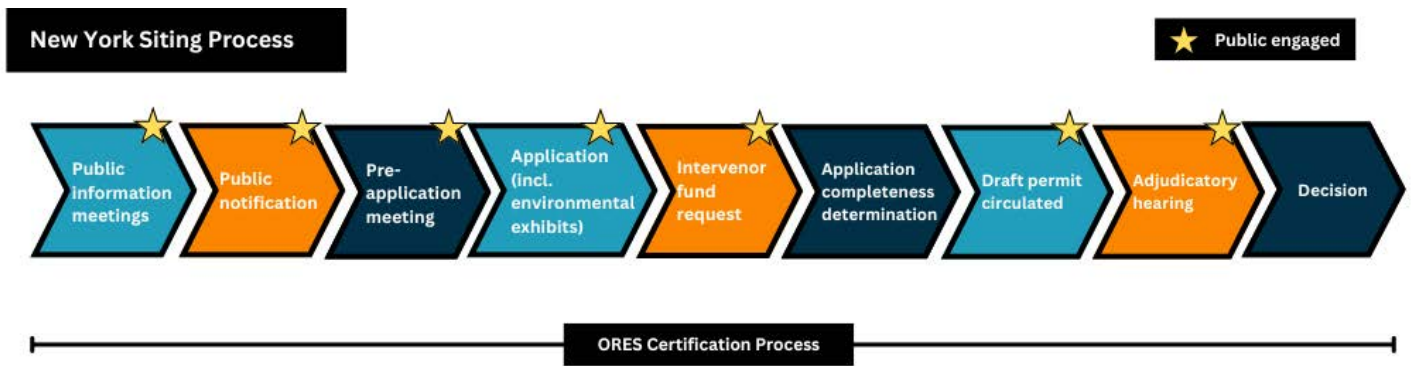


Figure ST-4: Standard New York Application Process

Environmental Review

Section 94-C consolidates environmental review under ORES. As part of the permitting application, developers are required to complete a wildlife characterization report,³⁹ which includes surveying protected or endangered species and habitats in the project area and geospatially delineating where wetlands are located.⁴⁰ Developers are also required to submit an exhibit addressing environmental justice, which includes an assessment of potential disproportionate adverse impacts on the surrounding community and a list of mitigation and avoidance measures that can be taken to minimize such impacts. Applications for permits are reviewed by ORES and the Department of Environmental Conservation for site-specific environmental impacts. ORES and the DEC collaborate on site-specific permit terms and conditions to address potential environmental impacts, ultimately with the understanding that such terms and conditions must achieve a net conservation benefit to any impacted species.⁴¹

Compliance and Monitoring

ORES partners with the state’s Department of Public Service (DPS) to oversee compliance and monitoring. After a project receives a permit and breaks ground on construction, DPS handles all compliance matters. DPS also manages complaints that may arise during the construction and operation phases of the project.

Initially, ORES hired consultants to support permitting work; today, it has an internal staff of approximately 35 experts in different fields supporting permitting efforts. ORES contracts with an engineering firm for wetland verification, fieldwork, and noise expertise, but ORES staff members complete final reviews for all projects.

Community Engagement

ORES requires developers to engage the public at least twice prior to submitting a permit application: (1) during a public meeting for community members who may be adversely impacted by the proposed project at least 60 days prior to filing an application,⁴² and (2) during a mandatory pre-filing meeting between the developer and the chief executive officer(s) of any affected localities.⁴³ These requirements are very similar to Michigan’s PA 233 requirements.

Three days prior to filing a permit application, developers are required to publish a notice of intent to file in a local newspaper; notify all residents that live within a one mile radius of a proposed solar facility and within a five mile radius of a proposed wind facility; and notify the member of the New York state legislature with jurisdiction over the proposed project area.

³⁹ 19 NYCRR § 900-1.3(g)

⁴⁰ 19 NYCRR § 900-1.3(e)

⁴¹ New York Executive Law § 94-C.3(d)

⁴² 19 NYCRR § 900-1.3(b)

⁴³ 19 NYCRR § 900-1.3(a)

As part of their permit application, developers must submit transcripts, presentation materials, a summary of the questions raised during the pre-application meeting, and a summary of responses provided by the developer. If applicable, applications must also explain why a developer was unable to meet with the local community and provide evidence of all “reasonable” attempts to reach out.⁴⁴ Once the application is submitted and the draft permit is published online, ORES issues notification about the draft permit and provides a mandatory public comment period of at least 60 days. ORES also holds a mandatory public comment hearing at least 60 days after issuing the draft permit availability notice. Within 15 days of the end of the public comment period, the developer must file responses to public comments received along with any supplemental information with ORES.⁴⁵ In cases where a project application is found to have “substantive and significant issues,” ORES holds an adjudicatory hearing. In order to participate in the adjudicatory hearing, parties must have full party or amicus party status.⁴⁶ While comments received during the public comment hearing cannot be considered as part of the evidentiary record in any adjudicated proceedings, the administrative law judge (ALJ) presiding over the case can use those comments to inform additional inquiries of parties to the case.⁴⁷

Intervenor Funds

New York law mandates that developers of all projects — not just those with “substantive and significant issues” — contribute intervenor funds when filing a permit application. Developers are required to contribute \$1,000 per MW of capacity into a local agency account.⁴⁸ ORES is required to reserve 75% of intervenor funds for local agency use. The other 25% is available for other groups that wish to participate in the process as intervenors.⁴⁹ Local agencies or community organizations that wish to use intervenor funds must submit a request to ORES within 30 days of the project application filing date.⁵⁰ An ALJ awards intervenor funds within 30 days of the request as long as that money goes towards building a “complete record leading to an informed permit decision” regarding a given site.⁵¹ Any unused intervenor funds are returned to the applicant.⁵²

Ohio

Overview of Energy Planning Landscape

State-level siting authority for energy facilities rests with the Ohio Power Siting Board (OPSB), which was created as part of Ohio Rev. Code §4906 (2012). It is coordinated by a multidisciplinary membership of individuals including the chairperson of the public utilities commission, the director of environmental protection, the director of health, the director of development, the director of natural resources, the director of agriculture, and a representative of the public.⁵³ The board regulates the development of all generation facilities over 50 MW (Table ST-5). Signed into law in 2021, Ohio Senate Bill 52 increased county commissioner oversight on wind and solar projects by:

- defining public meeting and notice requirements,
- allowing the board of county commissioners to adopt a resolution within 90 days of the public meeting that prohibits facility construction or limits project boundaries,
- and authorizing commissioners to designate all or part of an unincorporated area of a county as restricted from facility development.

According to their database of cases, the OPSB has approved 42 solar farms and eight wind farms that are currently in operation.⁵⁴

44 19 NYCRR § 900-1.3(c)

45 19 NYCRR § 900-8.3(b)(4)(ii)

46 19 NYCRR § 900-8.4

47 19 NYCRR § 900-8.3(a)(3)

48 19 NYCRR § 900-1.4(a)(8)

49 19 NYCRR § 900-5.1(g)(2)

50 19 NYCRR § 900-1.3(a)(8)

51 19 NYCRR § 900-5.1(b)

52 19 NYCRR § 900-5.1(g)(4)

53 Ohio Rev. Code § 4906.02

54 “Cases | Ohio Power Siting Board,” accessed March 29, 2024, <https://opsb.ohio.gov/cases?caseType=Operational>.

Table ST-5. Siting authority division among state and local governments in Ohio

Type	Threshold (MW)	State	Local
Wind Energy Projects	< 5 MW		X
	5+ MW	X	
Solar Energy Projects	< 50 MW		X
	50+ MW	X	

Siting Process, Application, Standards, and Use of Consultants

The adopted code governing state-level siting in Ohio specifies criteria for utility facility decommissioning and setbacks for economically-significant wind farms, but does not provide additional standards for siting and design. Interviewees at the OPSB and Ohio Public Utilities Commission (PUCO) shared their perspective with regard to development standards and guidance, commenting that in Ohio the “burden is on the applicant to show how they comply with our rules.”

In 2022, the OPSB proposed changes to the rules and requested stakeholder feedback through workshops and formal comments. Many of the changes respond to the significant amount of solar development that has occurred in Ohio since the last OPSB rulemaking.⁵⁵ The rule updates intend to codify conditions routinely found in issued certificates. A non-exhaustive list of changes most relevant to the scope of this paper are included under each thematic subheading on the pages that follow. Barring any legislative action against, the revised rules will be deemed approved in May 2024, according to OPSB staff.

The OPSB is composed of representatives from several member agencies. According to state regulators, the OPSB is also in constant communication with the Environmental Protection Agency (EPA), state DNR, and PUCO during the siting and permitting process. The regulators described their permitting process, from application to certification, as being robust with expertise. Since being given this authority by law, PUCO and OPSB staff have grown internally in ways that sufficiently cover the subject matters referenced in application review. Overlaying this internal expertise with that of the external experts standing behind the permittee’s application development, the team does not have a significant or frequent need for consultants, contracting out work only occasionally.

Figure ST-5 outlines intermediate steps in the OPSB certification process.

⁵⁵ Bricker Graydon Law Firm, “Ohio Power Siting Board Finalizes Rule Revisions Following Multi-Year Process,” July 21, 2023, <https://www.brickergraydon.com/insights/publications/Ohio-Power-Siting-Board-Finalizes-Rule-Revisions-Following-Multi-Year-Process>.



Figure ST-5: Standard Ohio Application Process

Environmental Review

The OPSB is the lead agency behind the environmental review. It consults with the EPA, state DNR, and other relevant agencies during the process. The environmental review will recommend certain required enhancements and act as a springboard for assessing mitigation measures. According to state regulators, all recommendations in the environmental review become compulsory.

During interviews, Ohio regulators communicated their agency’s perspective that ‘environmental’ does not only imply ‘ecological’, but goes further to consider a wider range of natural, social, and economic impacts of development. The review goes beyond standard habitat studies and migratory pathway review to also consider principles of comprehensive land use planning. Statutorily defined, the basis for granting a certificate will be determined by the nature of the probable environmental impact; that the facility represents the minimum adverse environmental impact; that the facility is consistent with regional plans for expansion of the electric power grid and will serve the interests of electric system economy and reliability; that the facility will serve the public interest, convenience, and necessity; that the development is protective of viable agricultural land; and that the facility incorporates maximum feasible water conservation practices as determined by the board.⁵⁶

Ohio’s proposed legislative revisions relevant to environmental review include:

- revised hearing requirements changed from a threshold of whether amendments to a certificate would result in “significant adverse” environmental impact to a new standard of “material increase in any” environmental impact;
- modifications and additions concerning compliance with aviation-related regulations;
- additional details on stormwater controls, erosion minimization, disposition of contaminated soils, and dusty or muddy soil conditions;
- new requirement of a staff-approved onsite environmental specialist during construction activities that may affect sensitive areas;
- new requirement that solar panel perimeter fencing be both small-wildlife permeable and aesthetically fitting for a rural location; and
- a new requirement of a landscape plan that addresses aesthetic impacts through measures such as vegetative screening, which are to be maintained for the life of the facility.

Compliance and Monitoring

Once a project is operational, PUCO handles ongoing complaints and ensures compliance with all aspects of the board-issued certificate. In interviews, state regulators emphasized that even though the project is online, it is still accountable to PUCO and the OPSB. The state regulators too described the active role played by the state compliance division during construction and operation stages. Ohio has three compliance investigators that ensure final designs are reviewed and approved by certified engineers, monitor construction to confirm it is accountable to the final plans, and respond to local complaints.

⁵⁶ Ohio Rev. Code § 4906.10

Ohio's proposed legislative revisions relevant to compliance and monitoring include:

- new rules implementing an annual reporting requirement, process for reporting violations, and self-reporting of incidents; and
- new complaint resolution requirements for electric generation facilities, including an ongoing quarterly reporting requirement for the first five years of operations.

Community Engagement

Before filing an application to build a new facility in Ohio, the developer is required to hold a public informational meeting in which they inform stakeholders about the project plan between 90 and 300 days before submitting their application to the OPSB.⁵⁷ The intent is also to gather input and hear concerns that the developer can incorporate into their application. The OPSB is also present at this initial informational meeting and, when invited by the developer, available to discuss the siting process and public participation.

Within 90 days of this meeting, the local board of county commissioners may adopt a resolution to prohibit construction or limit the geographic boundaries of the project.⁵⁸ In the absence of a resolution, the project may proceed to be filed as proposed. In addition, county commissioners can designate all or part of an unincorporated area in their county as a "restricted area," in which the development of large wind and solar projects is prohibited. Signed into law in 2021, these policies effectively allow for local veto on wind and solar, which is fundamentally different from policies in other states where, instead, local regulations can be overridden by state-level siting authority.

If there are additional pre-filing meetings, the OPSB receives a report covering subjects such as attendance, form of notification, etc. State regulators communicated to the team that while it is difficult to say exactly how and to what extent developers change their applications based on initial feedback, they have seen quite a few examples of developers making changes based on neighbor suggestions, whether by adjusting spatial design to protect areas of sensitivity or by coordinating good neighbor agreements. While state agencies are not involved in creating or evaluating such agreements, the Department of Development does facilitate an alternate taxing program wherein communities can decide whether to accept property taxes or payments in lieu of taxes (PILOT). Property taxes offer a large infusion of cash at first, but the financial contribution depreciates over time.

With PILOTs, a project pays a flat \$9,000 per MW each year. The predictability of the PILOT structure removes the transaction costs and inherent uncertainty associated with property tax assessments. Overall, the most advantageous tax structure depends on the community's unique set of current and expected county expenditures (e.g., counties that have high current financial obligations may choose property taxes while others that prefer long-term revenue stability may choose PILOT).⁵⁹ According to the team's interview with state regulators, communities in Ohio overwhelmingly choose PILOT over ad valorem property taxes.

Ohio's proposed legislative revisions relevant to community engagement include:

- a longer pre application notification period (changed from 15 to 21 days before a public meeting);
- new website requirements, including prominently posting certain information prior to application filing;
- additional public informational meeting (now two instead of one);
- additional notice requirements;
- procedure to incorporate county revisions to project boundaries; and
- the required use of mapping software with layers representing facility components, sensitive receptors, and address search capabilities.

The OPSB Staff Report will also be required to address how the project was determined to be in the "public interest" in order to grant a certificate

⁵⁷ Ohio Rev. Code § 303.61

⁵⁸ Ohio Rev. Code § 303.62

⁵⁹ Brent Sohngen, "Real Property Tax Versus PILOT for Solar?" Ohio State University, January 8, 2024, accessed April 21, 2024, <https://u.osu.edu/aede/2024/01/08/real-property-tax-versus-pilot-for-solar/>.

Intervenor Funds

During the OPSB process, members of the public can get involved at several stages: during the pre-application informational meeting, public comment, public hearing, and adjudicatory hearing. Affected entities or individuals can also formally participate in the OPSB process as intervenors. There are two types of intervention under Ohio law:⁶⁰

- 1. Intervention as a Right:** Certain affected municipal and county officials can formally intervene by placing an appropriate intervention notice on the docket.
- 2. Intervention by Motion (motion to intervene):** Any affected party that can demonstrate good cause to intervene may file a motion to do so with the Administrative Law Judge.

Intervenors do not receive funding from the developer with which to build their case, but as a party to the case they do receive special authority to participate in all stages of the application process. For example, an intervenor may appeal a decision made by the OPSB.

Wisconsin

Overview of Energy Planning Landscape

The Public Service Commission of Wisconsin (PSCW) governs permitting of large energy facilities in Wisconsin, enabled at the state level under Wis. Stat. 196.49 and 196.491. Additionally, Wis. PSC Chapter 128 is the state's wind siting rule and includes specific requirements and standards for wind developments. There is no equivalent statute specific to solar siting, but all energy generating facilities equal to and greater than 100 MW are subject to the PSCW's application process (Table ST-6).⁶¹

The 100 MW threshold applies to merchant developers, or private companies. A project below 100 MW may come before the PSCW if it is being developed by a Wisconsin utility and/or if it exceeds a certain cost threshold. Projects with a nameplate capacity of 100 MW or greater will require a Certificate of Public Convenience and Necessity⁶² while those below 100 MW that come before the PSCW require a Certificate of Authority.⁶³ The local government unit may also assume siting authority for projects below 100 MW by adopting an ordinance. The conditions of ordinance eligibility are outlined in the state code as follows.⁶⁴

Local governments may not set restrictions that are stricter than the standards set forth in Wis. Admin Code ch. PSC 128 unless those restrictions do one of the following:

- serves to preserve or protect public health or safety***
- does not significantly increase system cost or efficiency***
- allows for an alternative system of comparable cost and efficiency***

As of March 2024, there are 10 large solar projects and six large wind projects between 50 and 150 MW sited by the PSCW and operational in the state.^{65,66}

⁶⁰ Ohio Rev. Code § 4906.2

⁶¹ Wis Stat. § 196.491.3(a)

⁶² Wis Stat. § 196.491.3(a)

⁶³ Wis Stat. § 196.49

⁶⁴ Wis Admin. Code PSC § 128.03

⁶⁵ "U.S. Energy Atlas," accessed April 23, 2024, <https://atlas.eia.gov/>.

⁶⁶ Public Service Commission of Wisconsin, "PSC Highlighted Construction Cases," accessed April 23, 2024, <https://psc.wi.gov/Pages/CommissionActions/HighlightedCases.aspx>.

Table ST-6: Siting authority division among state and local governments in Wisconsin

Type	Threshold (MW)	State	Local
Wind Energy Projects	< 100 MW*		X
	100+ MW	X	
Solar Energy Projects	< 100 MW*		X
	100+ MW	X	

*Projects below 100 MW can come before the PSCW if being developed by a Wisconsin utility and if it exceeds a certain cost threshold. The 100 MW threshold applies to Merchant Developers (private companies).

Siting Process, Application, Standards, and Use of Consultants

The adopted code for wind siting authority includes criteria for setbacks and height, noise, decommissioning, shadow flicker, signal interference, and stray voltage. There is no equivalent statute specific to solar siting. Beyond those outlined in statute, the only additional standards that could be applied to wind and solar projects are decided by the PSCW on a case-by-case basis through conditions of application approval.

During the application process, the PSCW coordinates a joint application review with the Wisconsin DNR. Local governments can participate in cases through public comment or as intervenors, but otherwise do not have an official role beyond that of a member of the public. Certification work is completed entirely in-house by staff members of the PSCW and the state DNR; there are no external consultants hired to conduct work. For each project, there is typically one environmental analyst from the PSCW and two DNR staff members that co-coordinate the environmental review process. For large projects, perhaps that require an Environmental Impact Statement (EIS), the PSCW may assign one or two additional environmental analysts to contribute to the review. In 2009, Wisconsin Act 40 authorized the creation of a multidisciplinary wind siting council that advises the PSCW on wind siting rulemaking.⁶⁷ According to the team’s interview with one of the councilmembers, the council submits five-year reviews of scientific literature related to the environmental impacts of wind energy systems and regulatory developments on wind siting in other states. It does not produce legislation or feedback on any specific project proposal, but instead creates a report of recommendations for consideration by the legislature. Figure ST-6 outlines intermediate steps in the WPSC permitting process.

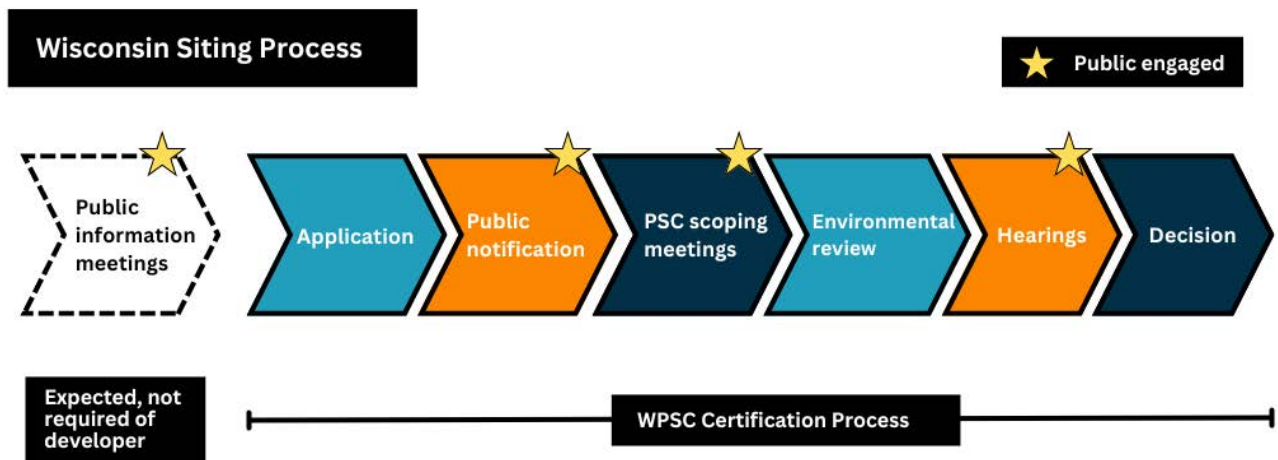


Figure ST-6: Standard Wisconsin Application Process

⁶⁷ “PSC Wind Siting Council,” accessed April 19, 2024, <https://psc.wi.gov/Pages/ServiceType/Energy/Renewables/WindSitingCouncil.aspx>.

Environmental Review

The PSCW investigates the potential environmental impacts of a proposed project. This investigation will decide whether staff will prepare an Environmental Assessment, EIS, or take no further review. Depending on the course pursued, the PSCW may hold a public hearing on draft documentation and provide additional opportunities to engage the public at various stages of review. When an application requires a permit from the state DNR for air, solid waste, water quality, or water discharge, PSCW and DNR staff will collaborate in the environmental review process.

This review may conclude with proposed changes to project design or location that better protect the environment or an affected community. These changes may be compulsory or strongly recommended. During interviews, Wisconsin regulators shared that mitigation measures may be required “to the extent reasonable,” which allows for some discretion in how the developer implements recommendations.

Compliance and Monitoring

Once the project is approved, the approving entity, whether it is the PSCW or the local government, is responsible for ensuring it is built as proposed and managing complaints. According to the team’s interview with Wisconsin regulators, the PSCW does not have a rigorous or detailed protocol for compliance and monitoring. For larger projects, post-approval compliance and monitoring takes the form of quarterly reports filed by the applicant to the PSCW. Based on the scale of the project, the PSCW may also require a pre-construction meeting or an independent environmental monitor to oversee the compliance, though according to PSCW staff this is not very common due to their limited capacity to conduct site visits in addition to managing the application review.

A political subdivision (i.e., any city, village, town, or county; a “town” in Wisconsin which is equivalent to a “township” in Michigan) may also establish a monitoring committee to oversee resolution of complaints regarding a wind energy system.⁶⁸ Membership of the monitoring committee must include a local employee of the project developer or owner and, if in existence, at least one nonparticipating landowner residing within a half-mile of a wind turbine that is located in the political subdivision.

Community Engagement

There is no statutory requirement in Wisconsin that dictates when the developer has to begin engaging the public in application development and review. Regulators described that developers frequently reach out to community members on their own prior to filing an application, whether through mailings or public meetings. This happens most commonly with larger projects and less so for smaller developments. Once the application is filed, the PSCW’s application process takes over. The developer is not required to attend PSCW’s public meetings, though according to state regulators they often do. The application process is represented below by Figure ST-6. Along this timeline, the PSCW engages the public at three major checkpoints:

- ***Public notification*** via mailing, newspaper articles, media outreach, and communications with other interested persons and parties.
- ***Scoping meetings*** discuss the project in greater detail and connect the public with PSCW staff, state DNR, and the utility to answer their questions. Usually, scoping takes the form of issuing letters in the mail with information about the project, the process, and ways to participate. For larger projects, the PSCW also hosts an open house in a representative location in the project area as part of the scoping process.
- ***Public hearings*** are held on the application (and any final EIS) depending on the size and cost of the project. Since the pandemic, these meetings are transitioning back from virtual to in-person in the project area. Parties to the case and landowners in the project area will receive a notice of their opportunity to participate. The PSCW also accepts written comments from the public.

⁶⁸ Wis Admin. Code § 128.41

Intervenor Funds

Intervenor compensation funds are set as part of the biannual budget process in Wisconsin, and are available to those who fit all of the following criteria:

- A customer of the utility which is the subject of the proceeding or someone who may be materially affected by the outcome of the proceeding.
- Someone for whom intervention in the proceeding would cause significant financial hardship without compensation from the commission.
- Someone who represents an interest material to the proceeding which but for an award of compensation would not be adequately represented.
- Someone whose interest must be represented for a fair determination in the proceeding.
- Someone who has been granted party status and who will participate in the proceeding as a party.⁶⁹

According to PSCW staff, for the past several years, the PSCW has received \$542,500 for each fiscal year of its two-year budget. If funds remain at the end of the first fiscal year, they can be rolled over into the second year. Funds not used at the end of budget do not roll over and the intervenor compensation fund is set anew in the next budget process.

The intervenor compensation is used to participate in a case by submitting evidence in the form of comments, testimony and exhibits, or testimony at hearings. Applications for intervenor compensation relating to a particular proceeding are due to the commission within 30 days of the hearing. An employee of the PSCW will process the application within 15 days of its submission and make a recommendation for decision by the Commission.

From time to time, the funds are not used to the full extent of the approved amount. In this case, the extra award monies would be unencumbered and remain in the pot, available for a future intervenor compensation award for something or someone else. On the other end, if someone wants to exceed the amount awarded, they can apply for supplemental intervenor compensation. Funds are awarded on a reimbursement basis after services have been rendered and invoices submitted.

The PSCW receives a handful of applications for intervenor compensation, but the actual number is dependent upon the underlying dockets that come before the Commission during the two-year cycle. PSCW staff noted that in the current fiscal year (as of March 2024), the PSCW received a high volume of applications — for the first time applications exceeded funds available — due to a comparably high volume of construction cases and three full investor owned utility rate cases.

Suggestions and Takeaways

This section describes major takeaways from background research on other states and interviews with state regulators, as well as how MPSC can incorporate some of these practices into the application review process within PA 233. Relevant sections of PA 233 are highlighted in bolded text.

states-1. Siting Process, Application, Standards, and Use of Consultants

Each of the five states researched described employing standards of application review beyond what is explicitly named in statute. Many statutes have the necessary flexibility built in to accommodate the unique characteristics of different renewables projects and their host communities, as well as to stay in step with the evolving body of knowledge surrounding renewable energy development.

While few have engaged in formal rulemaking, some states have developed a body of standards over time by embedding conditions of approval in application review (WI), publishing siting and permitting guidance (MN), and referring new developers to review the characteristics of issued site permits to understand what makes

⁶⁹ Wis. Admin. Code § 3.02

projects successful (MN). Aside from certain environmental placement restrictions (NY), some states defer to local placement standards and restrictions; in certain cases, however, a state agency may override local zoning restrictions for the purposes of granting a certificate (CA, MN). Ohio is categorically different from the rest in letting counties set exclusion zones, known as “restricted areas.”

PA 233 grants the MPSC discretion over applying conditions of approval to an application. In addition to the specified vegetative ground cover maintenance and pollinator standards, the MPSC can assess whether a project includes vegetative buffers and screening, proper road maintenance, and stormwater management, among others, that are commonly included in local government zoning. For more information on conditions of approval that may help address community impacts, see the subsequent chapters on Large-Scale Wind Projects in Michigan and Large-Scale Solar Projects in Michigan. **[§ 226.6]** Additionally, the MPSC has the authority to examine the long-term impacts of a project on a community. PA 233 requires applicants to provide a description of the “portion of the community” where the project will be sited; this can include socioeconomic and demographic profiles, major industries in the area, and local land use plans and policies. **[§ 225.1(h)]**

Local governments are involved to a different extent in each of the state-level siting processes studied. In Wisconsin, local governments can participate in cases through public comment or as intervenors, but otherwise do not have an official role beyond that of a member of the public. In California, the CEC is required to invite the local government to a mandatory pre-application filing meeting with the developer. In New York, ORES regulations require that the developer meet with the chief executive officer of the local jurisdiction prior to filing a permit application.

In Michigan, developers are not only required to meet with the chief elected official of each affected local unit to discuss the site plan prior to filing an application, but they are also required to hold a public meeting with the local community after discussing the site plan. As specified in PA 233, developers are required to submit a summary of community outreach efforts in their application. The MPSC can affirm the importance of these opportunities by asking developers, in their summaries, to enumerate the comments that they received and how the final site plan that is submitted as part of the application is responsive to those comments, or where it cannot be responsive. **[§§ 223.1, 223.2, 225.1]**

In all five states studied, interagency cooperation primarily occurs during environmental review and compliance and monitoring. In some states, the siting authority is required by statute to consult with other state agencies (MN, NY, CA) during the permitting process, while others have the option to do so (OH). Wisconsin is unique in that it has a wind siting council that develops long-range wind siting recommendations for the legislature. None of the states researched outsourced certification and permitting work exclusively to consultants; all five agencies reported using in-house staff to perform the majority of certification and permitting work. Occasionally, some agencies will contract out engineering reviews or technical work to external firms (NY, CA, MN).

In Michigan, MPSC is authorized to use consultants for the purposes of evaluating applications. While all of the interviewed states reported utilizing primarily in-house staff to complete application evaluations, several mentioned the benefit of hiring consultants during the ramp-up phase of implementing state-level siting authority. In the long run, it may be beneficial for the MPSC to hire full-time staff with varied expertise; in the near future, however, hiring consultants can ensure that the MPSC has the bandwidth to evaluate applications efficiently. **[§ 226.4]**

states-2. Compliance and Monitoring

Regulators in all five states stressed the importance of compliance and monitoring. In general, projects certified or permitted at the state level are subject to compliance and monitoring by a state agency. Some states (CA, OH, WI) conduct compliance using in-house inspectors or investigators, while others (NY, MN) partner with other state agencies to run compliance. For example, the MPUC requires the developer to fund an independent construction evaluator that reports to the Minnesota Department of Commerce. Energy projects in Minnesota also produce annual findings over the lifetime of the operating permit and are subject to immediate reporting for certain incidents (e.g., bird strikes). In California, every certified project is assigned a compliance project manager who acts as the point of contact for the developer and the community, and is required to hire an on-site monitor who oversees the project and observes the site for any biological issues.

In Michigan, ongoing compliance and monitoring are not stipulated in the law. To maintain accountability over the life of a project, the states studied have benefited from partnering with other state agencies to run compliance, requiring the developer to fund an independent, onsite evaluator during construction, and enforcing consistent reporting timed out over the lifetime of a permit. MPSC could consider whether to conduct periodic compliance checks or inspections. MPSC could also consider requiring the developer to fund an independent, onsite evaluator accountable to the Commission during construction as part of the application fees. **[§ 226.4]**

states-3. Environmental Review

In general, regulators make every effort to ensure that potential environmental impacts are mitigated, although the degree to which environmental impacts are blockers for permit approval varies. In California, if a project is found to have significant environmental impacts, the CEC is required to propose modifications or mitigation measures that will substantially reduce those impacts; if, however, environmental impacts are unavoidable, the CEC has the authority to grant certification to the developer if the project has a net positive impact on the community. In contrast, environmental review recommendations in Ohio are compulsory and must be addressed in order for a project to receive a permit. In Minnesota, Wisconsin, and New York, the lines were slightly more vague: Minnesota regulators indicated that environmental recommendations were not compulsory but could become permit conditions or formal testimony in the adjudicatory hearing; Wisconsin regulators indicated that changes may be strongly recommended or compulsory on a case-by-case basis; New York regulators indicated that ORES could require developers to financially compensate for any potential environmental impacts.

Among the states researched for this project, Ohio and Minnesota stand out. Regulators in these two states interpret “environmental impacts” as not only ecological impacts, but also natural, social, and economic impacts of development (for example, socioeconomic or demographic impacts). In doing so, regulators have the authority to conduct a more holistic assessment of anticipated effects of a given project. Rule revisions pending approval by the Ohio legislature could go even further to ensure projects are aligned with sustainable development, including by hiring a staff-approved onsite environmental specialist to monitor construction near sensitive areas and by requiring submission of a landscape plan that addresses measures like vegetative screening to be maintained over the life of a facility.

In Michigan, the MPSC is required to evaluate potential impacts on the environment, although “environment” is broadly defined in the statute as ranging from protected wetlands to cultural sites. The MPSC can emulate the Ohio and Minnesota approaches to include the social and economic impacts of a project in its environmental review process, which would ensure that developers are considering the long-term impacts on the community when planning for utility-scale renewables projects. **[§§ 225.1(f), 226.7(c)]**

In some states, regulators collaborate with other state agencies on environmental review. Ohio and Wisconsin regulators work with their states’ respective Department of Natural Resources to evaluate applications for environmental impact. In California, the CEC is required by statute to consult with other state agencies that assess impacts to endangered species and protected lands. Note that these instances of interagency consultation occur after the application has been submitted to the agency; in Michigan, PA 233 requires developers to show evidence of environmental consultation with various agencies prior to submitting an application. It will be important for MPSC to clarify both with the applicants and with their peer agencies what is expected out of these consultations and determine the extent to which interagency consultations will be compulsory or advisory. **[§ 225.1(k)]**

states-4. Community Engagement

Whether it was statutorily required (CA, NY, OH) or verified indirectly through other process steps (MN), regulators uniformly expected the developer to facilitate community engagement in advance of application filing. Regulators communicated that early engagement often saves time and money over the course of the application process as well as the life of a facility. By connecting with the community early and meaningfully, developers can proactively assuage concerns that may come up later in the form of hearing testimony or public complaints. In other states, state regulators are involved in the engagement process in several ways: by being present at the developer’s public meetings and available to answer siting questions (OH), by assigning a staff member to act as the project’s public advisor (MN), by responding to complaints (CA, NY, MN, OH, WI) or conducting further investigation (MN), and by receiving reports detailing the attendance, form of notification, and content of additional meetings

between the developer and the public (OH). The Commission could request such information as part of the application requirements [§ 225.1(j)]. Further, as part of its staffing decisions, MPSC could consider assigning a staff member to act as public advisor, or primary point of contact, for a project under review. The Commission could also consider establishing a system to document and resolve complaints over the project lifecycle.

Several states shared advice on the topic of community engagement based on lessons learned. In Ohio, the OPSB has invested from an agency leadership standpoint in its permitting process, ensuring that a member of the Board is present at every local public meeting. The Board members recognize that the siting process can be emotionally-charged and underscored the importance of showing up for local communities. Wisconsin PSC staff reiterated the importance of physical presence in the local community rather than demonstrating involvement through mailers, both for state officials and developers. MPSC staff could consider being present at the public meeting required in [§ 223.1] to be available to answer siting questions.

In Ohio's pending rules, OPSB has emphasized the importance of easy access to information regarding the project through the institution of new website requirements: the developer must post certain information prominently on its website prior to application filing and supplement descriptions using map visualizations with layers representing facility components, sensitive receptors, and address search capabilities. This echoes the sentiment shared by several state regulators that posting notices in a newspaper of general circulation is no longer a sufficient means of communicating information to the public. MPSC staff could consider defining options for a comparable digital alternative to notices posted in local newspapers [§§ 223.1, 226.2]. Examples from other states include a developer-hosted website that publishes project information and map visualizations with address search capabilities and clear identification of sensitive receptors.

Similar to Michigan's law, New York includes contested cases as part of the siting process. While public comments are not considered part of the evidentiary record, the presiding administrative law judge can use those comments to inform any further inquiries of the parties to the case. In Minnesota, the contested case process is reserved for large, more contentious projects and the MPUC typically employs an informal comment and reply process, rather than a more judicial alternative. The MPUC itself responds to and incorporates public input, mainly as project-specific permit conditions. Since public comment cannot be used as part of the evidentiary record in Michigan, the Commission should consider how it advertises public comment to be transparent about the limitations of its use. MPSC should consider other mechanisms by which to incorporate, or request the developer to incorporate, public comment in site planning. [§ 226.2]

states-5. Intervenor Funds

Michigan's law treats public hearings that take place after applications are submitted as "contested cases" in which local governments can participate as intervenors. It also mandates that developers contribute funds that local governments can use as intervenors. It should be noted that these hearings are distinct from Commission-hosted public meetings, at which commenters can also speak.

Of those studied, two states offered intervenor funds in the context of renewable energy siting: New York and Wisconsin. Insights from these states can inform how MPSC determines funding eligibility, allocates monies, and handles situations in which funds are not used in full. [§ 226.1]

In Wisconsin, intervenor funds are part of the state's biannual budget process, while in New York, the developer contributes to intervenor funds in an amount determined by project generation capacity, similar to Michigan's requirement for developer contribution to the fund. Since intervenor funds are deposited with application submission, potential intervenors in New York do not have access to those monies in pre-application public meetings. This limitation is also common to Michigan's timeline. Both states have similar considerations for funding eligibility that are concerned with bringing forth individuals and perspectives that would contribute to a complete record and lead to a more informed permit decision. Both Wisconsin's and New York's processes allocate funds on a reimbursement basis. Leftover funds in both cases are returned to the funding source, with unused funds in Wisconsin going back into the budgetary pot while those unused in New York are returned to the applicant.



CHAPTER 2: UTILITY-SCALE WIND PROJECTS IN MICHIGAN

Large-scale wind projects are not new to Michigan. There are currently 42 operational wind farms in the state, including 18 that meet PA 233’s 100 MW threshold.⁷⁰ In this chapter, the team sought to learn from the experiences of these existing Michigan wind projects.

Specifically, the team studied two recently completed projects spanning four zoning jurisdictions to understand the parameters under which they were approved. This section of the report begins by comparing PA 233 to existing sample zoning documents and conditions of approval to provide a better understanding of where and how the law regulates common elements of utility-scale wind projects and categories on which the law is silent. It then draws findings from the review of project site plans. Finally, it details lessons learned from interviews with wind developers active in Michigan as well as Michigan local officials with experience regulating wind.

Mapping PA 233 onto Common Zoning Provisions

Prior to the passage of PA 233, the only constraint on local governments’ regulation of large-scale wind projects was the Michigan Zoning Enabling Act,⁷¹ which prescribes the minimum procedures that must be followed, rather than the content of the regulations or standards of approval. As a result, zoning ordinances in the state vary widely. However, many wind zoning ordinances include common elements, modeled after regulations for other land uses but adapted for wind projects.

While PA 233 includes some regulations commonly found in local zoning ordinances, it also includes other sections unique to the law itself (e.g., regarding intervenor funds, contested case protocol, etc.). To best contextualize the lessons learned from existing Michigan wind farms, the team conducted a gap analysis comparing PA 233 to local ordinances. While there is no universal standard for wind projects, the team used the “Sample Zoning for Wind Energy Systems” (hereafter referred to as “sample zoning” or “sample ordinance”) as a baseline for its comparison. The guide was created by the Michigan State University Extension and is widely referenced, including by EGLE’s technical assistance program,⁷² as the key resource for wind zoning. This resource, first developed in 2008, uses existing research based in the United States and abroad to develop recommendations for regulations and standards. While not explicit on numerical standards (i.e., it uses a fill-in-the-blank approach for setback, sound, etc.), the sample ordinance is instructive of the types of things that communities may wish to regulate. The resource is revised and updated periodically, most recently in 2020. As shown in Appendix B, while PA 233 covers many of the general standards and some of the key technical standards identified by the sample ordinance, there are several subjects on which PA 233 is silent, including, but not limited to, complaint resolution, post construction sound standards, and annual maintenance review.

Methodology

In order to address one of the project’s key objectives — ascertaining best practices in Michigan-based renewable energy siting from existing wind farms — the team took a case study approach. The team drew insight from the four zoning ordinances of four cases studied, along with any conditions of approval placed upon the project by comparing their categorical coverage and specific standards to those of PA 233 and the Sample Zoning Ordinance. This analysis identified what local jurisdictions have regulated as well as what level and type of regulations have proven workable, as each jurisdiction eventually approved a now constructed and operational utility-scale wind project. The team pulled details from site plans and planning commission notes to identify where developers exceeded the minimum requirements stipulated by the governing ordinance. While the original intent was to interview the developers and local officials in each of the case study communities to understand specifically what worked well and what did not work as well — effectively, what would the developer and/or local government do differently next time — the small number of cases together with concerns about anonymity led the

⁷⁰ US Energy Information Administration, “Form EIA-860 Detailed Data with Previous Form Data (EIA-860A/860B),” 2024, <https://www.eia.gov/electricity/data/eia860/>.

⁷¹ Michigan State University, “Sample Zoning for Wind Energy Systems 2020,” MSU Extension, 2020. https://www.canr.msu.edu/resources/sample_zoning_for_wind_energy_systems_1.

⁷² Department of Environment, Great Lakes, and Energy (EGLE), “Wind Resources,” 2024, <https://www.michigan.gov/egle/about/organization/materials-management/energy/communities/wind-resources>.

the team to interview with a wider range of Michigan wind farm developers and local officials to gain more generic lessons learned.

Isabella and Meridian Wind Projects

The team identified the Isabella Wind Farm and the Meridian Wind Park as case studies for further research. The projects were chosen for three reasons. The first is that they are the two biggest wind projects in the state of Michigan at 383 MW and 225 MW respectively and therefore well exceed the 100 MW threshold of PA 233. Secondly, they provide insight on two different permitting jurisdictions as Isabella was approved at the county level and Meridian was approved through three townships: Mt. Haley, Porter, and Jonesfield. Finally, the two projects were both approved in the last five years (Isabella in 2019 and Meridian in 2020), so the team felt reflections on their development had the potential to be more accurate and the relevant documents more readily available.

The Isabella Wind Farm is located in Isabella County, occupying parts of Denver, Gilmore, Isabella, Nottawa, and Vernon Townships. First introduced in 2017, Isabella Wind Farm received land use approval in 2019 and was built and commissioned in 2021. Developed by Apex Clean Energy, the wind farm comprises 136 turbines that generate 383 MW and power over 120,000 households. Though the project spans five townships, all of them are governed by a single zoning authority: Isabella County. When the project was proposed, residents expressed concerns regarding setbacks, height, noise, and visual impacts. But the anticipated economic benefits of the project drew local support as well. Apex and the Isabella Planning Commission worked together from 2017 to 2019 to address resident feedback, including updating zoning amendments. For example, at the planning commission meeting on June 8, 2017, community members shared their concerns about the noise level of wind turbines. In response to community input from this meeting, two items were amended in the existing zoning ordinance. In Section 12.05.QQ.4 to 6, the original language used “hub height,” but residents were concerned that “hub height” was vague.⁷³ The amendment introduced changed the language to “tower height.” The commission also addressed community feedback regarding the noise standard, which was changed from an upper limit of 55 dB(A) to 50 dB(A) via amendment. At another meeting in 2018, the community once again voiced their concerns with regard to noise and setbacks. At the time of this meeting, Section 12.05.QQ.7 required setbacks from occupied buildings to be no less than the greater of a) two times the tower height, or (b) 1,000 feet. Throughout this meeting, there were calls to increase the setback to 1,640 feet and decrease the noise level once more to 40-45 dB(A). In the end, no changes were made to setbacks and noise levels, with some interpreting the proposed changes as an effort to “stop or slow clean energy development.”⁷⁴

Table W-1: Isabella and Meridian Wind Project Details

Project Name	Capacity in Megawatts (MW)	Local Ordinance	Approval date and Operational status
Isabella Wind Farm	383 MW	Isabella County	Currently operating
			Approved: 01/31/2019
Meridian Wind Farm	225 MW	Mt Haley Township	Currently operating
			Approved: 11/18/2020
		Porter Township	Currently operating
			Approved: 12/23/2020
		Jonesfield Township	Currently operating
			Approved: 11/30/2020

73 Isabella County Planning Commission, “Approved Meeting Minutes - February 8, 2018,” Isabella County, <https://www.isabellacounty.org/wp-content/uploads/2019/03/pcminutes02082018approved.pdf>

74 Isabella County Planning Commission, “Approved Meeting Minutes - February 8, 2018.”

Another amendment was introduced to require Apex to conduct a post construction study of sound level measurements. Apex representatives present at this meeting were agreeable to this proposal and an amendment was passed by the planning commission. Once amendments were established and conditions of approval were met, Isabella Wind Farm broke ground on construction. The project became operational in 2021. That same year, DTE acquired the Isabella Wind Park from Apex Energy.⁷⁵

Meridian Wind Park is located in mid-Michigan. The park falls under the jurisdiction of three townships: Jonesfield Township in Saginaw County, Mt. Haley Township in Midland County, and Porter Township in Midland County. DTE developed and currently operates the 225 MW wind park, which includes 77 wind turbines. The development process began in 2019, land use approvals were obtained in all three governing jurisdictions by December 2020, and the wind park became operational in April 2023. More than 700 landowners were participants in the project and created 350 temporary construction jobs.⁷⁶ To receive project approval, DTE worked across three separate township zoning ordinances and a local airport overlay district. The process proceeded differently in each jurisdiction due to the distinctions of each township's ordinances.

Comparing Local Zoning Ordinance and Conditions of Approval

Table W-2 provides a simplified comparison of standards from PA 233 and the sample ordinance to the zoning ordinances and conditions of approval relevant to the Isabella Wind and Meridian Wind projects. More details on the content of each of the zoning ordinance standards and conditions can be found in Appendix C.

A couple initial takeaways from this analysis stand out. First, the content that is in PA 233 is nearly ubiquitous in each of these cases — not just in their zoning, but also in their conditions of approval. When there is already a zoning requirement present, conditions of approval can be used to request more information. For example, Isabella County has a height requirement in their zoning, but also asked for a report of all of the heights of surrounding features within 600 feet as a condition of approval for Isabella Wind.⁷⁷ And, in Jonesfield Township, conditions were used to create more detailed project requirements regarding sound- the noise ordinance establishes a technical standard of 60 dB from the property line and mandates that it be confirmed before and after construction. Through conditions of approval, the township added specific guidelines for the completion of a noise study and requested that the developer submit an explanation whenever noise exceeded 55 dB at the property line of a non-participant.⁷⁸

Second, most of the standards within the Sample Zoning Ordinance that did not directly map to PA 233 were also addressed either in each jurisdiction's zoning ordinance or, more commonly, through conditions of approval. For example, all four jurisdictions required monetary performance security. Three of the four zoning authorities applied conditions around the placement or performance of construction-phase infrastructure, such as laydown yards and crane walks. And, three of the four also had stipulations governing burying the utility lines connecting wind turbines, accessory uses, laydown areas, visual impact studies, and complaint resolution.

What is perhaps even more interesting is not just the presence or absence of regulations in Table W-2, but what can be gleaned from the details of each of the ordinances, which are presented in their entirety in Appendix C. The following subsections discuss each in turn, following the order of provisions listed in both the Table and Appendix C. While the following subsections identify the most common elements, readers should refer to Appendix C for the full list of regulations and conditions that applied to each of these projects.

⁷⁵ Apex Clean Energy, "Apex Closes Sale of 383 MW Isabella Wind Projects to DTE Energy | Apex Clean Energy," Apex Clean Energy, October 2021.

⁷⁶ DTE Energy, "Wind Energy," <https://www.dteenergy.com/us/en/residential/community-and-news/renewable-energy/wind-energy.html>.

⁷⁷ Isabella County Planning Commission, "Approved Meeting Minutes - January 31, 2019," Isabella County, <https://www.isabellacounty.org/wp-content/uploads/2019/01/01312019-pcminutes-approved.pdf>.

⁷⁸ Spicer Group, "Review of DTE's Meridian Wind Park Special Land Use Permit Application," November 9, 2020, p. 11, http://www.jonesfield.com/Portals/8/Jonesfield_SUP%20Spicer%20Report_1.pdf.

Table W-2: Comparison of Local Zoning and Conditions of Approval to PA 233

Dark Blue Z blocks indicate that the topic was regulated in the zoning ordinance. Green C blocks indicate that the topic was regulated in the conditions of approval.

NOTE: Appendix C shows detailed matrix and source information. Minor requirements are omitted from the table.

	Topics	Isabella County	Porter Township	Mt Haley	Jonesfield
PA 233 Tech. Standards	Setbacks [226.8(b)(i)]	Z	Z	Z	C
	Shadow Flicker [226.8(b)(ii)]	Z	C	Z	C
	Height and Ground Clearance [226.8(b)(iii)]	Z	C	Z	Z
	Sound [226.8(b)(iv)]	Z	Z	C	Z
	Lighting [226.8(b)(v)]	Z	C	Z	C
	Radar and Signal Interference [226.8(b)(vi)]	Z	Z	C	Z
PA 233 General Standards	Safety [226.7(g), [225(g), [225(q)]		Z	Z	C
	Construction Codes and Interconnection Standards [226.7(g)]	Z	C	Z	C
	Airport and Aviation Permit [226.7(g)]	Z	C		
	Environment Permit [226.7(c), [225(c), [225(l), [225(p)]	Z	C	Z	C
	Avian and Wildlife Impact Permit [226.7(c), [225(c)]			Z	
	Utilities [226.7(c)]	Z	C	Z	Z
	Decommissioning and End of Useful Life [226.7(g), [225(r)]	Z	C	Z	C
Sample Zoning for Wind Energy Systems	Accessory Uses	Z	Z	Z	
	Post Construction Sound Study	Z	C		C
	Construction Specific Standards		C		Z
	Performance Security	Z		C	Z
	Visual Impact	Z	Z	C	Z
	Complaint Resolution	Z	C		Z
	Annual Maintenance Review			C	Z
Additional Requirements	Certifications			C	C
	Access Roads		C		C
	Public Roads			C	Z

Setbacks

As noted previously, all wind zoning ordinances included setback regulations, but three of the four exhibited at least one discrepancy with PA 233 by requiring setbacks from features not listed in the Act. Isabella County, for example, required a setback of 1.5x the tip height from railroads and rail trails.⁷⁹ Porter Township also includes such a setback of 2x the tip height.⁸⁰ Mt. Haley Township requires a setback of 100 feet from creeks and drains.⁸¹ It should also be noted that three of the four ordinances use the same “tip height” standard as the Act.⁸² Isabella County refers to “tower height,”⁸³ but this can be interpreted as the full height of the turbine or tip height. Porter Township uses hub height in its ordinance, so it is difficult to make direct numeric comparisons between the two standards.⁸⁴

The hierarchy of local setbacks, though, follows that of PA 233. The ordinances and PA 233 both require larger setbacks from dwellings and buildings than from property lines. For example, Isabella County required twice as large of a setback from a dwelling (2x tower height) as that from a non-participating property line (1x tower height).⁸⁵ It was not uncommon for setbacks to be greater from the dwellings of non-participating property owners compared to those of project participants. Mt. Haley requires a setback of 2x tip height (or 1,000 feet) from participating property owner dwellings but 2.5x tip height (or 1,320 feet) from the dwelling of a non-participating property owner.⁸⁶ When DTE submitted site plans for review in Jonesfield Township, they indicated that turbines needed to be 1,320 feet from non-participating residences, compared to only 1,000 feet from participating residences.⁸⁷

As is the case in PA 233, it is not uncommon to waive setbacks from participating property lines entirely. The reasoning behind this approach is to encourage the siting of turbines along internal property lines, the benefits of which will be explained in greater detail in the interview feedback section. Participating property line setback waivers were provided in at least three of the four zoning ordinances that the team reviewed. Jonesfield Township’s ordinance uses the word “adjacent” to describe setbacks from property lines, so it is unclear whether they also applied such a waiver.⁸⁸

While the setbacks in PA 233 are exclusively given as a multiple of turbine tip height, three of the four ordinances reviewed present two metrics, one framed in terms of tower height, and the other defined as an absolute distance. Generally, the developer must comply with whichever distance is greater.

Where there were additional conditions of approval for setbacks, the local government unit required staking or mapping just prior to excavation to demonstrate planned turbine locations complied with setbacks.^{89,90}

Shadow Flicker

PA 233 requires that shadow flicker not exceed 30 hours per year, “under planned operating conditions,”⁹¹ at any “non-participating residence” or “occupied community building.”⁹² It also specifies that this be demonstrated

79 Isabella County Zoning Ordinance § 12.05(QQ)(4)

80 Porter Township Ordinance 249 § 3(f) (2014)

81 Mt. Haley Zoning Ordinance § 621(2)(4)

82 Mich. PA 233 § 226.8.(b)(i)

83 Isabella County Zoning Ordinance § 12.05(QQ)(4)

84 Porter Township Ordinance 249 § 3(f) (2014)

85 Isabella County Zoning Ordinance § 12.05(QQ)(4)

86 Mt. Haley Zoning Ordinance § 621.2.4

87 Meridian Wind Park Phase I DTE Wind Energy Project site plan, Jonesfield Township, December 3, 2020.

88 Jonesfield Township Zoning Ordinance § 612.1

89 Mt. Haley Township Planning Commission Resolution Conditionally Approving Meridian Wind Park Site Plans, Mt. Haley Township, December 23, 2020.

90 Jonesfield Township Planning Commission Resolution Conditionally Approving Meridian Wind Park Site Plans, November 18, 2020.

91 Mich. PA 233 § 226.8.(b)(ii)

92 Mich. PA 233 § 226.8.(b)(ii)

with “industry standard computer modeling.”⁹³ Three of four ordinances have some level of discrepancy with this standard. Two townships have more stringent shadow flicker requirements. Zero shadow flicker is allowed on or within 100 feet of non-participating dwellings in Mt. Haley Township and there is a 30 hour requirement for participating dwellings.⁹⁴ In Porter Township, the standard for non-participating dwellings is a maximum 20 hours per year.⁹⁵ Isabella County required a standard of 30 hours per year, but the regulation applies to all occupied buildings, not just nonparticipating residences.⁹⁶ Jonesfield Township had no ordinance requirements for shadow flicker, but the developer offered 30 hours as a standard, which the township then required through conditions of approval, and aligns with the standard established in PA 233.⁹⁷

The differences between requirements go beyond technical standards. Mt. Haley Township had far more requirements for shadow flicker both in its ordinance and conditions of approval. Most notable are its requirements for a mitigation plan, curtailment software, and conflict resolution process, should shadow flicker be found to be a nuisance. Porter Township requested that the developer specify how excessive shadow flicker would be mitigated. Porter and Mt. Haley Townships gave the jurisdiction authority to request a post construction verification of shadow flicker^{98 99} and specified that the developer would fund any shadow flicker studies.^{100 101}

Height

PA 233 does not have an explicit height limit. Rather, it states that no wind blade tip may exceed the requirements established by the Federal Airline Administration (FAA)’s Determination of No Hazard to Air Navigation. Therefore, any jurisdiction requiring a specific height limit is not in alignment with the PA 233 standard.

In line with PA 233, the Sample Zoning Ordinance recommends that jurisdictions not establish a height limitation for large-scale wind projects. The rationale is that wind turbine technology is evolving and existing height ordinances established at one moment in time may not align with future technology. A height limitation may exclude new wind development and larger turbines, leading to less efficient utility-scale projects.¹⁰² None of the ordinances examined had an explicit height limit. Isabella County only provides height requirements for onsite WECS up to 66 feet in height, but not for utility-scale WECS.¹⁰³

While there is no mention of a specific height limit, three out of the four jurisdictions referenced the FAA height guidance. Additionally, some jurisdictions applied more scrutiny than is found in PA 233 through “tip clearance” requirements. For example:

- In Isabella County, the “minimum vertical blade tip clearance”¹⁰⁴ is 75 feet.¹⁰⁵ Isabella County is the only jurisdiction to condition height approval and required the developer to submit the height of all surrounding structures within 600 feet of a turbine.¹⁰⁶
- In Jonesfield Township, blade tips need to clear 20 feet and meet FAA guidelines.¹⁰⁷
- Both Mt. Haley and Porter Townships mention height requirements should meet FAA guidelines.

93 Mich. PA 233 § 226.8.(b)(ii)

94 Mt. Haley Zoning Ordinance § 621.2.11(a)

95 Porter Zoning Ordinance § 249.3.6

96 Isabella County Zoning Ordinance § 12.05(QQ)(4)

97 Jonesfield Township Planning Commission Resolution Conditionally Approving Meridian Wind Park Site Plans, November 18, 2020.

98 Porter Zoning Ordinance § 249.3.6

99 Mt. Haley Zoning Ordinance § 621.2.11

100 Porter Zoning Ordinance § 249.3.6

101 Mt. Haley Zoning Ordinance § 621.2.11

102 MSU Extension, “Sample Zoning,” pg. 26, 2020.

103 Isabella County Zoning Ordinance § 12.05(QQ)(2)(k)

104 Isabella County Zoning Ordinance, § 12.05(QQ)(9)

105 Isabella County Zoning Ordinance, § 12.05(QQ)(9)

106 Isabella County Planning Commission. “Special Meeting - January 31, 2019.”

107 Jonesville Township Zoning Ordinance Chapter 6 § 621 (l)

Noise

As with setbacks, each of the wind zoning ordinances include sound regulations, but none appear to fully comply with the standard set by PA 233 [§ 226.8(b)(iv)] of “55 average hourly decibels (dB)” at a nonparticipating dwelling. The differences lie in one of three things: a decibel number less than 55, a difference in the measurement descriptor (see note below), or measuring the sound from a different receptor.

Note: As explained at length in the sample ordinance,¹⁰⁸ sound measurement is complicated, and while most ordinances focus on just the decibel number, descriptor — or how the ordinance defines sound measurement — matters immensely. Instantaneous measurement (Lmax) is much more restrictive than averaged measurement (Leq), even if given the same decibel number. It is not uncommon for zoning ordinances to be silent on this matter, and has been the subject of at least one lawsuit specific to wind sound in Michigan.¹⁰⁹ There is some ambiguity in the descriptor in PA 233, but the team assumed that the “average hourly” means Leq (1 hr). MPSC should be aware that they may want to seek acoustical expertise in regulation and enforcement.

Isabella County differs from PA 233 on all three items. The County requires sound below 50 dB(A) measured instantaneously (Lmax) from a non-participating property line, as opposed to the dwelling.¹¹⁰ Porter Township requires the measurement from a “habitable structure”¹¹¹ to be no greater than 55 dB(A). Its ordinance is silent on the type of measurement (Lmax vs. Leq), but the allowance given to the project to exceed “during short periods”¹¹² suggests that this measurement is not intended to be an average, but may be the more stringent Lmax descriptor. Mt. Haley Township’s noise ordinance is extensive. It aligns with PA 233 in requiring an average measurement, but setbacks are to be measured to the property line, and must fall below 45 dB for a non-participant.¹¹³ Jonesfield Township’s decibel requirement is less restrictive than PA 233 at 60 dB. However, this must be measured from the property line and the ordinance is again silent on whether or not this is an Lmax or Leq measurement.¹¹⁴ Jonesfield Township also required that justification for noise greater than 55 dB at non-participating property lines be provided as part of its conditions of approval, per recommendation of the developer.¹¹⁵

Beyond the actual standard, most jurisdictions had either zoning regulations or conditions of approval that required verification of sound standards. Mt. Haley Township’s zoning ordinance contained extensive noise study requirements, which provided measurement location standards and featured a compulsory post-construction noise study.¹¹⁶ In Isabella County, the county amended their zoning ordinance in 2018 to include a post-construction sound study for wind developments.¹¹⁷ Jonesfield Township required a similar study through its conditions of approval for the project. The ordinances also included guidance on how to round or interpret measurements. Other conditions of approval for noise specified that the developer needed to pay for noise studies and that any excessive post construction noise needed to be mitigated. For example, Mt. Haley required that if “any noise sensitive facilities”¹¹⁸ exceeded noise minimums when the project was in operation, “the Applicant shall employ operational controls that reduce the sound pressure level to the requirements in the Ordinance.”¹¹⁹

108 MSU Extension, “Sample Zoning,” 2020, p. 38.

109 *Tuscola Wind III, LLC v. Almer Charter Twp.*, 327 F. Supp. 3d 1028 (E.D. Mich. 2018)

110 Isabella County Zoning Ordinance § 12.05(QQ)(16)

111 Porter Township Ordinance 249 § 6 (2014)

112 Porter Township Ordinance 249 § 6 (2014)

113 Mt. Haley Zoning Ordinance, Township Ord. 20, Ord No. 01-11 § 621.2.12

114 Jonesfield Township Zoning Ordinance, Chapter 6 § 612.1

115 Spicer Group, “Review of DTE’s Meridian Wind Park Special Land Use Permit Application.”

116 Mt. Haley Zoning Ordinance, Township Ord. 20, Ord No. 01-11 § 621.2.12

117 Isabella County Planning Commission. “Approved Meeting Minutes - February 8, 2018.”

118 Mt. Haley Township Planning Commission Resolution Conditionally Approving Meridian Wind Park Site Plans, Mt. Haley Township, December 23, 2020.

119 Mt. Haley Township Planning Commission Resolution Conditionally Approving Meridian Wind Park Site Plans, Mt. Haley Township, December 23, 2020.

Lighting

Since references to FAA guidelines within an ordinance can apply to both height and lighting, this section considers lighting requirements in the four jurisdictions. PA 233 requires that the wind facility be equipped with a “functioning light-mitigation”¹²⁰ technology, allows temporary lighting during construction prior to final lighting installation, and authorizes the Commission to grant a temporary exemption from lighting requirements, should there be a practical infeasibility to the use of the light-mitigation technology.¹²¹

Two of the four townships deviate from PA 233’s lighting requirements. Through conditions of approval, Porter Township required the developer to use ADLS technology, a sensor-based lighting system that can detect overhead traffic, as required by the FAA unless they could not get approval from “applicable agencies” — presumably the FAA and/or the local airport authority.¹²² Mt. Haley Township also required by ordinance that developers use ADLS for turbine lighting.¹²³ While ADLS is one of the light-mitigation technologies included in PA 233, it is not the only such technology, and neither township grants the developer any practical infeasibility exemptions. While Isabella County did not reference the FAA, it did mention that towers shall not have any affixed lights except for illumination devices required by federal regulations.¹²⁴ Through conditions of approval, Isabella required developers to provide temporary construction lighting plans to the planning commission.¹²⁵ Jonesfield Township’s requirements were aligned with PA 233.

Signal Interference

PA 233 [**§ 226.8(b)(vi)**] requires that wind energy facilities meet “any standards related to radar interference, lighting,... or other relevant issues.”¹²⁶ Three of the four jurisdictions include signal interference in their zoning ordinances, stating that facilities shall not “be installed in any location where its proximity with existing fixed broadcast, retransmission, or reception antennas for television, radio, or wireless phone or other personal communication systems would produce electromagnetic interference with signal transmission or reception.”¹²⁷ Both Mt. Haley and Porter Townships applied a condition of approval related to communications systems interference to Meridian Wind. The condition states that an applicant will “[remedy] at their own cost any electromagnetic interference that is disrupted by any wind energy facility and restore reception to at least the levels present before the wind energy facility operations.”^{128,129} Neither ordinance appears to require a pre-construction field assessment to set a pre-project baseline. Jonesfield Township has no language related to signal or communications systems interference in its zoning ordinance.¹³⁰

Certification and Maintenance Review

There is no mention of post-construction or periodic maintenance review in PA 233. However, two of the four jurisdictions had specifications in either the zoning ordinance or conditions of approval outlining a post-construction study or as-built certification process. Mt. Haley Township required as-built site plans to be submitted after construction, along with a maintenance and operations schedule.¹³¹ Porter Township required annual maintenance and inspection reports for the development as a condition of approval.¹³²

¹²⁰ Mich. PA 233 § 226.8(b)(v)

¹²¹ Mich. PA 233 § 226.8(b)(v)

¹²² Porter Township Planning Commission Resolution 2020-02 § 2

¹²³ Mt. Haley Zoning Ordinance, Township Ord. 20, Ord No. 01-11 § 621.2.5

¹²⁴ Isabella County Zoning Ordinance, § 12.05(QQ)(13)

¹²⁵ Isabella County Planning Commission. “Special Meeting -January 31, 2019.”

¹²⁶ Mich. PA 233 § 225.1(h)

¹²⁷ Porter Township Ordinance 249 § 8

¹²⁸ Mount Haley Township Planning Commission Resolution, December 23, 2020.

¹²⁹ Porter Township Planning Commission Resolution 2020-02 § 2

¹³⁰ Jonesville Township Zoning Ordinance

¹³¹ Mt. Haley Zoning Ordinance, Township Ord. 20, Ord No. 01-11 § 621.2.4(f)

¹³² Porter Township Planning Commission Resolution 2020-02 § 2

Utilities

Within a wind farm, it is common for utility cables connecting each turbine to be placed underground, usually crossing fields rather than running along the right of way. Utility cables that were not buried deep enough were a frequent point of concern of local officials, as explained further in the interviews section. Cable depth is not mentioned in PA 233, and is only present in two of the four zoning ordinances. Both Porter and Mt. Haley Townships had requirements instructing the burial of underground utility lines. In Porter Township, the zoning ordinance required utility lines to be buried to “maximize continued agricultural use of the land.”¹³³ Mt. Haley Township’s zoning ordinance provided a more concrete standard, requiring that cables be buried a minimum of five feet below grade.¹³⁴ Since the team could not schedule interviews with the two communities whose ordinances and conditions were silent on cable depth, it is unclear whether this posed a problem for those specific projects or if it would be considered a “lesson learned” for the future.

Visual Impact

Three of the four jurisdictions had standards for the visual impact of the project. These standards included limiting lighting beyond the FAA requirements and requirements that turbines should be non-reflective.^{135,136,137} Some standards included specifications, either in the zoning ordinance or conditions of approval, that turbines should be a neutral color and should not be used to advertise or feature any branding.^{138,139}

Decommissioning

All jurisdictions required a decommissioning plan either in the zoning ordinance or by condition of approval. With the exception of Jonesfield Township, who only required as a condition of approval that “Prior to construction, the applicant and Township Board enter into a mutually agreeable” plan,¹⁴⁰ the other jurisdictions are much more specific than what is listed in PA 233 **[§ 225.1(r)]**. For example, they stipulate the decommissioning timeline, depth of excavation of the turbine foundation, and the need for soil restoration. None of the regulations appear to allow for the decommissioning surety to be phased in, and while none of the regulations require periodic review of the decommissioning surety, as suggested in the sample ordinance, the three most detailed ordinances make explicit that they will be able to recover costs via liens and other legal means if the escrow proves to be insufficient to complete decommissioning.^{141,142,143}

Complaint Resolution

While complaint resolution is not addressed in PA 233, three of the four jurisdictions — whether enforced through ordinance or condition of approval — outlined a complaint resolution process in the project’s final plans and approval. Mt. Haley Township was the only jurisdiction to include a complaint resolution within its zoning ordinance. This requirement included that the developer have a process for addressing complaints, acknowledge complaints within ten days of receipt, specify a time limit for complaint response, provide an active and monitored telephone number to receive complaints and feedback, and, once project construction began, provide regular (monthly for first three years, then quarterly) reports about complaints received and how they were resolved.¹⁴⁴

¹³³ Porter Township Ordinance 249 § SPR(2)(b)(iv)

¹³⁴ Mt. Haley Zoning Ordinance, Township Ord. 20, Ord No. 01-11 § 621.24(g)(iii)

¹³⁵ Isabella County Zoning Ordinance, § 12.05(QQ)(18)

¹³⁶ Porter Township Ordinance 249 § SPR(2)(b)

¹³⁷ Mt. Haley Zoning Ordinance, Township Ord. 20, Ord No. 01-11 § 621.2.7(a-f)

¹³⁸ Porter Township Ordinance 249 § SPR(2)(b)

¹³⁹ Mt. Haley Zoning Ordinance, Township Ord. 20, Ord No. 01-11 § 621.2.7(a-f)

¹⁴⁰ Jonesfield Township Planning Commission Resolution, November 18, 2020

¹⁴¹ Isabella County Zoning Ordinance, § 12.05(QQ)(2)(l)

¹⁴² Porter Township Ordinance 249 § 6

¹⁴³ Mt. Haley Zoning Ordinance, Township Ord. 20, Ord No. 01-11 § 621.2.13(b)

¹⁴⁴ Mt. Haley Zoning Ordinance, Township Ord. 20, Ord No. 01-11 § 621.2.15(a-c)

Coordination with External Agencies

While PA 233 does not require coordination with external agencies, it does suggest seeking approval from the following: Federal Aviation Administration,¹⁴⁵ American National Standards Institute,¹⁴⁶ environmental agencies (EGLE, DNR, and MDARD),¹⁴⁷ the county drain commissioner,¹⁴⁸ and a regional transmission organization.¹⁴⁹ Between zoning ordinances and conditions of approval, all four jurisdictions required developers to seek approval from additional departments and/or external agencies. All four jurisdictions made references to the FAA in their zoning ordinances. Three also included the FAA in conditions of approval. The Meridian Wind and Isabella Wind projects fell within the MBS (Midland, Bay City, and Saginaw) International Airport overlay district, so additional air-traffic-related height and lighting requirements were part of the overall project approval. While state- and federal-level environmental regulations supersede local zoning, some zoning jurisdictions make that explicit in their ordinances or conditions of approval. Among the four cases, two conditioned approval upon the project complying with EGLE standards. Two jurisdictions deferred to the county-level road commissions in conditions involving road damages, construction, and materials. Three jurisdictions usually deferred to the drain commission in conditions involving flood impacts and drainage mitigation. And, as a condition of approval, two jurisdictions requested a fire and emergency response plan approved by their fire department.

Figure W-2 provides more information on which agencies were involved in each jurisdiction's permitting process and whether it was stated in the zoning ordinance or as a condition of approval.

	ISABELLA COUNTY	PORTER TOWNSHIP	MOUNT HALEY TOWNSHIP	JONESFIELD TOWNSHIP
 FEDERAL AVIATION ADMINISTRATION (FAA)	Z	Z C	Z C	Z C
 EGLE			C	C
 ROAD COMMISSION			C	C
 DRAIN COMMISSION		C	C	C
 FIRE AND EMERGENCY RESPONSE		C	C	

Figure W-2: Required Coordination with External Agencies

¹⁴⁵ Mich. PA 233 § 226.8(b)(iii)

¹⁴⁶ Mich. PA 233 § 226.8(b)(iv)

¹⁴⁷ Mich. PA 233 § 225.1(k)

¹⁴⁸ Mich. PA 233 § 225.1(p)

¹⁴⁹ Mich. PA 233 § 226.7(a)

Exceeds Minimum Requirements

Since most energy developers aim to maximize the potential power generation of their site, some may attempt to design site plans to the fullest capacity allowed by ordinance requirements. However, it is rarely the case for a site to be built to the maximums across all jurisdictional requirements. When this happens, it is usually because concessions were made in one area to meet another, more restrictive requirement somewhere else. It may also be a product of an energy developer’s internal standards that they have found to produce the most efficient design.

In order to understand how common it was for developers to “max out” or exceed the minimum requirements on standards, the team analyzed a selection of the site plans in the cases.

Setbacks

Across both projects, there were places where setbacks exceeded minimum requirements, but this often appeared to be a product of site design or a result of other ordinance requirements. Further, because the submitted site plan does not always reflect the as-built design, it may be in the developer’s best interest to propose turbines that exceed minimum setback requirements, so as to allow for making small adjustments to the turbine locations during construction. Additionally, the “wake effect” may have influenced technical requirements for separation between wind turbines to optimize the capture of wind.¹⁵⁰

Example sections from the Isabella Wind Park site plan¹⁵¹ show how setbacks were exceeded, but wind turbine placement may have been determined by other factors like wind speed or shadow flicker.

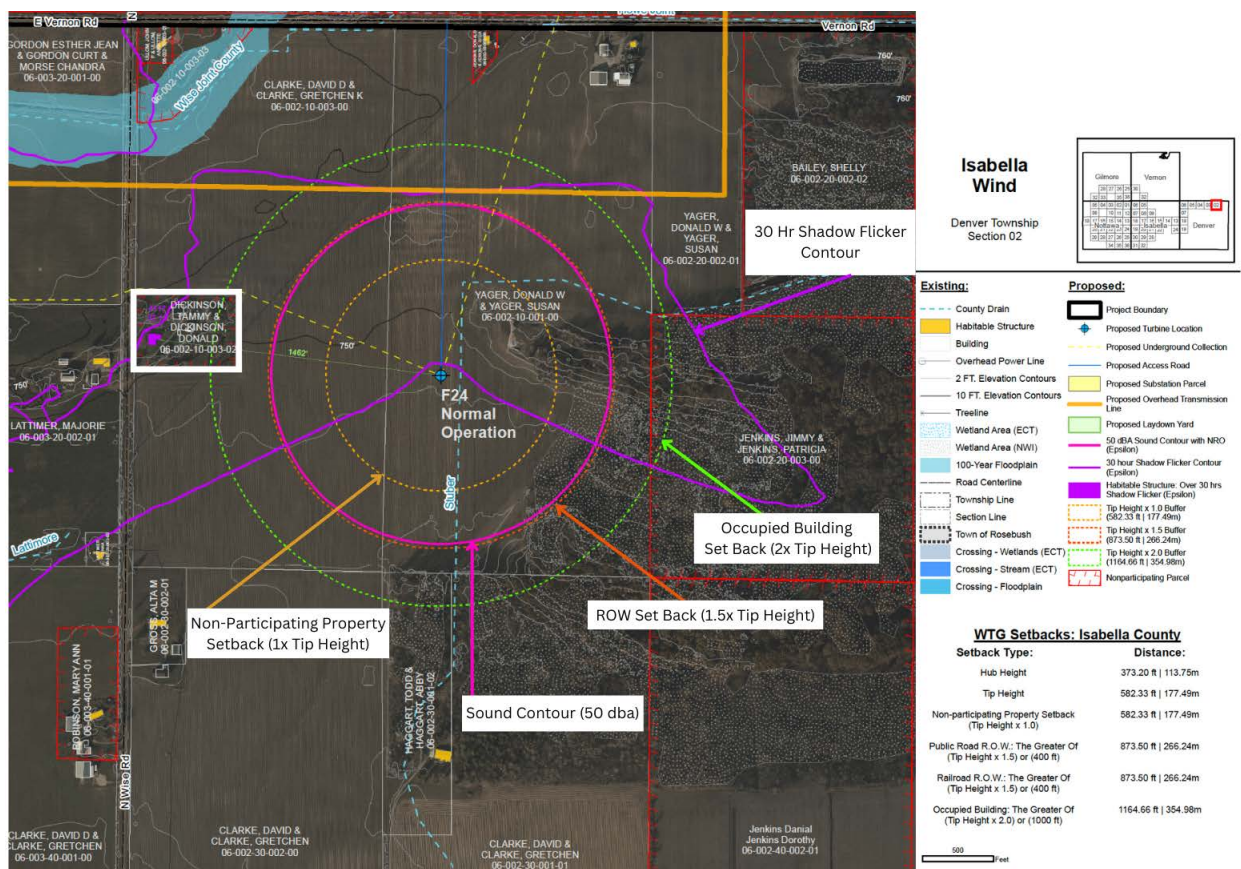


Figure W-3: Isabella Wind Site Plan Example Section I [Subsection of Denver Township]

150 “Reducing Wind Turbine Wakes Could Save Wind Farms Millions,” NREL, January 21, 2022, <https://www.nrel.gov/news/program/2022/reducing-wind-turbine-wakes.html>.

151 Apex Clean Energy, “Isabella Approved Site Plan,” 2019.

In Figure W-3, the Dickinson household's property line (outlined in white toward the upper left of Figure W-3) is setback beyond 1.5x tip height where the requirement was only 1.0x tip height. Additionally, the dwelling structure is 1,462 feet from the turbine, which is almost 300 feet greater than the setback requirement. The house is well outside the boundary of the 50 dB(A) sound contour as well. However, the house falls within the 30 hour shadow flicker contour, which means that even though all other setbacks were met, the turbine will need to occasionally operate at reduced capacity to reduce the amount of shadow flicker. In this case, the shadow flicker becomes the most geographically restrictive requirement. If an impactful quantity of turbines have to operate at reduced capacity to satisfy the requirement, project engineers may need to reposition turbines to maintain compliance while still developing an economically feasible project that can provide energy at an affordable rate.

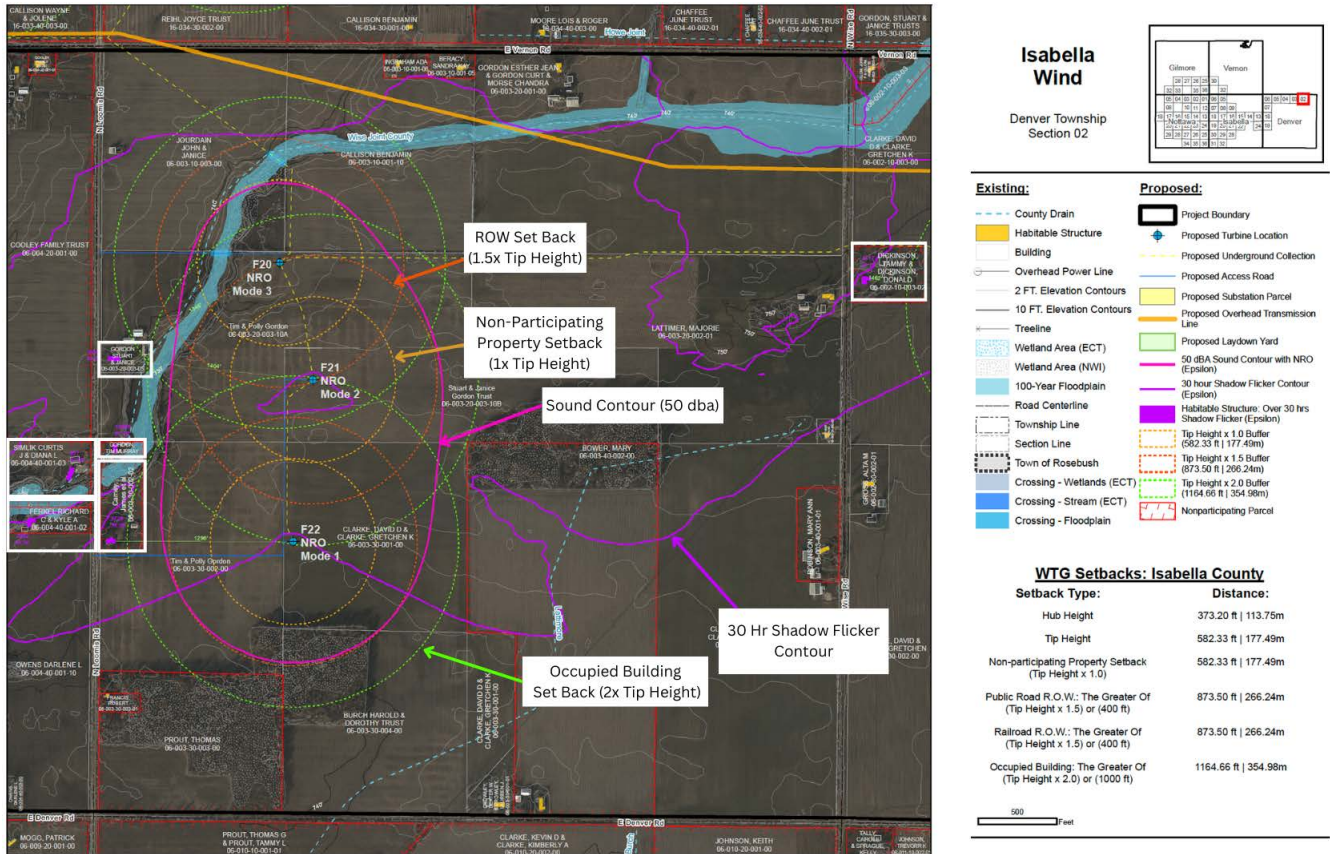


Figure W-4: Isabella Wind Site Plan Example Section II [Subsection of Denver Township]

This second example, shown in Figure W-4, illustrates that siting turbines close together may conserve the total land that falls within sound contours and physical setbacks. The turbines here are most restricted under two factors: shadow flicker and “wake effect” considerations. The shadow flicker contour for all three turbines shows that six different residences (filled in purple and outlined in white) may experience more than 30 hours of shadow flicker without reduced capacity intervention. Additionally, the turbines must be sited at a sufficient distance from each other to avoid “wake effect” reductions in wind capture. If Isabella County had imposed setbacks from rivers and streams, as other jurisdictions required,¹⁵² the farthest north turbine would likely have been relocated or not included at all. In both figures, all turbines exceed the 1.5x tip height right of way setback requirements.¹⁵³

¹⁵² Mt. Haley Zoning Ordinance, Township Ord. 20, Ord No. 01-11 § 621.2.4

¹⁵³ Isabella County Zoning Ordinance, Article 12 § 12.05(QQ)(4)

Interview Summary

To supplement the document review, the team conducted interviews with seven developers and six local officials who have existing large-scale wind projects in their jurisdictions to provide more context around the permitting and siting process in Michigan. The interviews explored topics of community engagement, conditions of approval, and zoning ordinance specifications. Interviewees were asked to reflect on their experience with large-scale wind and identify what worked well and not-so-well. Rather than covering each topic extensively, the course of interviews was guided by what lessons the interviewees most wanted to share. To preserve the anonymity of respondents, responses are not linked to any one project.

Community Engagement

Local officials and developers all noted they wanted a smooth and amicable relationship with all residents, including those who would host wind turbines on their properties as well as non-participating residents. Developers emphasized the importance of relationship-building as part of the process of acquiring leases from landowners and farmers. Local officials noted that they needed to represent and address the concerns of their constituents who would be impacted by the proposed projects. Local officials who had experience with more than one wind project noted how there may be differences in ability from developer-to-developer when it comes to fostering productive community relationships. The developers interviewed frequently established relationships with potential landowners and the broader community prior to submitting applications to local governments. This process often involved door-knocking or other outreach activities. During the development process, developers also made efforts to support local nonprofits or community-focused events. Developers acknowledged the benefit of maintaining a positive relationship with a community and have explored additional ways to strengthen that relationship even when a project is complete. Local officials, however, noted that it is not uncommon for wind projects to be sold — sometimes multiple times over the project’s life — and that this turnover undermines earnest efforts by previous owners to establish strong community relationships. This is especially true when contact with new project owners proves challenging.

Decommissioning

Decommissioning came up in interviews with both local officials and developers, but the two groups held different opinions as related to the financial considerations of decommissioning planning. According to local officials, up-front bonds are preferred to other “pay-as-you-go” escrow agreements. Decommissioning bonds, specifically financial assurance bonds, provide the safety and security that jurisdictions need to ensure that projects are fully decommissioned and that the property owners who host turbines are not accountable for costs, should the project be abandoned by a developer.

However, according to developers, excessive decommissioning bonds can be restrictive to project development. While decommissioning costs vary between states and between projects, research from the Department of Energy found (in a limited study of eight projects) that decommissioning costs per turbine ranged from \$114,000 to \$195,000, and \$67,000 to \$150,000 when salvage estimates were included.¹⁵⁴ By contrast, decommissioning costs per turbine at the Isabella Wind Farm were set at \$200,000 per turbine, as recommended by the county’s consultant based on a report from another Michigan-based project.¹⁵⁵ The timing of these bonds was also of concern. Many local governments require the decommissioning bond to be in place prior to issuing the special land use permit. According to the American Clean Power Association, when a jurisdiction requires the developer to have financial assurance in place before construction begins — let alone before issuance of a land use permit — it can impact the financial feasibility of the project.¹⁵⁶ Lenders may only provide decommissioning guarantees once there is a signed contract, leaving developers unable to count on decommissioning financing without project approval, and creating further risk at this stage of the project.

¹⁵⁴ Energy.gov, “WINDEXchange: End of Service Wind Turbine Guide,” 2022. <https://windexchange.energy.gov/end-of-service-guide>.

¹⁵⁵ Board of Commissioners, “Isabella Wind Decommissioning Agreement and Bond,” 2019, Isabella County.

¹⁵⁶ American Clean Power, “Renewable Energy Facility Decommissioning: Industry Management Practices I ACP,” ACP, October 13, 2021, <https://cleanpower.org/resources/wind-project-decommissioning-industry-management-practices/>.

Complaint Resolution

Projects generally received complaints from both residents and non-residents throughout the development process. Complaints ranged from noise levels to construction impacts and construction personnel behavior to unauthorized use of roads. While complaints can help a developer better understand the needs and concerns of the host community, at times, they can impact the project timeline and its feasibility.

Both developers and local officials noted that having a complaint resolution process has helped each party address complaints. Some jurisdictions have established a complaint validation process, meaning once a person has filed a complaint, a local official or other designee arrives on the property to confirm the problem and collect further information to aid its resolution. If a complainant does not allow the designated person on the property, the complaint is considered closed. In other cases, if a complaint regarding health issues is filed, a doctor must validate a direct correlation between the issue at hand and the presence of wind turbines. If validated, developers then must take the necessary steps to address the problem. According to local officials, if complaints are not resolved, tensions may escalate, so it is best for developers to establish these processes early on. Interviewees felt that these complaint resolution processes have led to a reduction in complaints throughout the project timeline.

Lease and Contracts

While lease and contract terms did not come up in interviews with developers, they came up frequently in interviews with local officials. Some concerns were related to the financial aspects of the lease: the price per acre, pay schedule, and the extent to which the landowner's compensation is linked to electricity prices. Local officials also recounted that leaseholders occasionally ask the local government to enforce elements that may or may not have been written in the lease. These include provisions related to broken drain tiles, excavation of topsoil, and undertaking construction activities in inclement weather, causing difficulties in restoring the ground post-construction.

Onsite Construction Inspection

Local officials frequently mentioned that their biggest takeaway from projects was the importance of on-site construction inspectors. These inspectors monitor compliance with the approved plans and are available to address construction-related issues when they arise. Construction compliance was especially important in monitoring the depth of utility cables connecting turbines to the electrical substations. Interviewees expressed concerns about cable depth for two reasons: (1) safety from electrocution, especially for those operating farm machinery, and (2) a decreased ability to add or maintain field tile. As noted earlier in this chapter, sometimes the electrical cable burial depth was specified by local ordinance; other times, as recounted by the local officials, it was established via the landowner's lease agreement. Often when construction occurred without inspectors present, utility cables were buried at a shallow depth or not placed in the approved location indicated in the site plans. Conversely, when on-site construction inspectors were present, utility cables were often placed more accurately both in terms of depth and planned location.

Furthermore, a local official in a jurisdiction that required construction monitoring noted that in addition to assuring compliance with the regulations and site plans, the inspector was able readily address conflicts between landowners and construction workers.

Notable Lessons Outside the Scope of PA 233

The following observations from interviews are notable, but are not directly applicable to the statutory text of PA 233:

Source of Equipment: Developers stated that they prefer equipment and materials sourced from within the state (and, if not in the state, domestically) whenever possible, to increase local and regional economic benefits. However, this is becoming more difficult due to increasing procurement costs and supply chain issues. Developers acknowledge that recent supply chain issues have impacted the construction phase and costs of a project, regardless of the origin of equipment.

Site Plan Scale: One of the challenges noted by wind project developers in working with local governments — even when projects have been successful — is the practical difficulties of meeting local site plan requirements. Most wind projects are regulated as special uses, and the permitting standards are often established for all special uses within the zoning district. Sometimes, this means that the plan requirements are not tailored to reflect the scale of wind projects. In some cases, developers need to submit duplicate plans: one at a scale where plans are easy to interpret and one at a scale that meets the plan regulations set by the jurisdiction.

Boundary Definitions: Large-scale wind projects — and solar projects, too — can sometimes span multiple parcels. In some cases, these parcels may belong to the same owner. Some developers that the team interviewed expressed frustration with ordinances that require setbacks from participating property lines or that do not allow for siting a turbine on the property line. More broadly, developers feel they should have more leeway to site turbines on property lines if both property owners agree to such an arrangement. They noted that this flexibility may address other concerns, like disruption to field tile and access roads impacting farming practices.¹⁵⁷ While PA 233 does not specify setbacks from participating property lines, this may concern how much flexibility may be granted when a single owner has both participating and nonparticipating properties in the vicinity of the project.

Height Studies: Developer interviewees noted that it is common for local governments to require height surveys for every structure within “X” feet of the project in order to assess visual impacts. The team observed such a study as a condition of approval in Isabella County.¹⁵⁸ Developers note that this cannot be completed via aerial cameras, which is how most of the project surveying is done. To get this information, developers must hire engineers to do a separate, in-person, height survey. This requirement adds lots of time and costs to the pre-development stage and can delay a project if added as a condition later in the process.

Per Turbine Approvals: Again, while not evidenced directly in the case studies, developers noted in interviews that local governments that require plans, permits, and approvals to be provided on a per-turbine as opposed to a per-project basis can further complicate site plan review, updates, and overall project permitting, adding time, and cost to projects.

Overlay vs. Special Use-Based Zoning: There are two fundamental approaches to setting up a utility-scale wind zoning ordinance: overlay zoning and special use permit zoning. Jurisdictions that chose to incorporate wind zoning overlay districts establish general regulations for these districts. The overlay district boundaries are set when a developer submits an application for a project. Because this is a zoning amendment — a change to the zoning map — rather than a special land use approval, this overlay approach may be put before voters in the zoning jurisdiction through a ballot referendum. This gives residents an opportunity to review, comment on, and approve or deny the redistricting. By contrast, the special use permit process does not get approved through a referendum since it is an administrative, rather than legislative, action.

When it comes time to approve and permit a wind project, jurisdictions with overlay districts have less discretion if the project meets the requirements of the overlay districts, though some approvals may still be required. However, by using direct democracy, the decision may lead to less political blowback for local officials and may garner less negative feedback overall since it’s put to the will of the people. This use of direct democracy may seem more costly by requiring a developer to get the whole zoning jurisdiction, not just participating landowners, on board; however, since wind development is typically allowed by-right in the overlay district it may allow more certainty than a special land use approval, which often has a number of very discretionary standards.

¹⁵⁷ Lee and Beverly Glazier, “DTE request for setback variance dated October 12, 2020,” email submitted to ZBA re: Meridian Wind Park, October 27, 2020.

¹⁵⁸ Isabella County Planning Commission, “Special Meeting - January 31, 2019.”

Suggestions and Takeaways

There are many lessons to be drawn from Michigan’s existing wind farms. An analysis of zoning ordinances and conditions of approval — viewed in the context of interviews with actors who have experience either developing or approving large-scale wind projects — points to a number of lessons for the MPSC. In places where these lessons fit neatly into the regulations of PA 233, the report notes the specific provision within the Act where they could be implemented.

PA 233 Suggestions and Takeaways

wind-1. Demonstrating Compliance with Noise and Shadow Flicker

While PA 233 includes standards for both noise and shadow flicker [**§ 226.8(b)**], there is no accompanying requirement in Section 225 for pre-construction modeling or a condition in Section 226 for post-construction measurements to demonstrate compliance. There are also no additional details on when it is necessary to provide the details of “industry standard computer modeling” for shadow flicker.

In Isabella County, the planning commission selected a qualified noise control engineer to conduct a post-construction sound study to confirm compliance.¹⁵⁹ The Commission could follow a similar approach of hiring third-party qualified individuals for compliance and monitoring. Through PA 233, MPSC could establish noise study criteria and require noise study submission as part of the demonstration of the effects of the proposed energy facility on public health and safety. Guidelines should specify the distance at which noise measurements should be taken and the conditions under which such studies are to be conducted. Without such guidelines, studies run the risk of being shaped to fit approval needs, rather than demonstrating an accurate assessment of the project’s noise generation. [**§ 225.1(s)**]

This also applies to signal interference, where PA 233 [**§ 226.8(b)(vi)**] provides a broad standard for signal interference (as mentioned in Table of Zoning; Signal Interference) with no way to assess and/or remedy interference should it occur after construction. Conditions of approval in the studied jurisdictions placed the responsibility of signal interference compliance on the developer. For all three effects — shadow flicker, signal interference, and noise — the Commission could require pre-construction compliance studies and industry-standard computer modeling. [**§ 225.1(s)**] Furthermore, the Commission could condition its approval on post-construction in-the-field studies that demonstrate compliance with the standards. [**§ 226.6**] The Commission should make clear what the consequences and sequence of corrective actions will be if these standards are not met at any time post-construction.

wind-2. Decommissioning

PA 233 has comparatively thin decommissioning requirements compared to the regulations in the case studies, with the exception of phased financial assurance, which was not present in any of the case studies. The inclusive language (e.g., “including”, “not be less than”, “but is not limited to”) in PA 233 may allow MPSC some discretion to add specificity. Ideally, the Commission would specify when decommissioning should commence following commercial operation, the depth of excavation required, and the quality of soil restoration the developer should perform. [**§ 225.1(r)**]

wind-3. Site Plan Specifications

PA 233 includes three requirements for a site plan: location and description of an energy facility, anticipated effect on the nearby habitat, and additional information required by the Commission. [**§ 224.1**] Wind-project engineers, as well as energy-focused planning experts or literature, should be consulted when deciding additional site plan requirements. While most local zoning ordinances have site plan requirements, they often apply to the full range

¹⁵⁹ Isabella County Planning Commission, “Professional Service Agreement-Post Construction Sound Pressure Study,” September 15, 2021.

of development projects under a local government's purview and may not be cognizant of the practical scale of wind projects. One interviewee shared that a scale of 1" = 800' was most appropriate for wind, a specification not currently stipulated by PA 233 but one that could be implemented through additional requirements. **[§ 224.1]**

wind-4. Reasonable Conditions

As the previous sections demonstrated, case study projects, as well as most wind projects in the state, have been built under local zoning ordinances that are significantly more stringent than the standards set by PA 233. Furthermore, most of these existing wind farms have needed to comply with zoning regulations and conditions on which PA 233 is entirely silent. Appendix C may prove instructive to identify what types of requirements have proven feasible in the past, as a way to assess what might be reasonable conditions to apply going forward. **[§ 226.6]** Notable candidates for these conditions, as identified by interviews, are:

wind-4.1 Setbacks to Features of Interest

As noted in the ordinance section, setbacks have been used at the local level to maintain distance from community resources, not just individual homes. For example, both Porter Township and Isabella County require setbacks from railroads and rail trails. Though MPSC cannot add setback requirements from additional features, development proximity to community resources could arise as testimony in contested cases. Therefore, it is in the Commission's best interest to ask the developer, in providing "a description of the portion of the community where the facility will be located," to submit the local comprehensive plan and zoning ordinance, as these documents will provide the most insight to the Commission about valued community features and consider whether there are opportunities to minimize impacts through applying conditions of approval. **[§ 225.1(h)]**

wind-4.2 Utility Cable Depth

The depth of collector cables factored prominently in interviews and is included in some ordinances, in part because of its impact on agricultural activity. The Commission could collaborate with MDARD to weigh in on suggested utility cable depth in the consultation required as part of **[§ 225.1(k)]**, and/or incorporate utility cable depth as a condition of approval. Additionally, the Commission may request a study to determine the ideal depth for utility cables and how this might vary across the state based on land use. Because of the agricultural implications of cable depth requirements, it may be possible for the Commission to include specifications as part of the preservation of agricultural farmland requirements **[§ 226.7(f)]**, but more scrutiny is needed on this issue. If this were the case, utility cable depth could be shown in the report of expected direct impacts on the environment. **[§ 225.1(f)]**

wind-4.3 Complaint Resolution Process

Having an established complaint resolution process will help developers and local officials better address emerging issues. A complaint validation process, as previously stated, can help confirm and reduce the number of complaints. The process should establish timing requirements for the acknowledgment of and response to complaints. It should also ensure that complaints are addressed in a way that can be documented and submitted via a complaint resolution report. The developer should also justify the reasoning behind complaints that must go unaddressed. These efforts should be documented and verified by the Commission. The Commission might consider requiring developers to submit a complaint resolution plan as an application document, or impose it as a condition of approval. **[§ 225.1(s)]**

wind-4.4 Annual Inspection and Reporting

Two of the case studies required regular (i.e., annual or, in the case of Mt. Hayley, daily) reporting to make sure that the wind turbines were in good condition. This in part can help determine when decommissioning should commence. The Commission could request the developer to submit regular inspection reports as a condition of approval. **[§ 226.6]**

General Suggestions and Takeaways

Lessons with no clear landing place in the current legislation were also included because of the context they provide or the future analysis they provoke.

wind-5. Construction Monitoring

Interviews revealed a mixed experience across the state in terms of construction enforcement. Local officials frequently cited more thorough construction monitoring as something they would implement should another large-scale project come through the jurisdiction. The construction period was often the most challenging for both the local officials and the developer because of unforeseen weather and personnel-related challenges. Even if a jurisdiction worked diligently to assure the farmland preservation in its ordinance, improper construction techniques could damage the land. In interviews with Michigan developers and local officials, many expressed doubt about how construction monitoring would proceed in the case of projects that go through the Commission. As the previous chapter pointed out, this is something that other states with state-level siting authority have addressed in numerous ways; the recommendation in States-2 suggests it may be considered as part of a condition of approval. In the review of Michigan wind projects and interviews, there are two additional considerations that came up in regards to construction regulation:

wind-5.1 Building and Electrical Permits

There have been questions about whether or not local jurisdictions can require building and electrical permits in the context of MPSC-approved projects. Even within the context of locally-approved projects there is some ambiguity and disagreement between developers and local officials about whether building and electrical permits and inspections are appropriate. There may be some opportunity, though, for local building and/or electrical inspections to provide the construction monitoring function that proved critical in past wind projects. The Commission should consult with the Attorney General's office or the Licensing and Regulatory Affairs (LARA) department on the applicability of building and electrical permits in PA 233, as this may provide an alternative avenue for construction monitoring. **[§ 231.5]**

wind-5.2 As-built Filing

To address the immediate concerns from local officials about unmonitored construction sites creating potentially unsafe conditions with respect to the depth and location of the underground collector lines, MPSC may wish to be explicit in requiring the as-built site plans. This would give the Commission assurance that important spatial regulations (such as setbacks) and conditions (such as utility cable depth) are met, not just through the intended plan, but in the project as-built as well. The Commission may consider requesting this as part of the completion report. **[§ 227(a)]**

wind-6. Contract/Lease Lessons

In interviews, concerns were brought up about contract and lease language for landowners. Local officials recounted that they were often called upon by leaseholders, especially during the construction phase, to address unanticipated construction impacts on the leaseholders' property. To ensure that local and state officials are not left to settle disputes between developers and landowners, it may be beneficial to provide education materials to lessors and consultants on lease and contract language so that landowners can better understand how to protect their interests. MPSC could also require the developer to be available to answer any questions regarding contract and lease language. Not only would this empower landowners, but also prevent future complaints and help landowners understand the extent of the practical repercussions of certificate approval.

wind-7. Pre-Approval Staking

From interviews with local officials, it was made clear that the practical reality of a site plan and its potential effects are better understood when it can be physically assessed at the project site. To gain this understanding, MPSC could implement a requirement for pre-approval staking, in which developers must physically mark and outline

the proposed site layout. This staking would allow for pre-approval project review by local officials and potentially impacted residents. This could ideally happen before site approval as part of the process of providing public notice. **[§ 223.1]** This process may help the Commission confirm the accuracy of site plan assertions, thereby preventing environmental harms, land use conflicts, and other issues, but more importantly would offer another avenue for feedback from the hosting jurisdictions ahead of any major project development and impacts.

wind-8. Communication with External Approvers

As previously mentioned, large-scale wind projects generally required approvals and reports from other regulatory agencies. As written in Section 231 of PA 233, it appears that, where relevant, their authority still applies. MPSC may need to clarify this with applicants, particularly for airport zoning district boards, drain commissioners, and road commissioners. Additionally, MPSC might benefit from being transparent about the agencies and external authorities who will be signing off on and generating reports for projects that go through the state-level siting process. This could be done through application instructions or by having an external contacts page on the MPSC website for applicants and host communities. MPSC might further benefit from building relationships with drain commissioners, road commissioners, airport zoning district boards, and other external approvers who have previously worked on projects sited locally. After the initial community outreach has concluded, the MPSC could hold regular meetings with these groups.



CHAPTER 3: UTILITY-SCALE SOLAR PROJECTS IN MICHIGAN

Lapeer Solar Farm, DTE Energy

As of October 2023, there were 48 solar farms operational in Michigan, but only two that met PA 233's 50 MW threshold.¹⁶⁰ This chapter draws upon the experience from the development and operation of these two solar farms, which span three zoning jurisdictions, using the same methodology outlined in the wind chapter: a review of each approving jurisdiction's zoning ordinances, site plans, and conditions of approval. Interviews were also conducted with solar developers active in Michigan and local officials with experience regulating Michigan-based solar.

Mapping PA 233 onto Common Zoning Provisions

Similar to the wind chapter, this section of the report cross-references PA 233 to an existing sample zoning ordinance to conduct a gap analysis. This analysis provides an understanding of where PA 233 addresses commonly regulated elements of solar projects and where the law is silent. To do this gap analysis, the team used the "Planning and Zoning for Solar Energy Systems" (referred to as "sample zoning" or "sample ordinance") report that was jointly prepared in 2021 by the Michigan State University Extension, Michigan State University's School of Planning, Design and Construction and the Graham Sustainability Institute at University of Michigan.¹⁶¹ The sample ordinance is instructive of the types of things that communities may wish to regulate.

While PA 233 covers many of the general standards and some of the key technical standards as the sample ordinance, there are several categories left unaddressed by the law, much like with wind, as shown in Appendix D. Some of these categories include, but are not limited to, screening/landscaping, soil management including land clearing and grading and wiring.

Methodology

In order to address one of the project's key objectives — ascertaining best practices in Michigan-based renewable energy siting from existing solar farms — the team took a case study approach. Zoning ordinances present in each of the cases, along with any conditions of approval placed on the projects, were compared to the standards established in PA 233 and the sample zoning ordinance to understand what regulations have proven workable in the past. The team also pulled from site plans and planning commission meeting notes, which provided foundational project details that helped the team identify where developers exceeded the minimum requirements. Interviews were conducted with a wide range of Michigan energy developers and local officials familiar with the development of solar projects in the state to capture their best practices and lessons learned.

Assembly and Calhoun Solar Projects

As previously mentioned, the case studies for this chapter are the only two Michigan solar projects that were operational as of January 2024 that satisfy PA 233's 50MW threshold: Assembly Solar and Calhoun Solar. Much like with the wind case studies, these projects provide insight on two different permitting jurisdictions: one at the county level and another through various townships.

Assembly Solar is a 239 MW solar generation facility that is located within Venice and Hazelton Townships in Shiawassee County, Michigan. Ranger Power, in partnership with D.E. Shaw Renewable Investments (DESRI), developed the Assembly project in three phases under Shiawassee County's zoning authority.¹⁶² The project spans a 1,900 acre site and is expected to provide energy for more than 35,000 homes.¹⁶³

¹⁶⁰ Clean Grid Alliance, "Solar energy projects — Michigan," <https://cleangridalliance.org/focus-areas/projects?gp=michigan&tp=Solar>.

¹⁶¹ Mary Reilly et. al, "Planning & Zoning for Solar Energy Systems: A Guide for Michigan Local Governments," MSU Extension, <http://www.canr.msu.edu/resources/planning-zoning-for-solar-energy-systems-a-guide-for-michigan-local-governments>.

¹⁶² Michigan Public Power Agency, "Assembly II and Assembly III Achieve Commercial Operation - Michigan Public Power Agency," March 29, 2022, <https://www.mppower.org/news/assembly-ii-and-assembly-iii-achieve-commercial-operation/>.

¹⁶³ Isis Simpson-Mersha, "Huge Shiawassee County Solar Farm Is Beginning of a 'Solar Boom' in Midwest," mlive, August 12, 2020, <https://www.mlive.com/news/flint/2020/08/huge-shiawassee-county-solar-farm-is-beginning-of-a-solar-boom-in-midwest>.

Calhoun Solar is a 200 MW solar generation facility that is located within Convis Township and Pennfield Charter Township in Calhoun County, Michigan. Calhoun Solar is located over approximately 2,500 total acres and is partially located on reclaimed gravel mine areas as well as lands adjacent to ongoing mine operations as well as an operating landfill. Calhoun Solar Energy LLC, a wholly owned subsidiary of Invenergy LLC,¹⁶⁴ produces enough energy to power 55,000 homes.¹⁶⁵ According to project documents, Calhoun Solar Energy LLC entered into a host agreement with Convis Township, to annually pay the township \$30,000, with yearly inflation adjustments, in addition to paying property taxes.

Table S-1: Summary Table of Solar Case Study Development Details

Project Name	Local Ordinance	Capacity	Approval Date & Operational Status
Assembly Solar Phase 1	Shiawassee County	50 MW	Currently Operating
Assembly Solar Phase 2		110 MW	Approved in February 2019
Assembly Solar Phase 3		79 MW	Approved in February 2019
Calhoun Solar	Convis Township	200 MW	Currently Operating
	Penfield Township		Approved in August 2019
			Currently Operating
			Approved in September 2020

To conduct case studies, the team reviewed project plans, municipal meeting minutes, project conditions of approval, and local zoning ordinances. To gain a better understanding of what is currently working and what could work better at the procedural level, the team conducted interviews with solar developers and Michigan local government officials with solar permitting experience — including some who have large-scale solar projects currently under construction in their township. In analyzing the information gleaned from these processes as well as a literature review, team members identified takeaways specific to solar projects. To learn more about community engagement for renewable energy, refer to Summary Report of Community Engagement Best Practices which begins on page 87.

Comparing Local Zoning Ordinances and Conditions of Approval

Table S-2 summarizes the standards from PA 233 and the sample ordinance to the zoning ordinances and conditions of approval relevant to the Assembly and Calhoun solar projects. The full details on the content of zoning ordinance standards and conditions can be found in Appendix E.

¹⁶⁴ Pennfield Charter Township, “Calhoun County Solar Energy Project,” 2020, <https://webgen1files.revize.com/pennfieldctmi/Document%20Center/How%20Do%20I/Find%20Learn%20About/Calhoun%20Solar%20Energy%20Plan/Calhoun-County-Solar-Energy-Project.pdf>.

¹⁶⁵ Brooks Hepp, “1200-Acre Solar Energy Center Proposed in Convis Township Could Be One of the Largest in Michigan,” Battle Creek Enquirer, July 24, 2019, <https://www.battlecreekenquirer.com/story/news/local/2019/07/24/convis-township-zoning-commissioners-wants-solar-energy-center/1803254001/>.

Table S-2: Summary Table of Solar Case Study Zoning Ordinances and Conditions of Approval

Yellow Z blocks indicate that the topic was regulated in the zoning ordinance. Purple C blocks indicate that the topic was regulated in the conditions of approval.
 NOTE : Appendix E shows detailed matrix and source information. Minor requirements are omitted from the table.

	Topics	Shiawassee County		Convis Township		Pennefield Township	
PA 233 Tech. Standards	Setbacks [§ 226.8(a)(i)]	Z	C	Z		Z	
	Fencing [§ 226.8(a)(ii)]	Z		Z		Z	C
	Height [§ 226.8(a)(iii)]	Z		Z		Z	
	Sound [§ 226.8(a)(iv)]	Z					
	Lighting [§ 226.8(a)(v)]	Z				Z	
PA 233 General Standards	Public Safety [§226(7)(g)], [§225(g)], [§225(q)]	Z					
	Ground Cover [§ 226(6)(a)]		C			Z	
	Environmental and Natural Resources Impact [§Sec 226(7)(c)]	Z	C			Z	
	Stormwater [§Sec 225(1)(p)]		C		C	Z	C
	Decommissioning [§226(7)(g)], [§225(r)]/End of Useful Life	Z	C		C	Z	C
Planning & Zoning for Solar Energy Systems (Sample Ordinance)	Screening/ Landscaping	Z	C	Z	C	Z	
	Lot Coverage					Z	
	Wiring						
	Signage				C		
	Soil (ref. Land Clearing and Access Drives)				C	Z	C
Additional Requirements	Glare	Z		Z	C		
	Liability Insurance	Z	C				
	Biological Resources					Z	
	Other Agency Permit/Approval	Z	C		C		C
	Transportation Plan	Z					
	Telecommunications Interference	Z					

Setbacks

To fully grasp the extent of a solar setback standard, it is important to first identify the context in which setback measurements are set. For example, 300-foot setback requirements can feel quite different to adjacent landowners depending on whether they are measured from the property line or from an occupied public building. A 300-foot setback measured from a shared property line is shown in the top graphic of Figure S-1. As demonstrated in the bottom image of Figure S-1, when setbacks are measured from an occupied public building on a neighboring property, the facility can actually be built closer to the shared property line. This is because the 300-foot measurement includes the existing setback for the neighboring building on its side of the shared property line; if that building is setback 50 feet, as in the example, it would only require the developer to build the facility with a setback of 250 feet from the shared property line.

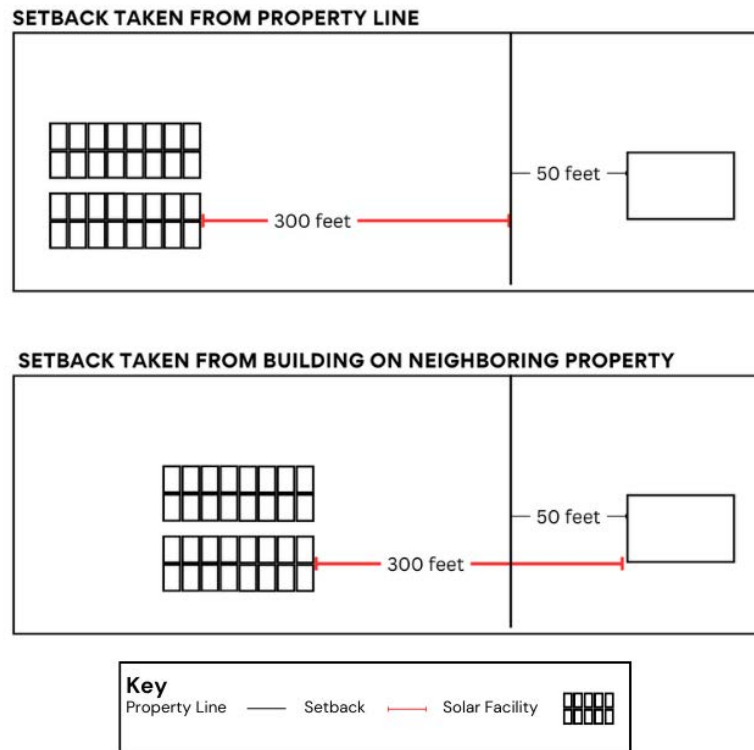


Figure S-1: Setback Measurement Illustration

Even though the required setbacks are the same, these differences can create outcomes that look and feel very different to adjacent landowners once built. Setbacks taken from buildings of interest (typically residential homes and public buildings) allow solar facilities to be much closer to existing land uses and may create a larger buildable area for any given site.¹⁶⁶

PA 233 specifies the following setback requirements for solar facilities: 300 feet from the nearest point on the outer wall to occupied community buildings and dwellings on nonparticipating properties, 50 feet measured from the nearest edge of a public road right-of-way, 50 feet measured from the nearest shared property line for nonparticipating properties [**§ 226.8(a)(i)**]. None of the three solar zoning ordinances had setbacks that fully conformed with these standards. In Shiawassee County, some of the standards were less restrictive: the County only required 40 feet from property lines, and matched PA 233’s 50-foot road setback. However, it does require a setback of 200 feet from “any habitable structure,” which is compliant with PA 233’s 300 feet setback from a nonparticipating dwelling, but would appear to also include participating dwellings, making it more restrictive than PA 233.¹⁶⁷ In Convis Township, there were no setbacks from structures, but there was a 60-foot setback from the

¹⁶⁶ Buildable area represents the amount of a parcel where a developer could construct a building after accounting for all local requirements.

¹⁶⁷ Shiawassee Zoning Ordinance Article 4 § 4(F) Solar Section

road (frontage).¹⁶⁸ Finally, Pennfield required a minimum setback of 75 feet from the property line which appears to apply to both the road and side property lines, exceeding PA 233's 50-foot standard."¹⁶⁹

Fencing

Developers in all projects studied elected to install perimeter fencing and all three jurisdictions include fencing provisions in their zoning. PA 233 mandates that fencing for a solar energy facility comply with the latest version of the National Electric Code (NEC), which requires a minimum fence height of seven feet or a six-foot fence with three strands of barbed wire. Shiawassee County has no special stipulations on fencing, while Convis Township does not allow fences to be taller than seven feet high — which is compatible with the current version of the NEC. Pennfield Township, however, conditioned approval of the Calhoun project on a woven wire fence design, instead of the proposed barbed wire fence which they feared would have posed a threat to the local deer population. While Pennfield's condition is achievable in light of NEC, it does constrain the developer more than the PA 233 standard would.

It is also notable that Shiawassee, Convis, and Pennfield ordinances also consider fencing as a potential screening strategy. In Pennfield, fencing material needs to be opaque if the developer wants fencing to serve as an alternative to landscape screening.

Height

PA 233 states solar panel array components should not exceed a maximum of 25 feet from finished grade when the arrays are set to full tilt. **[§ 226.8(a)(iii)]** Convis Township zoning was the most liberal standard of those studied. While the Convis ordinance does contain its own solar section, a height limit is not included directly but is instead pulled from the base zoning district, which at the time of approval was Agricultural-Residential (A-R). Solar facilities in Convis are exempt from a height limit so long as they can provide one linear foot of setback for every three feet of height constructed over 35 feet.¹⁷⁰ By contrast, Shiawassee and Pennfield were more stringent than the PA 233 standard, specifying a 16-foot maximum allowable height when arrays are fully tilted. In both the Assembly and Calhoun projects, developers proposed and built the arrays to a maximum height of 15 feet.

Sound

Only one of the three ordinances — Shiawassee County — addressed sound specific to solar in their ordinance. The Assembly Solar development was designed to comply with a County sound ordinance that was significantly stricter than what is required in PA 233: 40 dB(A) compared to PA 233's 55 dB. There is a slight relief for solar developers in the ordinance; if the ambient sound exceeds 40 dB(A), the solar array is permitted to exceed the ambient by five decibels. But it is not just the numerical value that is more stringent: the language in Shiawassee County's ordinance does not include a sound descriptor and thus may be interpreted to be Lmax measurement, which is significantly stricter than PA 233's likely intent to be an Leq(1hr) measurement. Both Shiawassee County and PA 233 take the measurement from the exterior of a habitable structure on a non-participating property, so there is no discrepancy in stringency on that measure.

Neither of the townships in the Calhoun Solar project had solar-specific noise standards within their ordinance or conditions of approval. Pennfield Township does have a "performance standard" that applies "to all activities, in any zoning district," saying that they "shall be conducted so as not to create or permit trespass or spillage of dust, glare, sounds, noise, vibrations, fumes, odors, or light onto neighboring properties, adjacent streets or public right-of-ways." This does not, however, appear to have factored into the evaluation of the Calhoun Solar project.

¹⁶⁸ Convis Zoning Ordinance 6.19, Article 3, Table 3-4 Site Development Requirements

¹⁶⁹ Pennfield Charter Township Zoning Ordinance 6.38.2(A)

¹⁷⁰ Convis Zoning Ordinance 6.19, Article 3, Table 3-4: Site Development Requirements, Footnote 3

Lighting

PA 233 requires solar facilities to implement dark-sky friendly lighting. Two of the three ordinances addressed lighting. Pennfield’s ordinance says that, where required for site access or safety, lighting is to be activated by motion sensors and angled to downcast. Shiawassee County required that “no light may adversely affect adjacent parcels.” It is not clear whether these standards would be interpreted as being more or less stringent than PA 233.

Ground Cover

Only one of the three observed jurisdictions addressed ground cover. Pennfield’s zoning ordinance requires that native plants should be used, but only to the extent that is feasible. In the application to Pennfield, Calhoun Solar’s developer highlights the benefits of using native plants in their submittal package: “Choosing to use native grasses and wildflowers within the Project site can provide many key benefits for reestablishing and enhancing the natural ecosystem. Restoring native grasses and wildflowers can create a beneficial pollinator habitat. Besides helping to promote biodiversity amongst native pollinator populations, pollinators play a vital role in pollinating crops, produce, and forestry products which are essential to our survival and economic success.”¹⁷¹

Ground cover has implications for site maintenance. In Shiawassee County, a condition was imposed on the developer to maintain the area outside the fence but within the participating property parcel, provided the landowner did not plant any row crops in that area. The condition required developers to maintain the area outside the fence by mowing the strips between the fence and property line. This is similar to the condition that the Commission may impose upon applicants, which requires facility owner/operator to make “a good-faith effort to maintain and provide proper care of the property where the energy facility is proposed to be located during construction and operation of the facility.” **[§ 226.6(d)]**

One nuance here is the connection between native ground cover, property maintenance, and fire risk. During interviews, one local official commented there is a concern amongst some township and village officials over their ability to contain any future fires at these facilities. Vegetation management — especially removing dead or dry vegetation — was seen as an important way to minimize the amount of combustible material around solar installations.

Soil and Stormwater

Pennfield Township’s Zoning Ordinance directly states that grading should be minimized wherever possible.¹⁷² Grading and stormwater requirements were conditions of approval for both Assembly and Calhoun projects. Through these conditions, local regulators required the developers to obtain a Soil Erosion and Sedimentation Control permit from the County Road Commission, obtain a permit from the Calhoun County Water Resources Commissioner for the stormwater management on the site, and to pay for the regrading of roads damaged due to the construction or operation of the solar energy facilities.

Similar to wind siting, it is important for regulators to coordinate with government agencies during the solar siting process. Figure S-2 illustrates the network of interagency coordination that were explicitly named in the ordinances and conditions of approval governing the Assembly Solar and Calhoun Solar developments.

¹⁷¹ Invenergy, “Calhoun Solar Energy Center Development Plan — Section 2.4.7 Landscape & Screening,” September 1, 2020.

¹⁷² Pennfield Township Zoning Ordinance, Article 6 § 6.38.2(D)

	SHIAWASSEE COUNTY	CONVIS TOWNSHIP	PENNFIELD TOWNSHIP
EGLE		Z	
ROAD COMMISSION			C
DRAIN COMMISSION OR WATER RESOURCE BOARD	C	C	C
FIRE AND EMERGENCY RESPONSE	Z		

Figure S-2: Coordination with External Agencies

Decommissioning Plan

Much like with wind siting, the zoning jurisdictions overseeing solar development all had requirements for decommissioning, either within their zoning ordinance or through conditions of approval. All were more extensive than what is required of developers in PA 233. [§ 225.1(r)] For example, all three jurisdictions specify the depth of reclamation expected at the end of the project. More specifically, Shiawassee County^{173,174} and Pennfield Township¹⁷⁵ require reclamation of a minimum of four feet, whereas Convis Township only requires a minimum of three feet.¹⁷⁶

Table S-3 summarizes the key fiscal assurances associated with the decommissioning plans for Shiawassee County, Convis and Pennfield Townships. Two of the three zoning jurisdictions allow for salvage cost to be taken into consideration, consistent with PA 233. For example, the conditions of approval in both Convis and Pennfield did not require decommissioning performance guarantees to be posted until there is “an assessment that the decommissioning costs are greater than the value of the recyclables.” To that end, all three zoning entities required developers to periodically review the cost for decommissioning. Shiawassee County required an annual review, though it is ambiguous whether the developer must pay for the updates to the decommissioning cost analysis. On the other hand, Convis and Pennfield Townships require the developer to pay a qualified third party to update these cost projections.^{177,178} Pennfield Township requires a review every three years, whereas in Convis Township the cadence is “every three to five years.” To address instances when a funding gap is present, Shiawassee County and Pennfield Township Zoning Ordinances include replenishment obligation provisions. Both Shiawassee County and Pennfield Township Zoning Ordinances require the decommissioning process be completed within a year of the end of project life or abandonment, whereas Convis — like PA 233 — does not

¹⁷³ Shiawassee County Ordinance, Ord No. 16-06-02, Article 4 § 4.3.78.4(M)(5)

¹⁷⁴ Shiawassee County Ordinance, Ord No. 16-06-02, Article 4 § 4.3.78.4(M)(6)

¹⁷⁵ Pennfield Charter Township Zoning Ordinance, Article 6 § 6.38.2(l)(4) (2023)

¹⁷⁶ Convis Township Board, “Conditional Use Permit Application for Large Solar Energy System,” Motion for Final Conditional Approval, August 13, 2019, p. 2.

¹⁷⁷ Convis Township Board, “Conditional Use Permit Application,” August 13, 2019, p. 5.

¹⁷⁸ Pennfield Charter Township Zoning Ordinance, Article 6 § 6.38.2(J) (2023)

specify when decommissioning must commence.^{179,180}

Table S-3: Decommissioning Solar Case Study Summary Table

Jurisdiction	Type of Fiscal Assurance	Amount	Frequency of Review	Is salvage allowed?	Replenishment Obligation
Shiawassee County	Surety Bond	125% cost of estimated removal and restoration	Annual	Not specified	Yes
Convis Township	Bonds can be phased in when costs become greater than salvage value	Not specified	3 to 5 yrs	Yes	Not specified
Penfield Township	Surety as security bond, irrevocable letter of credit, escrow or other form deemed acceptable by Township	150% of the total estimated decommissioning and reclamation costs prior to issuance of building permit	3 yrs	Yes	Yes

Screening and Landscaping

While screening and landscaping are not addressed within PA 233, all three zoning jurisdictions include landscape requirements in their zoning ordinances. The ordinances of Shiawassee County and Pennfield Township grant discretionary authority over project landscaping to their planning commissioners. This level of authority enables local regulators to decide what is appropriate based on site conditions, community input, and surrounding land uses. Landscape buffers were required in Convis and Pennfield Townships in areas abutting higher concentrations of existing residential buildings. Only Convis Township specified the size (height) of individual trees and planting density. Their ordinance required that where ground-mounted panels share a property line with a lot that is within an Agricultural, Residential, or Conservation District, and the panels are located within 100 feet of the shared property line, “The screening shall consist of evergreen trees of a minimum of six (6) feet in height at the time of planting and with a projected growth rate of a minimum of six (6) inches per year and to a minimum projected height of twenty (20) feet, and spaced no greater than twelve (12) feet apart measured on-center.”¹⁸¹

In addition to requiring the initial installation of vegetative screening, Convis Township also required maintenance of these planting materials as a condition of approval. Specifically, they required that plant material located in landscape buffers is required to be replaced within one year of its death or if the zoning administrator determines excessive disease is present. Shiawassee County similarly conditioned its approval on “all strips not being farmed [presumably outside the project fence] need to be mowed one time per year.” Landscaping came up multiple times in interviews and is discussed further in the interview section at the end of this chapter.

¹⁷⁹ Shiawassee County Ordinance, Ord No. 16-06-02, Article 4 § 4.3.78.4(M)(6)(d)

¹⁸⁰ Pennfield Charter Township Zoning Ordinance, Article 6 § 6.38.2(l)(3) (2023)

¹⁸¹ Convis Township Zoning Ordinance, Article 13 § 13.24(C)(2)(d)(3)

Glare

Though PA 233 contains no mention of glare standards, it appears in the zoning ordinances for all three jurisdictions in this report. Shiawassee County and Convis Township zoning ordinances contain basic requirements for solar array facilities to be designed such that concentrated glare shall not be directed on neighboring properties or roads, whereas, like with sound, Pennfield Township has a general prohibition for any land use in the township to generate glare that affects a neighboring property. Convis Township was the only jurisdiction to require the submission of a glare technical study and did so through a project condition of approval.

Glare came up multiple times in interviews, and so the ease of compliance with glare standards is discussed at the end of the chapter. Based on feedback from local officials, they believe their strategies worked well as pre-construction community concerns over glare were strong but there have been few post-construction complaints about glare.

Exceeding Minimum Requirements

As with the wind section, this section looked at site plans to understand how common it was for solar developers to “max out,” or push against all ordinance requirements. Sometimes, the developers also align with additional standards not outlined in the zoning ordinance based on their internal standards or as a response to other agency requirements to protect existing natural features on site.

Wetland Delineation

While local governments did not explicitly require setbacks from wetlands, waterways, or other such natural site features, a review of the site plans makes it clear that developers considered natural features in site design. This is in part because there are other agencies, such as the Michigan Department of Natural Resources (DNR), Michigan Department of Environment, Great Lakes, and Energy (EGLE), and State Historic Preservation Office, that also have jurisdiction in these project areas. In the interviews with developers, they mentioned taking an avoidance approach to siting of solar development. This involves avoiding floodplains, minimizing impacts to wetlands, complying with timing restrictions, and avoiding any cultural or historical features to the extent feasible. An excerpt of the Assembly Solar project in Figure S-3 shows how the arrays were sited to maintain a 25-foot buffer from wetlands, which are regulated by EGLE.

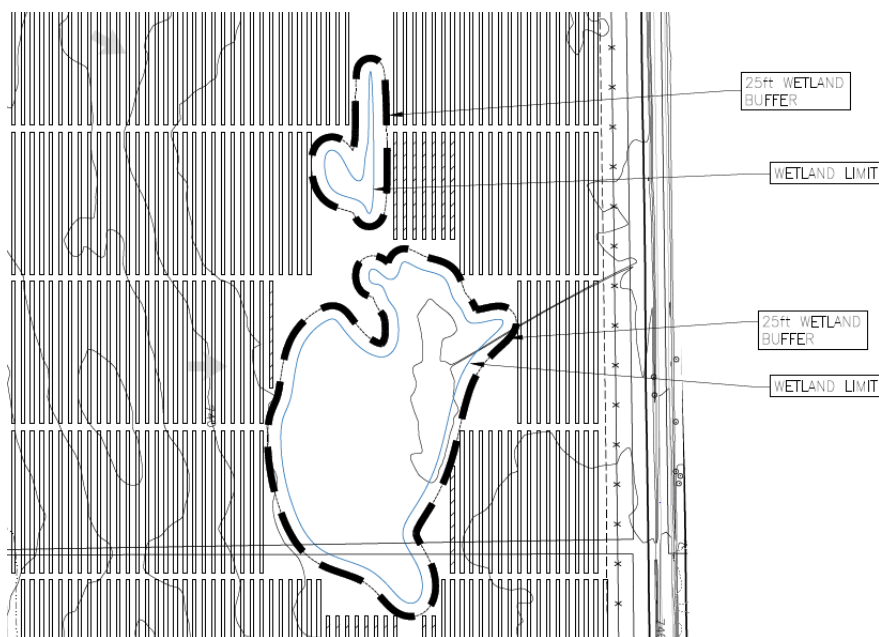


Figure S-3: Shiawassee County example section I [Subsection of Shiawassee County]

Other Setbacks

In both projects, there were several places where the minimum setback requirements were exceeded or additional setbacks were required as conditions of approval. From the site plan review, the team observed greater-than-required setbacks in areas where the property lines abutted residential properties, where there was an overhead power-line as seen in Fig S-5, where adjustments were made to better arrange solar arrays, or where more space was needed to create an access route to temporary laydown area as seen in Fig S-4¹⁸². The exact reason for why arrays were set further back than required by local standards is not clear. The larger setbacks could be due to concerns raised by neighbors, limitations in building near a powerline or right-of-way, or other considerations related to site design or construction management.

Developers mentioned that for regulated county drains, it is scientifically required to leave 40 feet of right-of-way (i.e., 20 feet on either side measured from the middle of the drain). This standard is usually not mentioned in zoning ordinances. In Assembly Solar, the project was conditioned to maintain an additional 40 feet from the top of the bank of the drain to ensure that the drain commission can drive along the bank to clean it.

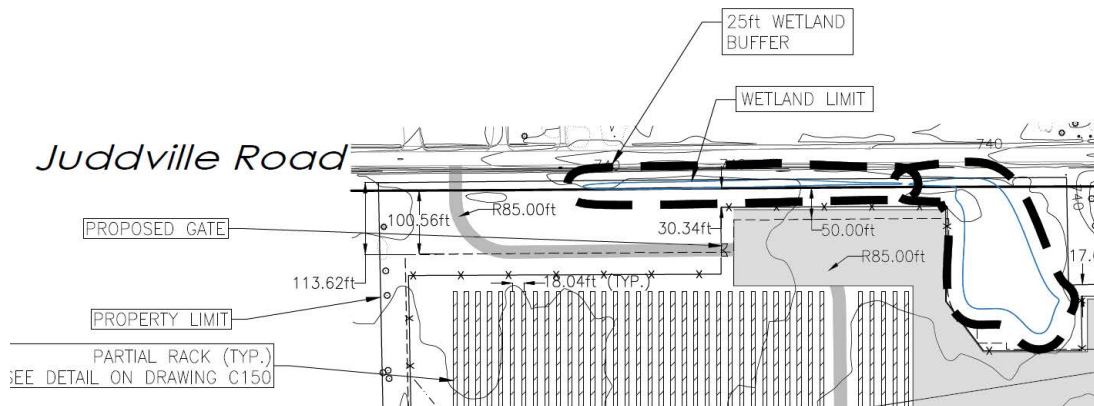


Figure S-4: Shiawassee County example section II [Subsection of Shiawassee County]

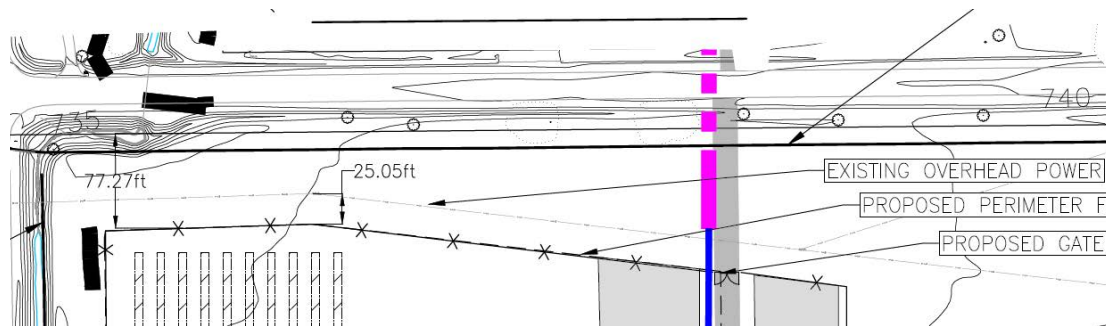



Figure S-5: Shiawassee County example section III [Subsection of Shiawassee County]

Minimum Inverter Setbacks

None of the studied jurisdictions had specific standards for inverter setbacks; instead, the setbacks applied to inverters were the same as any other component of the solar project. In interviews, developers shared that they often voluntarily commit to keeping larger setbacks for inverters, especially in residential areas since the inverter's cooling fan is the noisiest component of an operational solar farm. To understand the location of inverters with respect to other site conditions, the team examined the site plans for case study projects to measure the distance from inverters to the nearest property lines and habitable residences. Most of the inverters on site were placed close to access roads that were running either near to the center of the site or on the periphery. Based on the

¹⁸² A standard setback from any ROW for one county was 50 ft but the setback was taken back to 77ft near the overhead power line or 100ft for creating a temporary access route.

Assembly Solar site plan, the closest distance between an  INVERTER STATION property line to be 180 feet and from the closest residence at 1,000 feet.¹⁸³ To better understand the impact of this setback, the team would need to conduct interviews with landowners living nearby solar farms to understand post-construction impacts and at what point along the 180-1,000 foot distance sound was adequately dissipated. This, however, was beyond the scope of this project.

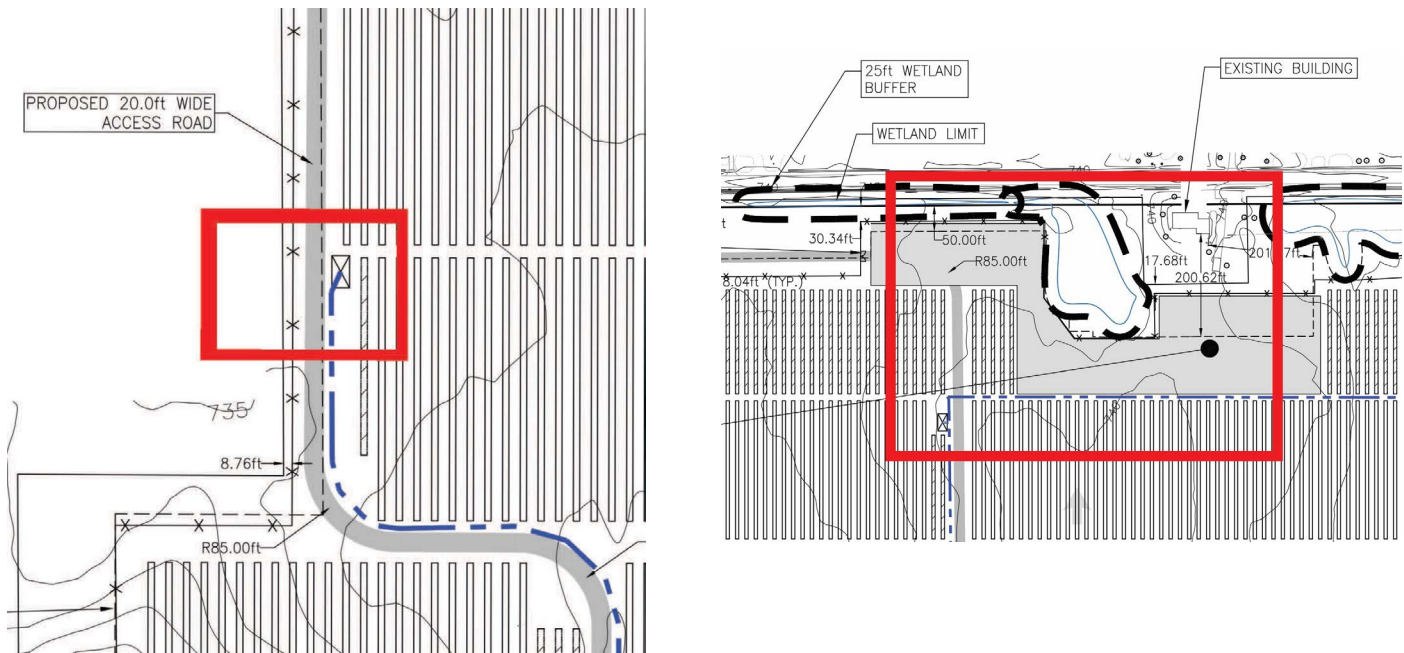


Figure S-6: Shiawassee County example section IV [Subsection of Shiawassee County]

Interview Summary

To supplement document review, the team conducted interviews with two developers and five local officials who have existing utility-scale solar projects operational or under construction in their jurisdictions to provide more context to permitting and siting process in Michigan. The interviews explored topics of community engagement, conditions of approval, and zoning ordinances. Interviewees were asked to reflect on their experience with utility-scale solar projects and identify what worked well and not-so-well. Rather than covering each topic extensively, the interviews were guided by what lessons the interviewees wanted to share. Each interview provided additional context on how local officials and developers navigated permitting and siting across different jurisdictions. Interviews also highlighted areas where host community administrators had questions or concerns regarding how to proceed under PA 233. To preserve the anonymity of respondents, responses are not linked to any one project. The following sections provide an overview of the feedback collected, organized by topic.

Cross-jurisdictional Cooperation

The important role of local recommending bodies in representing the community's needs was brought up by the developers while discussing the permitting process. They asserted that addressing these needs is most commonly done by defining certain conditions of approval. In one case study, while the county had zoning jurisdiction, townships could serve as recommending bodies for the project. One township took this opportunity to hear community feedback and went through the formal notice process as outlined in the Michigan Zoning Enabling Act even though it was not required to do so. Mailers were sent to people who lived within 300 feet of the project area 15 days before the hearing, notices were put in the newspaper, and the township called the developer to an internal board meeting and a public meeting. From the township's process of proactively

¹⁸³ Assembly Solar, "Conceptual Site Plan," October 12, 2018.

reviewing the developer's application, they recommended several conditions of approval to the county's planning commission, which the commission approved and required the developer to comply with.

Surety Bonds and Escrow Funds

It is more common in the solar ordinances researched than in the wind ordinances for decommissioning bonds to exceed the cost of decommissioning, with one of the counties requiring 125% of estimated decommissioning costs. From interviews, a common opinion shared was that requiring bonds that exceeded 100% of estimated decommissioning costs were unnecessary. A number of solar ordinances also included a condition for permit approval that required updating the decommissioning plan periodically to capture inflationary changes in costs, which the interviewed developers felt was reasonable.

In interviews, local officials elaborated that the buffer value exceeds 100% of upfront cost to anticipate changes in labor costs, scrap and salvage value, and other costs that may change over time but are related to bringing the site back to a pre-development condition. Furthermore, local official interviewees underscored that they had incurred costs reviewing, enforcing, and perhaps future decommissioning solar projects. Keeping that in mind, they talked about how requiring escrow funds from the developer proved valuable. These funds would give local governments the necessary funding to have the technical aspects of a project, such as sound and glare studies, reviewed by an external expert. The funds would also be used to hire attorneys to review the agreements included in the project and ensure everything is legally binding.

Community Engagement

There was a shared sentiment among the developers and local officials that community outreach helped to increase the likelihood of a project's success. In most cases recounted by interviewees, developers are not mandated by the zoning ordinance to conduct community-wide outreach before submitting applications, so they typically limited outreach to participating and non-participating property owners. Developers described initiating frequent meetings with landowners and adjacent non-participating property owners during the site plan preparation phase, going door-to-door to introduce themselves and the project to neighbors prior to sending out notice for public hearing. They met with the planning commission and township officials and some attended town hall meetings to hear resident concerns. According to interviewees, these engagement efforts were foundational to building productive working relationships.

In projects where fear and misinformation about solar technology were high, solar developers noted that it was challenging to garner community support. In these situations, they sometimes brought in neutral third party experts, like university professors, to host educational activities for local decision makers and community members. The use of unbiased third party experts, they believe, fostered a greater sense of trust in the information and process than when experts were employees of the developer.

Mixed Opinions on "Diminishing Farmland"

Developers highlighted mixed feelings that arose in the community regarding solar projects hosted on farmlands. They noted tensions arose when farmers agreed to host solar, particularly among their neighbors who were not participating in the projects. Non-participating neighbors often felt a sense of being "sold out," expressing strong sentiments that agricultural lands should be reserved for growing crops because the zoning designation and character of the land is agricultural. Developers also mentioned that in areas where there was a lot of competition among developers to propose projects, communities became nervous about how the volume of renewable energy projects would transform their rural landscape. The hesitation to become a community saturated with renewables development made the permitting process for individual projects harder. One way the developers respond to concerns is by providing a decommissioning plan tailored to prime agricultural soil restoration. They work with local farm bureaus and commissions to make soil management plans that avoid, correct, or mitigate potential adverse impacts to agricultural land resulting from construction, operation, and decommissioning of the project.¹⁸⁴

¹⁸⁴ "Solar Farms and Agricultural Communities." Ranger Power. <https://rangerpower.com/solar-farms/>.

Farmland preservation also came up in interviews with local officials. They believed that situating solar installations in areas where soil is less fertile and therefore less conducive to traditional farming significantly mitigated such conflicts. Discussion during interviews brought out an important point that communities are thinking about the impacts of large-scale renewable projects on land use and local officials are informally addressing these concerns through least-conflict siting, which is discussed in greater detail in the *Community Engagement* section located at the end of this report.

Short Permit Shelf Life

Developers in interviews raised concerns about the short shelf life of land use permits that were approved by local governments. In one case, permits were valid for only six months, with the option of a single extension for an additional six months. Due to the contentious nature of the permit process and the uncertainty surrounding permit approval, developers aim to secure these approvals earlier in the project lifecycle, rather than waiting until a year before starting construction. The rationale behind this approach is to avoid investing significant time and monetary resources into a project only to find out later that the land use permit cannot be secured. This is complicated, though, since there is currently a long delay for solar developers to get approval from the transmission operator MISO. Ideally, developers would prefer permits to be valid for three to four years, starting from the approval date and before start of construction, allowing sufficient time for project planning and other approvals. Short permit timelines often pose significant hurdles in project development, emphasizing the importance of obtaining approvals at an earlier stage in the project timeline.

Supporting Documentation

Not all local zoning ordinances in our case studies mandated additional studies to demonstrate compliance with regulations concerning sound, glare, or environmental standards. However, developers shared that they often choose to voluntarily produce these technical studies and are often required to as a condition of approval from local deciding bodies if they did not provide them earlier in the process. When anticipated and done voluntarily, these studies are often submitted early on in the project in the form of a comprehensive package, which includes supporting studies alongside the permit application. This approach provides evidence of compliance with the diverse requirements outlined in the ordinances, thereby preemptively addressing complaints that may arise in the future.

Visual Impact

Screening requirements often mention planting native trees to act as buffers between the solar equipment and areas with higher concentrations of residential buildings. However, developers mentioned during interviews that sometimes residents wanted fewer trees than what the project proposed. Some residents appreciated the rural, open character of the landscape and felt that the trees diminished their views by either compromising the pastoral quality of the scenery or by literally blocking views of the surrounding area. Local official interviewees also mentioned strategies to maintain the feeling of openness. They mentioned that the solar panels themselves are black and so, at a certain tilt, they can almost disappear into the landscape, appearing like water on the landscape. However, the structural supports for the panels are typically made of shiny metal which remain visible and diminish the water-like effect. They suggested painting the metal structure matte black to match the panels.

Suggestions and Takeaways

Existing examples of utility-scale solar projects in Michigan can contribute valuable insight as the MPSC transitions to a state-level siting process. This section summarizes the findings of case study and interview research. The following section includes takeaways where the team’s findings map onto PA 233 and how these insights could further inform efficient and effective implementation of the law without reinventing the wheel. Relevant sections of PA 233 are highlighted in bolded text.

solar-1. Decommissioning Plan

As the Commission evaluates decommissioning plans and sets financial assurances, they may look to existing solar projects for inspiration. The solar case studies highlight different things than the wind cases, though. Specifically, the solar cases examined required periodic updates of the financial surety. Two of the three solar zoning authorities also appear to allow for including salvage value — ultimately reducing the value of the surety — while also applying a multiplier to the value, requiring between 125% and 150% of the estimated net cost. This latter practice, in particular, was brought up in the interviews by developers and may be seen as excessive, and so is something the Commission may want to consider carefully before applying. **[§ 225.1(r)]**

solar-2. Reasonable Conditions

Standards or conditions of approval observed in local processes reference fencing, screening, landscaping, vegetation maintenance, and more. Many of these conditions do not have an equivalent standard set by PA 233. Recurring conditions or zoning standards from research and interviews are noted below that might qualify as reasonable conditions to apply under PA 233. MPSC staff may wish to consult Appendix E to assess whether conditions requested by community intervenors are in line with existing solar projects in the state. **[§ 226.6]**

solar-2.1 Fencing

As noted in the ordinance section, most local jurisdictions wanted to have some input on fencing materials, especially giving sensitivity to specific site features or along property lines with non-participating property owners. None of the requirements conflicted with the National Electric Code, however, none gave strict deference to it, as PA 233 requires. **[§ 226.8(a)(ii)]** MPSC may consider imposing a condition of approval that requires the developer to consult with the local jurisdiction on their preferred fencing materials and design, so long as the design is not incompatible with the NEC.

solar-2.2 Screening/Landscaping

Loose standards for vegetative screening and landscaping requirements on the side and rear of non-participating property lines were common standards observed across all jurisdictions studied. There were also often more stringent conditions applied requiring that non-participating dwelling units receive vegetative screening to ensure their view is reasonably protected. Some local ordinances stipulate the height and density or spacing between trees or shrubs. There was some concern voiced in interviews, however, that strict application of screening, which is largely borrowed from zoning ordinance language for other land uses with smaller footprints, may not actually blend with the natural setting and may compromise the open view of the rural landscape. At present, PA 233 doesn’t mention any vegetative screening or landscaping requirements. While it may not make sense to require screening on the full perimeter of the project, the MPSC may consider adding screening as a condition of approval **[§ 226.6]**, especially alongside adjacent non-participating residences. If this is a condition the Commission is likely to apply, the Commission may also suggest that the developer add screening details to the site plan to get community’s input on the type and method of screening proposed during the site plan approval phase.

solar-2.3 Sound

The issue of sound came up often in interviews. One of the lessons shared by some developers was that inverters have created noise issues for nearby residents. Though sound is only regulated in one ordinance

in the case study analysis, the noise limits under PA 233 **[§ 226.8(a)(iv)]** are much less restrictive than the 40 dB(A) allowed in that local ordinance, and higher than standard suggested by the sample zoning ordinance (i.e., 45 dB(A)). It may be instructive to look to a wider array of solar project cases to see what sound standards have proven workable. Furthermore, the MPSC could consider imposing a condition of approval that requires the developer to place inverters closer to the center of the project or a larger distance from habitable structures than other solar project equipment may be allowed.

solar-2.4 Environmental Analysis (Water and Soil Testing)

While PA 233 requires developers to consider and address impacts on the environment and natural resources **[§ 226.7(c)]**, it does not specifically mention considering any impacts that the solar array may have on local water and soil quality, which at least one developer interviewee said was a common concern of the local community. They recounted that some community members are nervous chemicals may leach from damaged panels to contaminate soil or groundwater, even if the solar equipment is removed after decommissioning. To preemptively address this concern, the developers interviewed sometimes agreed to test water and soil quality to provide a baseline of preexisting conditions to reference upon decommissioning. The MPSC may consider imposing a condition for the developer to conduct pre-construction testing to set a baseline upon which a final decommissioning plan can be measured against to ensure that the water and soil quality has not been affected.

solar-2.5 Vegetation Maintenance as Public Safety

One of the common concerns brought up in the interviews concerned fire risk: either from improperly ventilated inverters or from an electrical short in one of the panels. If a fire does occur, some interviewees voiced concerns that poor vegetation management may allow the fire to spread. To address this, some local jurisdictions required developers to maintain vegetation or ground cover on site and also maintain the area outside the fence by mowing the strips between the fence and property line, provided the landowner did not plant any row crops in that area. MPSC may consider requiring regular maintenance and mowing of the vegetative cover as a condition of approval **[§ 226.6]** to ensure public safety as applicable to **[§ 226.7(g)]**.

solar-3. Balancing Local Land Use Needs

In interviews, developers mentioned hearing concerns from community members in public meetings about the impact that large-scale renewable projects are going to have on their local land use. Local officials have sometimes tried to address these concerns by allowing for solar development in areas of the community with the least productive farmland. Some communities, though, have taken this to an extreme, placing limitations that would not allow for a viable solar project anywhere in the jurisdiction. PA 233 acknowledges that it is important to consider both the impact of a proposed facility on local land use and the percentage of land dedicated for energy generation within the local unit of government. **[§ 226.6]** Where land use planning around solar has been done in a good faith attempt to direct it to lower impact areas of the community, not as a blanket way to block a project, this information should be available to MPSC. MPSC could address this concern by consulting local zoning jurisdictions' comprehensive zoning plans, community energy vision, and local zoning requirements in the course of their deliberations. Developers can be asked to supply these documents in their application to help with the "description of the portion of the community where the energy facility will be located." **[§ 225.1(h)]** Furthermore, any community plans outlining preferred locations for solar development could be referred to the developer's feasible alternatives analysis. **[§ 225.1(n)]**

solar-4. Application Requirements

Some additional application requirements that came up frequently during case studies were a glare study, sound study, stormwater management, vegetation management, and more. While PA 233 captures some general application requirements, **[§§ 224, 225]** additional, common requirements that could be added as other information reasonably required by the Commission **[§ 225.1(s)]** have been highlighted. Developer interviewees mentioned that these requirements were often put in to help local jurisdictions assess compliance with certain standards or used by the developer as evidence of compliance with the standards while responding to community complaints.

solar-4.1 Glare Study

Glare standards were present in all three jurisdictions and were mentioned multiple times in interviews; however, PA 233 does not stipulate requirements for glare studies. If not addressed, this could become an area of frequent complaints from residents and raise issues of public safety if glare is not diverted from roadways. The Commission might consider requiring the developer to provide a glare study by a third-party qualified professional to determine if glare from the solar project will be visible from nearby residences and roadways. As this is an issue of public safety, it may reasonably be required to show compliance with **[§ 225.1(g)]**.

solar-4.2 Stormwater Assessment

Our local ordinance review found the County Drain Commissioner frequently required developers to leave setbacks from county drains on the project site. There were also conditions imposed for the developer to provide a Drain Tile Management Plan, identifying all farm fields containing drainage tiles. The plan was then used as a resource to avoid creating drainage issues during construction. Though PA 233 does require a developer to provide a stormwater assessment plan and consult the county drain commissioner before submitting the application, **[§ 225.1(p)]** the MPSC may consider requiring developers to document the requirements of the County Drain Commissioner in project applications to ensure drainage impacts are adequately considered.

solar-4.3 Sound Study

As mentioned in the wind chapter, there is no requirement within PA 233 to submit modeling results to show compliance with the **[§ 226.8(a)(iv)]** sound standard. As recommended in the sample zoning ordinance,¹⁸⁵ MPSC may consider requiring sound isolines to be modeled on the site plan to show predicted sound levels, typically in five-decibel increments, starting at the sound source and extending to or beyond the property line. Application requirements should clearly state the methodology for such measurements to increase clarity for the developer and reduce confusion should noise complaints arise once the project is operational.

solar-4.4 Ground Cover

From interviews, the team understood that the quality and extent of ground cover was important for the communities to know how well the site would be stabilized throughout its operations so it may return to its original use after decommissioning. The local ordinances required the developer to submit ground cover vegetation establishment and management plan which included invasive plant species control and a re-vegetation plan that shows how the site will be restored with native vegetation upon decommissioning. The MPSC may consider requiring both of these plans under its authority in **[§ 225.1(r)]**.

solar-5. Providing Unbiased Information to Residents

Throughout the interviews conducted,¹⁸⁶ there was an overall consensus that providing unbiased and thorough information is vital when building community trust. Residents may be exposed to misinformation and biased one-sided information, which can prevent constructive dialogue with developers, further impacting the overall efforts to achieve a clean energy future. Providing materials on the impacts, costs, and benefits of renewables, along with information on how to navigate contracts with developers, will empower residents to be more involved in the planning process. Information should be neutral, based on facts and objective sources, and concise so as to not overwhelm stakeholders. While there are no details on what constitutes such efforts, PA 233 calls on developers

¹⁸⁵ Reilly, M. et al. Planning & zoning for solar energy systems: A guide for Michigan local governments. Planning.://www.canr.msu.edu/resources/planning-zoning-for-solar-energy-systems-a-guide-for-michigan-local-governments

¹⁸⁶ “Unbiased, thorough information is needed to get this work done”; “We need to be thinking more deeply about how to change people’s minds- this is a huge piece of the puzzle that hasn’t quite come along with this bill”; “Our residents knew what to expect because turbines were present in other townships and they could see a lot of the misinformation had not panned out, could talk to neighbors, could visit the projects in other places”

to provide a summary of community outreach and education efforts taken. The Commission could explicitly require developers to submit their efforts based on what document or information they provided and review if they are appropriately implemented. **[§ 225.1(j)]**



CHAPTER 4: UTILITY-SCALE BATTERY ENERGY STORAGE SYSTEMS (BESS)

Stationary battery storage is an emerging renewable technology. Across the United States, only 51 BESS systems that meet the PA 233 threshold (50 MW / 200 MWh) are currently operational, compared to 481 solar projects and 610 wind projects.¹⁸⁷ Yet, as a result of PA 233 and growing interest in renewables in Michigan, BESS is now poised for potentially rapid deployment.

While the teams' research for battery energy storage was motivated by the same intent of the wind and solar chapters — to learn from the development and operation of existing energy facilities — the results are organized differently to better accommodate the nascency of BESS projects. Additionally, some of the community considerations for the technology and the departments involved in siting BESS (in particular, local fire departments) are different from wind or solar. As a result, this chapter looks beyond Michigan to consider three BESS deployments in other states. Using NYSERDA's model zoning ordinance — the only one of its kind for utility-sized BESS — this project compares PA 233 provisions with case study findings and concludes with an analysis of the opportunities for BESS siting in Michigan. First, the next preliminary research section has collated recent research on BESS to help direct MPSC to relevant information.

Preliminary Research

The team began by outlining the technical aspects related to siting battery energy storage technology and identifying concerns specific to BESS facilities. Some concerns raised by BESS siting are similar to those raised by other renewable-energy technologies. For example, community concerns related to noise, odor, and environmental impacts were common. But, for BESS specifically, fire risk and explosion hazards are frequently the most pressing concerns in communities asked to host this type of energy technology. As experience with BESS grows, the existing standards and codes have evolved based on learned experiences preventing, mitigating, and dealing with the consequences of these risks.

There have been several efforts outside of traditional regulation to promote local units' readiness for safe and locally-tailored BESS siting. These efforts have provided guidance on updated mitigation measures. Thus, the research first relied on several technical handbooks before conducting an analysis of precedents set by other states.

Battery-Specific Considerations

The best overall guide for helping officials tasked with siting BESS, "Energy Storage in Local Zoning Ordinances," was published in October 2023 by the Pacific Northwest National Laboratory (PNNL).¹⁸⁸ This document lays out common concerns for BESS facilities and how to address them through siting regulations.

The concerns associated with BESS, such as noise and visual impacts, are similar to those encountered with wind and solar energy. Notable sources for noise-related concerns arise from the sound produced by inverters and transformers. Although current BESS unit designs typically do not exceed 9.5 feet in height,¹⁸⁹ they often possess a more industrial appearance. However, these impacts can be mitigated in ways similar to those used for wind and solar energy: through measures such as increased setbacks, screening, and stricter noise regulations. For further information, readers are encouraged to refer to the PNNL report. However, some concerns are unique to storage. For instance, BESS facilities have HVAC (heat, ventilation, and air conditioning) systems. These systems can introduce additional noise sources to the surrounding areas. The chief concern unique to batteries is the risk of fire and explosion. In the case of a battery fire, systems may emit toxic gasses; if water is used for fire suppression, it is important to have provisions for chemical drainage. The following sections focus on fire safety matters through an exploration of the technological background, mitigation measures, and corresponding codes and standards.

¹⁸⁷ "Form EIA-860 Detailed Data with Previous Form Data," EIA (Energy Information Administration), Accessed March 28, 2024, <https://www.eia.gov/electricity/data/eia860/>.

¹⁸⁸ Jeremy Twitchell, Devyn Powell & Matthew Paiss, "Energy Storage in Local Zoning Ordinances," Pacific Northwest National Laboratory (PNNL), November 2023, <https://www.pnnl.gov/publications/energy-storage-local-zoning-ordinances>.

¹⁸⁹ NFPA 855 9.5.2.4 stipulates the maximum size (53 x 8.5 x 9.5 feet) of walk-in units or cabinets with a limited exception, for any type of battery technologies.

Why the Research Focused on Fire and Explosion Safety Concerns

Some might wonder whether fire risks for BESS are significantly higher than those for other technologies. There do not yet exist objective research studies comparing the incident likelihood between BESS and other technologies. The U.S. Fire Administration (USFA) does not publish fire incident data specific to renewable technologies.¹⁹⁰ Furthermore, the incident rate depends on the scale of facilities, making it challenging to compare between technologies.

However, one can begin to understand the relative fire risk in BESS facilities by considering the differences in the fire source for each technology. For instance, the primary source of fire incidents in solar energy facilities is not PV modules but electrical system equipment.¹⁹¹ By contrast, as explained in the next subsection, chemical reactions inside battery modules are the primary fire source for BESS, in addition to the risk posed by electrical system equipment. Twitchell et al. find that 2.9% of all existing BESS facilities have experienced fire incidents.¹⁹² Explosion risks are also unique to battery technology. Community opposition to BESS projects often stems from a fire and explosion incident in Arizona in 2019 that injured four firefighters.¹⁹³ The explosion occurred when flammable gasses released from the battery fire lingered unvented in the container, even after visible gas spills had ceased.¹⁹⁴ It is prudent for regulators of BESS facilities to understand these risks and mitigation strategies.

Although the absolute number of fire incidents experienced with BESS is small (18 across the U.S.), the average age of the facilities that caught fire is young (18 months).¹⁹⁵ Considering the rapid growth anticipated for BESS facilities (from 9,000 MW in 2022 to projected 31,000 MW in 2024), the absolute number of fire incidents should also be expected to increase in the near future.¹⁹⁶ If BESS facilities and local firefighters are not trained and prepared to manage battery-specific risks, a fatal incident may take place. While, fortunately, no BESS incidents have resulted in fatality so far, one tragic incident may fuel local concerns and prevent further BESS deployment. Therefore, this project proposes preparing for these risks, as the limited number of experiences induces some unpredictability in what constitutes proper mitigation and emergency management, and the absolute number of potential incidents may increase dramatically.

Fire and Explosion Safety Considerations

While the incident in Arizona involved both a fire and an explosion, a 2022 International Code Council (ICC) report emphasized that fire and explosion are distinct risks with complex interrelationships. The primary source of fire in BESS facilities is thermal runaway, an exothermic chemical reaction in battery cells that generates excessive heat. A battery cell can ignite within a minute, a rapid progression that renders human intervention during a thermal runaway impractical. On the other hand, explosion risks are driven by the ignition of flammable gasses (e.g., hydrogen, methane, and propane) in an enclosed space. Even a small flame or spark may trigger an explosion if gasses have accumulated.

190 "How Often Do Solar Farm Fires Occur?," Firetrace International, October 2022, <https://www.firetrace.com/fire-protection-blog/how-often-do-solar-farm-fires-occur>.

191 A study that analyzed UK fire incidents demonstrated that 57-85% (27-39 incidents out of 46) came from electrical system equipment such as DC isolators and connectors, and 2-4% (1-2 incidents out of 46) came from PV modules. ("Fire and Solar PV Systems — Recommendations for the Photovoltaic Industry," BRE National Solar Centre, May 2017, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/630641/fire-solar-pv-systems-frs-recommendations.pdf.)

192 Twitchell et al., "Energy Storage in Local Zoning Ordinances," 2023.

193 Andy Calthope, "Local opposition leads to BESS project cancellations in North America – Report," Energy Storage News, February 2023, <https://www.energy-storage.news/local-opposition-leads-to-bess-project-cancellations-in-north-america-report/>.

194 Mark McKinnon, Sean DeCrane & Steve Kerber, "Report: Four Firefighters Injured In Lithium-Ion Battery Energy Storage System Explosion - Arizona," Fire Safety Research Institute, July 2020, <https://fsri.org/research-update/report-four-firefighters-injured-lithium-ion-battery-energy-storage-system>.

195 One of the reasons for the youngness of the average age would be that "thermal runaway [is] caused by an internal short circuit, such as might be caused by a cell manufacturing defect." ("Energy Storage Systems based on the IBC, IFC, IRC, and NEC," International Code Council (ICC), January 2022, <https://shop.iccsafe.org/energy-storage-systems-based-on-the-ibcr-ifcr-irc-and-necr.html>.)

196 Twitchell et al., "Energy Storage in Local Zoning Ordinances," 2023.

BESS equipment design now requires multiple measures to address fire and explosion risks, as outlined in the following paragraph. Site designs are also an essential factor to prevent damage to surroundings and encourage effective firefighting. Site planning should consider factors like the distance between BESS enclosures and the separation between BESS enclosures and nearby occupied structures.¹⁹⁷

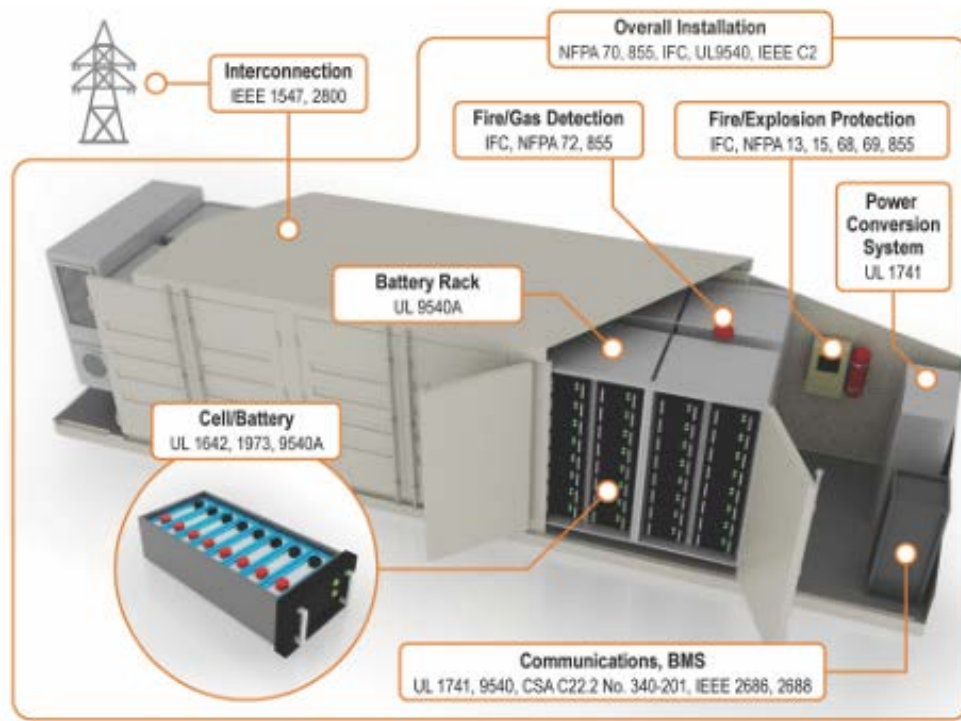


Figure B-1: BESS Facilities and Codes/Standards¹⁹⁸

Figure B-1 identifies the main components of BESS facilities and their corresponding risk mitigation measures. As codes and standards correspond to these facilities and mitigation measures, regulators should understand the range of fire risk mitigation measures.¹⁹⁹

- **Smoke/Gas/Flame Detector:** Multiple types of detectors (smoke, gas, and flame) can sense abnormal conditions in battery facilities. As the BESS is operated remotely, the detectors will also help determine what happened and when during the post-incident review.
- **Fire Suppression System:** Ideally, it is recommended to use water-based fire suppression for Li-ion (also known as lithium-ion) BESS instead of using clean agents because water can more effectively remove heat from cells and modules under ongoing thermal runaway. However, water-based fire suppression has certain drawbacks, and first responders should proceed with caution when mixing water and electricity
- **Explosion Control and Prevention:** Explosion risks can be largely controlled by either instituting preventative measures or by managing the release of energy in a controlled manner, which are governed by two different NFPA standards (NFPA 69 & 68). The key measure for the prevention approach is maintaining power to ventilation systems. The controlled release approach includes installing deflagration panels or specialized vents that are designed to fail at lower pressures than the BESS enclosure.

¹⁹⁷ Twitchell et al., “Energy Storage in Local Zoning Ordinances,” 2023.

¹⁹⁸ Ibid.

¹⁹⁹ ICC, “Energy Storage Systems based on the IBC, IFC, IRC, and NEC,” 2022.

Safety Code/Standard Structure

In the aftermath of the Arizona incident, BESS facility standards and emergency response practices are regarded by many as having significantly improved.²⁰⁰ This section briefly explains the multiple layers of safety codes and standards that now help govern BESS facilities. As PA 233 refers directly to NFPA 855, this section reviews codes and standards with a focus on NFPA 855.

Codes typically detail installation requirements, whereas standards focus on product safety features and certification testing. For example, the NFPA 1 Fire Code mandates that certain energy storage systems be tested and listed according to UL 9540, a primary standard for energy storage system safety that covers component compatibility, functional safety, and fire safety measures.

Table B-1 introduces several codes relevant to PA 233.²⁰¹ NFPA 855 is particularly relevant for stationary energy storage systems and details criteria for system design, installation, and decommissioning with a focus on mitigating risks associated with lithium-ion technology. NFPA 855, while technical, contains sections pertinent to siting considerations, such as emergency response plans, use of listed equipment, and fire control systems. Local planning officials can utilize this document when evaluating projects and imposing relevant conditions. As the table shows, these codes are often referred to in NFPA 855. Thus, relying on NFPA 855 will be an efficient way to cover major strategies to mitigate fire risks. Yet, regulators should know that some mitigation measures, such as central station monitoring (NFPA 72), may not be covered in NFPA 855.

Table B-1: Relevant Codes/Standards and Reference in NFPA 855

Standard	Title	Notes
NFPA 855	NFPA 855: Standard for the Installation of Stationary Energy Storage Systems	Stipulates requirements to ensure the safety of BESSs, including new and emerging technologies. Bedrock standard to assist authorities having jurisdiction (AHJ) in determining if a BESS installation has minimized risks.
ICC IFC	International Fire Code 2021	Chapter 12 of the IFC covers energy systems. Section 1207 within that chapter covers electrical BESSs. The ICC code development process associated with the 2021 IFC has been completed, and the new edition has been available since December 2021. During the process, the provisions of the 2018 IFC related to BESS were enhanced to be consistent with the needs of the industry and with NFPA 855.
UL 9540	ANSI/CAN/UL 9540: Energy Storage Systems and Equipment	Product safety standard for an Underwriters Laboratories (UL) listing of an energy storage system. This standard is a requirement in both the IFC and NFPA 855.
UL 9540A	UL 9540A: Test Method for Evaluating Thermal Runaway Fire Propagation in Battery Energy Storage Systems	Named a “Large-Scale Fire Test,” this multilevel test method evaluates the fire characteristics of a BESS that undergoes thermal runaway. The data generated can be used to determine the fire and explosion protection required for an installation of that battery energy storage system. NFPA 855 requires fire and explosion testing in accordance with this standard.
NFPA 1	NFPA 1: Fire Code	Adopted in 19 states as one of the key NFPA safety codes working at an overarching level for fire prevention and remedial action. Correlates with NFPA 855, specifying requirements related to the installation of BESSs, recognizing both established battery technologies and newer emerging energy storage technologies.

²⁰⁰ ICC, “Energy Storage Systems based on the IBC, IFC, IRC, and NEC,” 2022.

²⁰¹ Matthew Paiss, Ryan Franks, Jeremy Twitchell, Michael Ropp, Chris Searles, Charles Vartanian & Vincent Sprenkle, “Study of Codes & Standards for Energy Storage Systems: A Report to Congress,” Pacific Northwest National Laboratory (PNNL), March 2022, <https://doi.org/10.2172/1985701>.

As part of this research, the team conducted interviews with technical experts, which revealed the benefits and drawbacks of laws and regulations that refer directly to industry standards. One advantage is that it enables regulators to catch up with frequent code updates, as they may not have the capacity to update their ordinances every three years to align with code updates. Although simply referencing NFPA 855 will secure the comprehensiveness of fire risk mitigation measures to some extent, general codes have a certain amount of ambiguity to maintain general applicability. In addition, it may give regulators little understanding of technical matters. Thus, it is suggested that the Commission acknowledges these drawbacks while continuing to clarify code interpretation and catch up with technical matters, as the recommendation section suggests.

New York State Policy Practice

New York State has demonstrated leadership in BESS fire safety. For example, it was the first to adopt the International Code, which includes BESS considerations, into its state fire code. In conducting background research for this chapter, our team sought to learn from New York initiatives for BESS siting readiness. Firstly, a review of New York's policy updates following fire incidents in 2023 pointed to the importance of having an updated state fire code and local first responders trained and ready to respond in case of emergency. Second, the team also reviewed a guidebook New York developed for local governments, which bundled standards and codes as well as a model ordinance covering the design of BESS equipment.

Upcoming State Fire Code Update

After three BESS fire incidents in the summer of 2023, the governor of New York created an Inter-Agency Fire Safety Working Group and announced new fire code recommendations.^{202,203} Many of the recommendations suggest that the state fire code be amended to require the developer to take several actions that are optional under the current code. In interviews with staff familiar with the review, an official commented that, prior to the incidents, local jurisdictions had not understood the state fire code well enough to make use of these options. For instance, the recommendation includes mandating an emergency response plan and regular fire department training, which are currently optional within NFPA 855. In suggesting recommendations to the state fire code, New York was judicious in adding additional cost or time to the siting process; they aimed to recommend only those actions that would significantly improve safety, so as not to discourage future BESS development. For example, an official stated that the Working Group review process eliminated a requirement for full-scale fire testing that extends to multiple containers (as opposed to large-scale fire testing for a single unit, which is required in the current state fire code in accordance with UL 9540A).

Guidebooks for Local Governments

While several BESS guidance documents can be found online, the New York Battery Energy Storage System Guidebook, created by the New York State Energy Research & Development Agency (NYSERDA) in 2020,²⁰⁴ is the document referred to by many local units when establishing siting regulations for BESS. The guidebook consists of a model law, model permit, electrical checklist, and a reference to fire prevention and building codes. Comparing NYDERDA's model law from this guidebook with PA 233, several requirements present in the guidebook are absent from PA 233, specifically with respect to vegetation and tree-cutting, and fencing.

Interviews with New York officials aimed to understand whether such additional provisions appeared redundant or had proven insufficient. An official commented that the fencing requirement, in spite of acknowledged redundancy, is included to make local officials easily ascertain compliance with the industrial fire code requirements. The model law also requires the submission of a fire safety compliance plan, an operation and

202 There are currently 11 stand-alone BESS facilities operational in NY (EIA database). One of the three fire incidents in 2023 took place in a stand-alone BESS facility, another happened in a battery unit in a solar farm, and the other was a pre-operational BESS.

203 The Governor's Press Office, "Governor Hochul Convenes Inter-Agency Fire Safety Working Group Following Fires in Jefferson, Orange, and Suffolk Counties," New York State, July 28, 2023, <https://www.governor.ny.gov/news/governor-hochul-convenes-inter-agency-fire-safety-working-group-following-fires-jefferson>.

204 "Fire Code Recommendations," New York State Inter Agency Fire Safety Working Group, December 2023, <https://www.nyserdera.ny.gov/All-Programs/Energy-Storage-Program/New-York-Inter-Agency-Fire-Safety-Working-Group>.

maintenance manual, and an emergency operations plan; designates what information shall be included; and provides additional detail to insights from NFPA 855.

In Michigan, the Graham Sustainability Institute at University of Michigan is developing a guidebook for Michigan local governments that includes a sample zoning code and uses NYSERDA's guidebook as a starting point. Appendix F includes the gap analysis between the draft version of the Michigan guidebook and PA 233 requirements.

Case Studies

Methodology and Case Overview

To incorporate practical local knowledge in siting processes, the research conducted case studies of BESS siting precedents. Since Michigan has limited experience hosting utility-scale BESS, the study relied on siting experiences from other states. The researchers selected two projects from 51 operational utility-scale BESS projects across the country,²⁰⁵ considering document availability and the variety of project types. In order to balance the geography of case studies and learn from an example of Host Community Agreements (HCA) between local units and developers, the team also examined one utility-scale BESS project that will soon begin commercial operation in Massachusetts. Table B-2 shows a summary of each case. While efforts were made to interview developers and local officials for these projects, response rates were low, and ultimately, only one interview with a local official was conducted. The lessons learned were used to supplement knowledge acquired from the document review of that project.

Case 1. Valley Center Energy Storage, CA²⁰⁶

Valley Center is a community located in northern San Diego County, CA, with a population of approximately 10,000. While it is a low-density agricultural community, the project site is located in a semi-industrial zone and adjacent to existing residential uses on its western boundary.²⁰⁷ Terra-Gen, a San Diego-based renewable developer, selected this 8.9-acre parcel, attracted by the vicinity (0.3 miles) of a substation. However, the characteristics of the project site resulted in additional noise impact evaluation and community apprehension regarding fire and explosion risks. An on-site fire in September 2023 further spiked community distrust and complaints, showcasing the importance of post-approval communication with communities.²⁰⁸

Case 2. Le Conte Energy Storage, CA

Le Conte BESS is located in Imperial County, which is on the southeast border of California and has a population of 179,700. This community has an extensive amount of renewable resources in its jurisdiction, including geothermal, wind, and solar.²⁰⁹ While Imperial County has its own Renewable Energy (RE) Overlay Zone, similar to many of the BESS initiatives sited there, the Le Conte Energy Storage project was constructed in a remote location within an agricultural zone (A2) at the authority of a Conditional Use Permit approval. The Le Conte BESS project, developed by L.S. Power, is positioned within the fence line of an existing 200 MW Centinela Solar Energy (CSE) site, on land owned by CSE.²¹⁰

205 "Form EIA-860 Detailed Data with Previous Form Data," EIA. Corresponding to Section 222 of PA 233, the search query set BESS with over 50 MW capacity. Note that 56% (32 projects) of utility-size BESS are located in California, and 28% (16 projects) in Texas at the time of February 2024.

206 This case study relied much on the documents that the county government disclosed on [its website](#) ("Valley Center Energy Storage," San Diego County, Accessed March 28, 2024), which includes the site plan, checklists, and supplemental documents such as a Fire Protection Plan.

207 M54 General Impact Industrial: "allows unenclosed commercial and industrial operations having potential nuisance characteristics such as construction sales and services."

208 According to [EPRI Database](#) ("BESS Failure Event Database," Electric Power Research Institute (EPRI), Accessed April 15, 2024), it is one fire event out of six that occurred in BESS over 50 MW across the world.

209 "Home - Imperial County," Imperial County, Accessed April 10, 2024, <https://imperialcounty.org/>.

210 "Notice Of Preparation Of Draft Supplemental Environmental Impact Report (Seir) For The Le Conte Battery Energy Storage Project, Notice Of Public Seir Scoping Meeting," Imperial County Planning & Development Services Department, August 2019, <https://www.icpds.com/assets/planning/notices/notice-of-preparation-leconte-bess-31419.pdf>.

Case 3. Medway Grid Battery Project, MA²¹¹

The Town of Medway is a community 30 miles away from Boston with a population of approximately 13,000 residents. The project site is zoned as an Agricultural Residential area and adjacent to residential uses on its west boundary and a public road on the north boundary. The developer, Medway Grid LLC, proposed a 250 MW BESS facility on the project site, which is in the vicinity (0.1 miles) of an existing electric substation, funded by Eolian Energy, which has BESS development experience in Texas. While this deviates from the other case studies in that it is not yet operational, it was selected because the state was involved in brokering an exemption from the Town's local ordinance to allow the project to exceed local noise and setback regulations. The project also exemplifies the use of a host community agreement between local units and developers to address local concerns.²¹²

Table B-2: Case Study Summary for BESS

#	Project Name	Municipality	County	State	Capacity	Approval Date & Operational Status	Area Type	Project Type	Local Ordinance
1	Valley Center Energy Storage	-	San Diego	CA	140MW	Aug 2020 Operational	"Semi-industrial" next to residential	stand-alone	General(County)
2	Le Conte Energy Storage	-	Imperial	CA	125MW	Sep 2019 Operational	"Agricultural" remote from residential	hybrid w/ solar	Customized (County)
3	Medway Grid Battery Project	Town of Medway	Norfolk	MA	250MW	June 2023 Under Construction	"Agricultural Residential" close to residential	stand-alone	General(Town)

Code/Ordinance and Conditions of Approval

Appendix G summarizes how codes, ordinances, and conditions of approval correspond to the general approval requirements used in BESS siting, and Table B-3 designates how stringent they are compared to PA 233. None of the case studies shown Table B-2 had BESS-specific code requirements, likely due to there not being model ordinances widely available when projects were first proposed. In the two California cases, the county governments used the Environmental Impact Report (EIR) required under the California Environmental Quality Act (CEQA) to assess potential impacts on the environment.²¹³ Thus, the following review relied on examining the reports themselves, the requirement checklists in the approval processes, and the siting decision with conditions of approval. Even though the Medway case was approved through local zoning, some of the project features (e.g., noise impacts) did not comply with local ordinances. As a result, the state siting authority reviewed the petition for an exemption from local ordinances. In justifying this exemption, the state siting decision referred to the HCA — not expressly as a condition of approval, but perhaps in concert with the approval — and so the team also examined the HCA and the state order for analyzing the Medway case.

²¹¹ This case study relied much on the documents that the state and government disclose on their website ([Massachusetts State](#) ("Medway Grid Battery Project," mass.gov, Accessed March 28, 2024.) & [the Town of Medway](#) ("Battery Energy Storage Systems (BESS)," Medway Massachusetts, Accessed March 28, 2024.)), which includes the site plan and the order, and the HCA.

²¹² [The Zoning Bylaw](#) of the Town of Medway hasn't explicitly listed BESS in the schedule of uses, only listing electric power generation. Since the state authority determined that BESS was not power generation, the project was able to be permitted as long as it cleared these factors not exceeding the minimum requirements. State records indicate that there was a failed attempt to change the zoning designation from Agricultural Residential to Energy Resources, which is less restrictive zoning, due to local objection.

²¹³ While local ordinances regulate habitat loss, species conservation, groundwater, resource protection, and storm waters, the CEQA (California Environmental Quality Act) exemption process reviews these requirements simultaneously. In California, projects under siting approval process have to be reviewed in parallel by the county government to be exempt from the additional environmental review under Section 15183 of CEQA. This exemption approval process functioned as a substantive siting approval process.

Fire Risks

In case studies where the local ordinance did not explicitly address BESS, no fire mitigation measures were imposed by regulation. However, in its ordinance, San Diego County requires developers to consult with the local fire department to verify the department has the capacity to provide fire service in the event of an emergency. Additionally, the amended general zoning ordinance in the Town of Medway requires fire system certifications under the UL series and a test data submission under UL 9540A, as does NFPA 855. In the Medway case, both state and local authorities were aware of local concerns about fire risks and responded by applying a number of conditions to its approval. These conditions include maintaining year-round emergency access to the site by requiring snow removal from access roads, providing developer-funded first responder fire training, stocking equipment for battery fire suppression, and conducting periodic inspections, all of which are not explicitly required by NFPA 855. Specifically, the Medway case required, as a condition of approval, ensuring real-time notification of system failures to residents and local fire departments as well as reporting on any incidents in the project site.

Decommissioning

While the California-based case studies do not include decommissioning within their ordinances, Medway's amended zoning ordinance provides a good example of a BESS decommissioning plan. A decommissioning plan — which typically includes the manner by which decommissioning will unfold (e.g., removal of the batteries, transporting, re-grading), waste disposal methods (e.g., whether the waste will be landfilled or recycled), an initial decommissioning cost estimate, and a method for periodic cost updates — is required to be submitted for site approval. The ordinance also requires that a financial guarantee for decommissioning be maintained in a manner approved by the Town.

Auditory Impacts

To address the noise produced by inverters and BESS-specific HVAC equipment, two of the three case studies had provisions to mitigate impacts at the local level. In Valley Center, an eight-foot vinyl fence or similar fence was required, the effectiveness of which can be seen in the case's noise impact study.²¹⁴ In Medway, the state siting authority required the developer to conduct and submit a post-construction noise study to ensure that noise impacts complied with the local government's more restrictive noise ordinance.

Physical Site Features

The team did not observe specific regulations and approval practices for BESS setbacks, height, and lighting. Yet, the cases discussed fencing as a tool for balancing noise, aesthetics, security, and safety concerns. The Valley Center project required an "eight-foot vinyl fence or similar fence." The ambiguity in the requirement of what constitutes a "similar fence" might imply flexibility in coordinating with local stakeholders. In this case, the material of the fence was changed from vinyl to brick. In Medway, the state siting authority similarly directed the developer to incorporate local input regarding the design of the wall that surrounded the BESS facility.

Community Outreach

Medway's updated ordinance requires developers to submit a community outreach plan to respond to concerns regarding adverse and unexpected community impacts during construction and operation processes.

Agency Coordination

Each of the case studies demonstrates comprehensive coordination among state, federal, and external agencies (see Figure B-2). In addition to adhering to CEQA, the California-based case studies coordinated with the Department of Conservation, Department of Historic Preservation, Department of Fish and Wildlife, Office of

²¹⁴ "Noise Impact Analysis," County of San Diego, May 2020, <https://www.sandiegocounty.gov/content/dam/sdc/pds/ceqa/STP-20-011/Noise%20Impact%20Analysis.pdf#page=27>.

Emergency Services, Air Resources Board, California State Transportation Agency, California Environmental Protection Agency, and the Regional Water Quality Board.

	VALLEY CENTER	LE CONTE	MEDWAY
EMERGENCY AND HAZMAT MANAGEMENT	C	Z C	Z
ENVIRONMENTAL AGENCIES	Z C		Z
ROAD COMMISSION	C		
DRAIN COMMISSION	Z C	C	
FIRE AND EMERGENCY RESPONSE	Z C	Z	Z C

Figure B-2: Agency Coordination for BESS Siting

Table B-3. Summary Table of BESS Case Study Zoning Ordinances and Conditions of Approval

Dark Blue Z blocks indicate that the topic was regulated in the zoning ordinance. Pink C blocks indicate that the topic was regulated in the conditions of approval.

NOTE : Appendix G shows detailed matrix and source information. Minor requirements are omitted from the table.

	Topics	Valley Center		Le Conte		Medway	
PA 233 General Standards	Setbacks [226.8(c)(i)]	Z		Z		Z	
	Fire Risk [226.8(c)(ii)]	Z	C	Z	C	Z	C
	Public Benefits [226.7(a)]						
	Sound [226.8(c)(iii)]	Z	C	Z	C	Z	C
	Lighting [226.8(c)(iv)]	Z			C	Z	
	Environmental Impact [226.6(b), 226.7(b)(c)]	Z	C	Z	C	Z	
	Labor Agreements [226.7(e)]						
	Decommissioning [225.1(r)]				C	Z	
	Farmland [226.7(f)]	Z					
Requirements Included in the Model Ordinance	Maintenance, Repair & Augmentation					Z	
	Fencing	Z	C		C	Z	
	Vegetation/Tree-cutting					Z	
	Screening/Visibility	Z		Z	C	Z	
	Access Drive	Z		Z	C		C
	Signage					Z	
	Wiring					Z	
Additional Requirements from case studies	Height	Z		Z		Z	
	Odors / Air Quality	Z	C	Z	C	Z	
	Ownership Change					Z	
	Community Outreach					Z	

Exceeds Minimum Requirements and Findings in Siting Processes

The team compared the site plans, conditions of approval, interview insights, and local news articles with the codes and ordinances in each jurisdiction to identify areas where developers' efforts exceeded minimum requirements. These findings include not only the physical features of the project but also efforts made during the application and development processes.

Case 1. Valley Center Energy Storage, CA

Local Fire Responder Training

The California Fire Code explicitly requires that only BESS facility staff receive training outlined in NFPA 855, but the local fire department in Valley Center pushed developers to also offer training to local fire responders. Before commercial operation, the developer provided three four-hour training classes for all the fire agencies in Valley Center and adjacent jurisdictions. They held classes focused on challenges specific to battery technologies and how to safely administer medical aid and fire suppression in the project vicinity. The developer also agreed to provide annual training to ensure firefighters keep up with technological updates.²¹⁵

Involvement of the Fire Department

Valley Center's County Fire Code requires developers to submit emergency response plans and hazard mitigation analyses in cooperation with the county fire department as part of the application submission. That requires the local fire protection district and the developer to start communication in advance of the application process. The fire district then submits a formal comment letter to the siting authority that includes a recommendation for the developer.

According to the Valley Center fire chief, there is commonly direct and informal communication between the fire district and the developer throughout the siting process. The fire chief, for example, sought out additional information and lessons learned from fire officials in other jurisdictions. During an interview with local news outlets, the Valley Center chief recounted how they sought advice from the fire chief in Paradise, AZ, which experienced an explosion accident in 2019, as well as from Escondido, CA, which has the largest battery in the San Diego region. The chief described their goal to learn more about specific considerations and practical knowledge for battery projects and how to best mitigate fire risk.²¹⁶

Community Outreach

The Valley Center Community Planning Group has consistently opposed the battery project, mainly because of fire risk concerns.^{217,218} While the developer was responsible for communicating project information and the fire risks in Planning Group meetings, the Group and the local media demanded to hear from the fire department regarding fire risk assessment as well. In response to the concerns raised, the developer agreed to make a donation to a new fire station in the district after they received land use approval.²¹⁹ Further, after the BESS facility experienced a fire in September 2023, the developer attended a Planning Group regular meeting to explain the accident's cause and risk mitigation measures to the residents in March 2024.²²⁰

215 Roadrunner, "Local Firefighters Get Training on Battery Fire Suppression," Valley Roadrunner, November 4, 2021, <https://www.valleycenter.com/articles/local-firefighters-get-training-on-battery-fire-suppression/>.

216 David Ross, "Proposed Battery Storage Has 'More Bites on Safety' Apple as It Moves Forward," Valley Roadrunner, July 22, 2020, <https://www.valleycenter.com/articles/proposed-battery-storage-has-more-bites-on-safety-apple-as-it-moves-forward/>.

217 The Planning Group is organized based on the county ordinance and the regular meeting is held monthly. "They are advisers to the administrators of the County of San Diego. In other words, the Planning Group has no authority to make any decisions, simply make recommendations." – sourced from the Group's website

218 [Meeting minutes](#) of the Community Planning Group (July 13, 2020)

219 Terra-Gen, "Valley Center Battery Storage Project Fully Online," Terra-Gen, February 15, 2022, <https://terra-gen.com/valley-center-online/>.

220 David Ross, "Terra-Gen Reps Answer Planners' Safety Concerns, but Satisfy Few," Valley Roadrunner, March 21, 2024, <https://www.valleycenter.com/articles/terra-gen-reps-answer-planners-safety-concerns-but-satisfy-few/>.

Case 2. Le Conte Energy Storage, CA

Post-completion Annual Compliance Report

The project owner was required to provide the County with any necessary information to demonstrate that the completed project is in compliance with the permit's regulations. If the project is no longer in compliance, the permit may be revoked. An annual report detailing adherence to project conditions and measures must be submitted to the Planning & Development Services Department. Furthermore, the project owner is obligated to cover any costs associated with routine monitoring and unscheduled investigation carried out by the department, as outlined in the department's fee schedule.²²¹

Fire Safety and Equipment Requirements

To assure fire safety and comply with NFPA 24, Le Conte Energy Storage, LLC's battery storage facility had to install private fire service mains. Additionally, before the energy development company could receive its initial grading permit, it was required to contribute to supplying the County Fire Department with Type 1 fire apparatus. The contribution, capped at \$500,000, was to be determined by the Imperial County Fire Department. It was stipulated that other projects within the southwest solar and battery storage area of Imperial County would also contribute to the cost, based on their operational size (measured in Megawatts). In the event that Le Conte Energy Storage, LLC undertook the purchase, they were eligible for reimbursement for any expenditure exceeding their proportional share. Conversely, if the Type 1 fire apparatus had previously been acquired by another project, Le Conte Energy Storage, LLC's obligation was limited to covering their share of the cost, a process administered by the County.

Case 3. Medway Grid Battery Project, MA

Host Community Agreement

After the developer's initial project proposal, the Town of Medway declared a two-year moratorium on BESS development. The town used this period to examine the technological challenges and potential impacts of BESS projects, as well as to contemplate how BESS might be added to their zoning ordinance, which was previously silent on this technology. While the developer sought out — and was granted — state-level exemptions from some local ordinance requirements that were deemed overly restrictive, the developer agreed to enter into a host community agreement (HCA). Since the zoning ordinance was not designed for BESS projects, this agreement included several action items that required the developer to exceed the minimum requirements stipulated by the town zoning ordinance. The agreement was settled six months before the state authority's decision on the project. This gave the state authority time to review the agreement. As a result, some of the key HCA contents were incorporated into the state siting decision, much like conditions of approval for local zoning.

Local Fire Responder Training

While local fire responder training is not required under the Massachusetts Fire Code, the developer agreed to provide annual training. They also agreed to establish a fund for additional training needs, contributing an additional \$35,000 per year. The state siting authority encouraged the developer to work with the Medway Fire Department to develop a joint action plan as a part of its emergency response plan that provides neighboring fire departments with the appropriate information in case of an incident.

²²¹ Ord. 1386(part), 2004; Ord. 1355, § 2(part), 2002; Ord. No. 1587, §§ 1, 2, 12-5-23 https://library.municode.com/ca/imperial_county/codes/code_of_ordinances?nodeId=TIT9LAUSCO_DIV9FE_CH1LAUSPLPR_90901.03GEPL.

Developer’s Emergency Response

The state siting authority also directed the developer to work with the Medway Fire Department to provide residents near the project site with real-time notification and instructions, including an evacuation protocol in the event of an emergency. In addition, the developer committed to having an official representative present onsite within two hours after an incident notification.

Development Timelines

Tables B-4 and B-5 show the development timelines for each reviewed case. As the two California cases both follow the CEQA exemption procedure, they went through similar timelines. The Valley Center case took just four months from application to approval, while Le Conte took six months. The Massachusetts case took comparatively longer (12 months) as it had to proceed through the state-level siting process.

Table B-4. The California Cases Timeline

Events	Case 1. Valley Center		Case 2. Le Conte	
	Year.Month	Description	Year.Month	Description
First Contact with Local Units	No Data	-	No Data	-
First Contact with Local Residents	2020.3 (-1M)	Presentation at the Community Planning Group	2019.3 (-4M)	A public scoping meeting for Supplemental EIR
Application	2020.4 (±0M)	-	2019.7 (±0M)	-
Public Comment	2020.6 (+2M)	45 days	2019.8 (+2M)	50 days
Public Meeting	2020.7 (+3M)	Community Planning Group Vote	No Data	-
Approval	2020.8 (+4M)	Certificate exemption	2020.1 (+6M)	With conditional use permit
Commercial Operation	2022.1 (+21M)	5 months late from the original plan	2023.1 (±42M)	Completed

Table B-5. The Massachusetts (Medway) Case Timeline

Events	Year.Month	Description
First Contact with Local Units	2019.9 (-29M)	-
First Contact with Local Residents	2021.3 (-11M)	Five Q&A sessions for the Planning & Economic Development Board and Medway residents
	2021.5 (-9M)	Town Meeting Vote: hiring consultants
	2021.11 (-5M)	Town Meeting Vote: two-year moratorium
Application	2022.2 (±0M)	Petition to be exempted from the local ordinance
Public Comment	2022.7 (+5M)	15 days
Public Meeting	2022.7 (+5M)	on Zoom
	2022.8 (+6M)	Host Community Agreement (HCA)
	2022.11 (+9M)	Zoning Amendment
Approval	2023.6 (+12M)	Certificate exemption
Commercial Operation	2024.6 (+28M)	Scheduled

Suggestions and Takeaways

This section identifies potential suggestions for how best to implement PA 233 based on the findings from preliminary research and case studies. Each subsection justifies these suggestions based on published reports, interviews surrounding New York-based efforts, and observations from the selected cases. Where the suggestion is relevant to fire safety, it also provides an interpretation of whether NFPA 855, which is referenced in PA 233, requires the action or if it is optional within NFPA 855. [§ 226.8(c)(iii)] Each subsection includes a reference to the applicable section in PA 233.

battery-1. Consultation and Pre-incident Planning with the Fire Department

All aspects of this research conclude that it is imperative for developers to consult local fire responders about the mitigation of BESS-specific fire and explosion risks.²²² Indeed, the New York working group suggests that the “ERP (Emergency Response Plan) should be developed in consultation with the local fire department to ensure it is in alignment with their operating procedures, capabilities, resources, etc.”²²³ The California cases included this practice explicitly, though they differed on the method of communication and how it was required. In the Valley Center case, the developer was required to present documents directly to the fire department for certification prior to submitting applications for site plan approval. This can be interpreted as requiring direct communication. By contrast, in the Le Conte case, the developer and the fire department communicated indirectly through the

²²² Twitchell et al., “Energy Storage in Local Zoning Ordinances,” 2023. & American Clean Power (ACP), “First Responders Guide to Lithium-Ion Battery Energy Storage System Incidents,” July 2023, <https://cleanpower.org/wp-content/uploads/gateway/2023/07/ACP-ES-Product-7-First-Responders-Guide-to-BESS-Incidents-6.28.23.pdf>.

²²³ New York State Inter Agency Fire Safety Working Group, “Fire Code Recommendations,” 2023.

siting authority. However, as the New York working group pointed out, NFPA 855 does not require developers to consult with local fire departments. It just says that “the owner should work with their local fire department to develop a pre-incident plan for responding to fires, explosions, and other emergency conditions.” (G.11.2.1)

As PA 233 refers directly to NFPA 855, MPSC may face this ambiguity about whether they require developers to consult with local fire departments. If it is required, the Commission should consider whether they prefer the developer directly communicate with local fire departments or indirectly communicate with local fire departments through MPSC staff. They should also consider how to best enforce any required communication with the local fire departments. Evidence of consultation specified in PA 233 is limited to state and federal agencies. **[§ 225(k)]** If the Commission does not require evidence of consultation with local fire departments, it may be able to impose these conversations as a condition of approval. **[§§ 225.1(s), 226.6, 226.8(c)(ii)]**

battery-2. Local Fire Responder Training

While NFPA 855 explicitly requires developers to provide training for their own facility operations and maintenance staff, site-specific training for local fire responders is also essential to prevent battery-specific fire and explosion risks.^{224, 225, 226} Indeed, the New York working group recommends “site-specific training... for local fire departments to familiarize them with the project, hazards ..., and procedures.”²²⁷ All three studied cases explicitly included site-specific training for local fire responders but the cases differed on how it was implemented. In the Valley Center case, training was provided by the developer. In Le Conte and Medway, the developer provided funding so the fire departments could conduct their own training. However, as the New York working group pointed out, NFPA 855 does not require developers to provide local fire departments with training; it only says that “training ... should ensure that the local fire department understands the procedures.” (G.11.2.1)

As PA 233 refers directly to NFPA 855, MPSC may face this ambiguity about whether to require developers to provide local fire departments with training. The developer may signal its intentions regarding local fire responder training through the submission of its emergency response plan or other relevant documents. If the developer does not address training, the Commission may be able to impose this training as a condition of approval and determine whether it would like the developer to directly provide the training or instead fund the local fire department to conduct the training. **[§§ 225.1(q), 226.6, 226.8(c)(ii)]**

battery-3. Periodic Inspections

While not all BESS fires are attributed to equipment deterioration, periodic inspections are a necessary part of fire safety within BESS. These inspections can detect equipment deterioration that would lead to fires. The New York working group recommends “requiring special inspections at a regular cadence.”²²⁸ Similarly, the Valley Center and Le Conte case studies required developer-conducted inspections as a condition of approval. However, NFPA 855 does not require that developers conduct periodic inspections. It only stipulates that “[a]ll fire protection systems and equipment should be periodically inspected, tested, and maintained in accordance with applicable national fire codes,” (G.10.2.1), offering a reference guide (Table G.10.2.1) and a sample inspection checklist (Figure G.10.7.3).

As PA 233 refers directly to NFPA 855, MPSC may face this ambiguity about whether to require developers to conduct periodic inspections. If it is required, the Commission may be able to include this matter in conditions of approval. **[§§ 226.6, 226.8(c)(ii)]**

224 Twitchell et al., “Energy Storage in Local Zoning Ordinances,” 2023. https://planning-org-uploaded-media.s3.amazonaws.com/publication/download_pdf/Zoning-Practice-2024-03.pdf.

225 ACP, “First Responders Guide to Lithium-Ion Battery Energy Storage System Incidents,” 2023.

226 Brian Ross & Monika Vadali, “Zoning Practice: Battery Energy Storage Systems,” American Planning Association (APA), March 2024.

227 New York State Inter Agency Fire Safety Working Group, “Fire Code Recommendations,” December 2023.

228 Ibid.

battery-4. Retroactive Approach

Due to the continued evolution of battery technology and lessons learned following incidents, safety codes related to BESS are updated frequently. This means that it is rare for existing BESS developments to comply with the most up-to-date fire safety codes. To best protect against fire and explosion incidents, BESS should implement retrofitting practices. The ICC report, for example, recommends retrofitting existing projects with the Intellivent System, pioneered by PNNL, which allows exterior doors to be remotely opened to minimize the risk of explosion due to unvented gasses.²²⁹ While such retrofitting practices were not observed in the case studies, the permitting authority can encourage these practices through the hazard mitigation analysis requirement in NFPA 855.²³⁰ This would have to be a retroactive requirement for existing systems to be responsive to future industrial fire code updates.

Imposing conditions of approval subject to future significant industrial fire code updates might be one strategy for preparing for unforeseen risks in existing projects. **[§ 226.6]**

battery-5. Fencing and Flexible Design

As fencing can both address and provoke concerns, projects often consider the fence design and height flexibly, taking into account local preferences. For example, higher fencing may harm visual aesthetics from roads or neighboring properties while simultaneously being beneficial for noise mitigation and safety concerns. In the Valley Center case, while the siting authority required “a solid, eight-foot vinyl or similar fence” as a condition of approval, the developer ultimately built an eight-foot brick fence. In the Medway case, the planned wall was 20 feet high. This drew complaints from some local residents concerned about the visual impacts. The siting authority directed the developer to consult local input regarding the wall design (including wall material specifications) and related landscaping before construction.

Note that while NFPA 70 requires a fence at least seven feet tall, NFPA 855 only requires fencing and does not specify its height (4.7). While PA 233 does not explicitly require fencing for BESS as it does for solar facilities, the Commission may consider requiring certain fencing as part of NFPA 855 compliance. The Commission may further consider how to provide flexibility and encourage developers to reflect local input in their design choices, as illustrated by the Medway case. **[§§ 226.6, 226.8(c)(v)]**

battery-6. Clarifying Decommissioning Plan Requirement

As BESS technology is emergent, there are few decommissioning experiences so far. Many reports recommend siting authorities require a decommissioning plan and funds.²³¹ While a decommissioning plan required by PA 233 ensures the return of all participating properties to a “useful condition” and includes financial assurance, it does not specify the information that should be included in the plan. As for decommissioning processes, it will be helpful to refer to NFPA 855 since it specifies the information that shall be included in detail (8.1.3).²³² Furthermore, considering the non-negligible risk of a fire incident, the decommissioning plan may include the responsibilities, processes, and cost handling to remove damaged equipment following an incident.²³³

Decommission costs may fluctuate depending on when the project will be commissioned, when the budget is

229 An interviewee commented that it was retrofitted to several existing BESS in Washington State.

230 4.4.1 A hazard mitigation analysis shall be provided to the AHJ for review and approval where any of the following conditions are present:

(5) Where required for existing lithium-in ESS systems that are not UL 9540 listed in accordance with 9.2.2.1

231 Twitchell et al., “Energy Storage in Local Zoning Ordinances,” 2023, Ross et al. “Zoning Practice: Battery Energy Storage Systems,” 2024.

232 e.g., decommissioning process and activities, roles and responsibilities, means and methods. Note that it does not include decommissioning cost matters as it is stipulated in terms of safety concerns.

233 See the example of [BESS-specific decommissioning plan for Oak Hill Solar, NY \(Section 6.0\)](#) for details. While our research was unable to identify any case studies focusing on the replacement and disposal processes in augmentation or emergency removal, the processes for emergency removal will be similar to ordinary decommissioning processes for replacing individual units or containers.

calculated, and who conducts the calculation.²³⁴ The HCA between the Town of Medway and the developer agreed that a mutually agreeable consultant determine decommissioning costs.²³⁵ PA 233 stipulates that the estimated cost of decommissioning will be calculated by a third party hired by a developer. The Commission may consider whether it wants some discretion over the choice of the third-party estimator. It may also consider requiring periodic cost updates. **[§ 225.1(r)]**

battery-7. Clarifying Information Included in the Required Documents

For all types of renewable energy facilities, PA 233 requires applicants to submit a fire response plan and an emergency response plan. **[§ 225.1(q)]** The law requires NFPA 855 compliance but does not explicitly describe how compliance is demonstrated. As Table B-6 shows, the three documents that NFPA 855 itself requires to submit to an AHJ (Authority Having Jurisdiction)²³⁶ are different from those listed in PA 233. This may make potential applicants confused about which information they should prepare for siting approvals for BESS.

Looking at the practices present in the case studies, the siting authorities seem to have required unique documents to verify fire risk mitigation efforts or information corresponding to local concerns, based on state or local fire codes. In Valley Center, the application requirements contained wildfire simulations along with multiple scenarios in the fire protection plan. Thus, asking BESS developers to submit the plans outlined in NFPA 855 along with the fire response and emergency response plan does not appear unreasonable.

As a result, the Commission may want to be explicit in its application instructions — particularly for BESS projects — as to what information is needed in the two documents currently required in PA 233 (a fire response plan and an emergency response plan) and what broader information (i.e., the documents required by NFPA 855) is needed. **[§ 225.1(q),(s)]**

Table B-6. Documents Required by NFPA 855

Document	NFPA 855	Information
Commissioning Plan	4.2.46.1.3.2	Commissioning Process, Roles and Responsibilities, Means and Methods, Checklist, Staff Training Methods, etc.
Emergency Operation Plan	4.3.2.1.4	Procedures for Shutdown and Inspection, Procedures after Notification, Procedures after Fire, Response Considerations, Procedures dealing with ESS equipment, etc.
Hazard Mitigation Analysis	4.4.2	Evaluation of the Consequences of Failure Modes, including Thermal Runaway

234 Qiang Dai, Jeff Apangenberger, & Jakob Elias, “End-of-life Considerations for Stationary Energy Storage Systems,” Argonne National Laboratory, October 2023, https://www.sandia.gov/app/uploads/sites/82/2023/10/PR2023_901_Dai_Qiang_Analytics-Tools.pdf.

235 “...the Town may request that a qualified independent engineer mutually acceptable to the Parties perform an appraisal of the estimated cost ... If the Parties are unable to mutually agree on an independent engineer after thirty days of negotiations regarding the selection of the same, one shall be appointed by the American Arbitration Association, Boston office...”

236 AHJ “is used in NFPA standards in a broader manner,” and “may be a federal, state, local, ... department ... such as a fire chief; fire martial; chief of a fire prevention bureau, ..., or others having statutory authority.” (A.3.2.2)

battery-8. Requiring Community Outreach Including Post-Incident Approaches

The Valley Center and Medway projects both experienced significant local concerns about fire and explosion risks and received complaints about transparency. These are not isolated incidents but instead a common concern, leading to BESS project cancellations across North America.²³⁷ For the sake of transparency, the Massachusetts siting authority directed the developer to prepare a community outreach plan. Within the plan, the developer had to provide an account of any developer actions that could result in unexpected community impact and outlined complaint response procedures. In the Valley Center case, the local planning group also invited the developer to provide a post-event briefing following the 2023 fire incident. This was not required as part of the siting process but proved a useful step toward alleviating concerns about the safe operation of the facility going forward. Anticipating that there may be public concerns about fire risks and complaints about transparency, the Commission could require the developer to make a community outreach plan. This plan should include post-incident approaches in case of future fire incidents and conflict resolution processes. Alternatively, the Commission could condition their approval on post-construction outreach. **[§§ 225.1(s), 226.6]**

battery-9. Considering Host Community Agreement

The Medway case serves as an example of how an HCA may serve as a negotiation tool for local units. The HCA allowed Medway to extract concessions from the developer to mitigate local concerns. In response to Medway's HCA, the Massachusetts siting authority adopted portions of the HCA through conditions of approval to secure the developer's commitments. PA 233 expresses that the generated HCA or CBA is legally binding, so the developer must fulfill their commitments to the agreement. However, making a significant effort to incorporate priorities expressed in the local agreement into the state-level conditions of approval may enhance the security of developers' commitments and demonstrate alignment with the priorities of host communities. **[§§ 226.6, 227.1]**

battery-10. Coordination with External Agencies

Compared to traditional energy generation facilities, the Commission should recognize that BESS facilities possess unique attributes and perform distinct functions that necessitate coordinated interaction with state and local agencies. The case studies highlight the importance of identifying which agencies are involved at various stages — pre-construction, construction, and post-construction — and determining the appropriate timing for their involvement. In the Le Conte project, for example, the Air Quality Division and the Highway and Road Division were involved during the construction phase for permitting.²³⁸

To facilitate this, it is advisable to establish a dedicated body of reviewing agencies potentially involved in the permitting and approval processes for BESS, similar to the CEQA process in California. For a thorough review process tailored to the specific needs of each BESS project, the Commission could consider mandating developers to obtain approvals from agencies such as the Michigan State Police/Emergency Management and Homeland Security Division, the Department of Environment, Great Lakes, and Energy, the Department of Natural Resources, and other relevant agencies deemed necessary by the Commission for BESS siting compliance. **[§§ 225.1(k)-(p), 226.8(c)(v)]**

²³⁷ Calthope, "Local opposition leads to BESS project cancellations in North America — report," 2023.

²³⁸ "Le Conte Battery Energy Storage Project," ca.gov, Accessed March 14, 2024, <https://ceqanet.opr.ca.gov/2010111056/6>.



CHAPTER 5: COMMUNITY ENGAGEMENT BEST PRACTICES

General Engagement Best Practices

Large-scale renewables siting is as much a land use planning issue as it is a technological one. At the core of land use planning is an understanding that new developments should benefit and integrate with the community that they serve, which almost always involves deliberate, robust, and intentional public engagement. As outlined below, public engagement best practices from urban planning include taking into account local history and context, stakeholder identification, proper use of time during public meetings, and building relationships with the community throughout all stages of a development project.

This chapter focuses specifically on the capstone project’s second goal: “To help ensure that projects sited under the MPSC process follow best practices with respect to project design and community engagement.” To gather a range of insights towards best practices for engaging communities in the siting process, the team conducted a literature review of community engagement best practices both generally for all sorts of land uses and then specifically for renewable energy projects. Key themes drawn from these readings are enumerated below, as well as how these practices can apply to the public engagement processes laid out in PA 233.

Local History and Context

Conducting thorough research of a community’s history and context, especially regarding similar developments, is a crucial component of community engagement.²³⁹ Understanding the community’s demographics — including socioeconomic status, average age, cultural norms, and predominant languages spoken in the area — helps to inform outreach strategies.²⁴⁰

Equally important is understanding the relationship and connection that residents have to their community and the landscape. Whether a resident has lived in that community for generations or just recently relocated to the area, people have well-established attachments to where they live.²⁴¹ Investing time in getting to know residents’ vision for their community well in advance of any proposed development is key in fostering stakeholder trust.

Land use decisions are often transformative and can leave lasting impacts on a community’s landscape for years to come; as such, it’s important to involve the community in land use planning well in advance of any development. As communities are asked to prioritize certain land uses in the near future (for example, renewables), bringing residents to the drawing board at the outset of the planning process ensures that they have a say in what happens in their community. Regular and varied engagement sessions can help to surface a collective vision for the community. Engagement related to a specific project is also more likely to be fruitful for all parties involved if (a) the community has established a zoning ordinance that incorporates potential large-scale developments and (b) the developer is aware of how a proposed project would fit into the landscape of that community before even beginning the design process.

Stakeholder Identification and Engagement

Stakeholders relevant to any development project include those who will benefit as well as those who may be harmed.²⁴² In addition to spatially relevant stakeholders — for example, landowners whose properties abut a proposed development site — planning best practices suggest that developers should broaden the circle to include local business leaders, community development advocates, faith leaders, school representatives, and community groups.²⁴³ Intentionally identifying stakeholders is essential for ensuring that all affected parties have

239 “General Plan Guideline, Chapter 3: Community Engagement and Outreach,” California Governor’s Office of Planning and Research, October 2023, https://opr.ca.gov/docs/OPR_C3_final.pdf

240 Ibid.

241 Lynne C. Manzo & Douglas D. Perkins, “Finding Common Ground: The Importance of Place Attachment to Community Participation and Planning,” *Journal of Planning Literature* 20, no. 4 (2006): 335–50. <https://doi.org/10.1177/0885412205286160>.

242 “Public Engagement Guide,” City of Fort Collins, Accessed April 6, 2024. <https://www.fcgov.com/excellence/files/publicengagementguide.pdf>.

243 Ibid.

an opportunity to provide feedback, building lasting relationships with community members, and gathering valuable community insight as a project progresses.

Equally important is making sure that stakeholders can access the process. Where possible, stakeholder engagement sessions should be held in locations that are easily accessible to stakeholders. In an urban context, much of the focus suggests that it be accessible by public transit.²⁴⁴ While renewable development in Michigan is likely to occur in rural areas, the same foundational concept applies. Conducting due diligence to understand what venues and times of day work best for the majority of the community is equally important; stakeholders are more likely to attend public engagement sessions that fit into their schedules.²⁴⁵ Offering a variety of meeting places, particularly spaces that are familiar to and comfortable for stakeholders, can not only increase participation rates but also “help to bridge cultural and trust gaps.”²⁴⁶ Finally, prior to committing to dates and times for engagement activities organizers may also consider if the intended setting coincides with any cultural or religious observances.

Public Meetings

Good public engagement begins early, occurs often, and provides participants with confirmation that their contributions are actively addressed. Rather than seeing community meetings as requirements to be crossed off the list, public meetings should be viewed as opportunities to foster trust and open an ongoing two-way dialogue between a developer and the community. Moreover, public engagement is a critical venue for problem-solving in a way that sets up a community for success long after the project is completed. If community members are not involved at every step of the process, “the public may feel that its voice is being ignored.”²⁴⁷ Critiques that this does not currently happen in most land use processes — especially in the often-required “public hearing” — abound.²⁴⁸

Public meetings can take different forms, depending on the stage of the development process. Planners may hold public meetings to understand a community’s long-range vision; developers may be required to hold a public meeting before submitting an application for a permit; public hearings may be statutorily required during the application review process. In each case, it is vital that the public is aware of the purpose of the meeting to avoid misleading community members about their ability to provide input and affect the outcome. If a public meeting is intended to collect input on a proposed development, that should be communicated to the public well in advance of the event. If a public hearing is an avenue for the public to air grievances about a project — but the comments from that hearing cannot and will not influence future proceedings, due to administrative laws — that must be communicated in any public notices. Clearly announcing the purpose of a meeting increases participants’ knowledge of the meeting topic, which leads to better, more productive meeting outcomes.²⁴⁹

Preparation ahead of a public meeting demonstrates respect for stakeholder time. Hiring facilitators that are trained in mediation can be especially helpful for gathering valuable insights during particularly contentious public meetings. Asking open-ended questions that offer room for stakeholders to elaborate on their ideas, preparing alternatives to present to the audience ahead of time, and affirming a commitment to taking such ideas into account demonstrates that developers are willing to work in partnership with, rather than against, a community.²⁵⁰

244 California Governor’s Office of Planning and Research, “General Plan Guideline, Chapter 3: Community Engagement and Outreach,” 2023.

245 “A Guidebook to Community Engagement: Involving Urban and Low-Income Populations in an Environmental Planning Process,” MSU Planning & Zoning Center, September 2014. https://www.canr.msu.edu/uploads/375/65790/GuidebooktoCommunityEngagement_FINAL_Sept2014.pdf

246 California Governor’s Office of Planning and Research, “General Plan Guideline, Chapter 3: Community Engagement and Outreach,” 2023.

247 “How to Conduct a Meeting,” Michigan Economic Development Corporation, Summer 2020, <https://www.miplace.org/4a72d3/globalassets/documents/rrc/rrc-library/map-tear-sheets/quick-sheet---how-to-conduct-a-meeting.pdf>

248 “Effective Public Engagement Requires a Lot More than a Public Hearing,” Utah Chapter, American Planning Association, May 13, 2021. <https://apautah.org/effective-public-engagement-requires-a-lot-more-than-a-public-hearing/>.

249 Pauline Mogilevsky, “Public Meetings: Barriers and Solutions,” WWU Honors Program Senior Projects, June 2019, https://cedar.wvu.edu/cgj/viewcontent.cgi?article=1136&context=wwu_honors

250 City of Fort Collins, “Public Engagement Guide,” Accessed April 6, 2024.

Building Relationships

Perhaps the most indicative demonstration of investment in a community is following through on commitments made throughout the development process. Whether it is a commitment to modify a site plan based on community feedback or send out meeting minutes in a timely fashion, proactively completing what was asked of a developer signals respect for the community's time and input.²⁵¹

Additionally, the ability to directly interact with a developer can significantly strengthen residents' trust of that developer. Insights from local history and context studies can inform how developers should set up lines of communication. Notices and correspondence regarding public meetings should be shared in the major languages spoken in that community.²⁵² Creating a telephone hotline, an email address, and a website are simple but effective ways to provide community members with an opportunity to express concerns if they cannot physically attend public meetings.²⁵³

Translating Engagement Practices into Renewable Energy Siting

Decarbonization, while necessarily fast-paced, proposes changes to the physical, social, and economic landscapes of a community. One of the most widely known pathways to net zero is through the transition to renewable energy resources, and it is a pathway paved by a technological revolution that has solar and wind either cost-competitive with or cheaper than new fossil fuel projects.²⁵⁴

With the rollout of these technologies, there has been increased nationwide recognition of the importance of community engagement to the industry's growth trajectory. If undertaken with full participation, decarbonization will deliver more than sustained life on this planet to the people of the United States; it stands to bring collective benefits in the form of cheaper energy bills, cleaner air, public revenue, energy democracy, and energy sovereignty.²⁵⁵ In addition to these benefits, there are costs associated with renewable energy development that fall most heavily on the communities that host these systems, including the loss of agricultural lands, loss of cultural lands, aesthetic and visual changes, and potential impacts to wildlife and habitat.²⁵⁶

Fossil fuel plants have most often been developed in the urban fringe and suburban areas. By contrast, solar and wind technologies require large swaths of open land, meaning that their expansion rests mainly with rural communities. Yet, many small towns and rural areas generally lack the staff, technical, and financial resources to organize their collective land use priorities and respond constructively to development proposals.²⁵⁷ As soon-to-be graduates of an urban and regional planning program, the team made it a principal aim of this project to span the urban-rural continuum in how we define and plan for meaningful community engagement. Therefore, as an extension of the preceding collection of general best practices for community engagement, this section provides a tailored case for engagement in renewable energy siting. Without full participation, action on decarbonization may risk both timelines and the political will that fuels it.

Community engagement is not simply a nicety, but a necessity to ensure the long-term success of the renewable energy industry. Research has demonstrated that limiting engagement and thereby opposition to a project can

251 "Community Engagement Guidelines for the Australian Wind Industry," Clean Energy Council, June 2018. <https://assets.cleanenergycouncil.org.au/documents/advocacy-initiatives/community-engagement/wind-community-engagement-guidelines.pdf>.

252 California Governor's Office of Planning and Research, "General Plan Guideline, Chapter 3: Community Engagement and Outreach," 2023.

253 Clean Energy Council, "Community Engagement Guidelines for the Australian Wind Industry," June 2018.

254 National Academies of Sciences, Engineering, and Medicine. Accelerating Decarbonization in the United States: Technology, Policy, and Societal Dimensions (Washington, DC: The National Academies Press). 2023. <https://doi.org/10.17226/25931>.

255 Ibid.

256 Anthony M. Levenda, Ingrid Behrsin, & F. Disano, "Renewable Energy for Whom? A Global Systematic Review of the Environmental Justice Implications of Renewable Energy Technologies," Energy Research & Social Science 71 (2021): 101837, <https://doi.org/10.1016/j.erss.2020.101837>.

257 Kevin Nelson, "Essential Smart Growth Fixes for Rural Planning, Zoning, and Development Codes," EPA, February 2012, https://www.epa.gov/sites/default/files/documents/essential_smart_growth_fixes_rural_0.pdf.

deliver a relatively fast build-out at the expense of the long-term growth of the industry, with technocratic planning processes often facing backlash in the form of moratoria on development, resolutions declaring townships as “non-willing hosts”, and claims of injustice with political traction.^{258,259,260}

Instead, one way of conceptualizing the significance of early, frequent, and deliberative engagement is to think of it as a project obtaining its “social license to operate,” or the general level of acceptance granted to a renewable developer’s project by local stakeholders.²⁶¹

Local History and Context

When a renewable energy company or utility proposes development in a rural community, they are not only negotiating with private property rights and aesthetic concerns, but are also contending with the cultural legacy of farming generations.²⁶² To be considerate of deep-rooted place attachment requires exploring the range of reasons why residents chose to live in this community, whether it be for the rural amenities, land productivity, or family ties. The type of connection that a resident has with the landscape can determine how they perceive and engage with renewables projects.²⁶³

Developers should also take care when navigating inequities between urban and rural residents in terms of who benefits from large-scale renewables and who pays the price.²⁶⁴ In order to build a non-extractive relationship between the developer and host community, it is important to consider how a project might fit within local land use history and goals. What is most valuable to one community is distinct from what came up in community benefits discussion for another. It is especially important with state-level siting processes to tailor projects to be responsive to these nuances, or else risk compromising local trust and acceptance of the constructed facility.²⁶⁵

The local comprehensive plan can be a helpful starting point for structuring conversations with the community, including those sections that do not speak directly to energy facilities or energy development (e.g., expanding the employment base, investing in public schools, etc.). If local history and context has not been formalized in a planning document, it should be a topic of discussion when negotiating host community agreements (HCAs) and community benefits agreements (CBAs). When constructing CBAs and HCAs, the developer should think beyond direct monetary benefit and work collaboratively with both participating and non-participating landowners to determine how this project can make progress on collective goals.

Developers can tailor community benefits by considering the unique array of local concerns and interests, including the fiscal status of school districts and local governments, whether there are certain unmet community needs due to revenue constraints, the community’s preferred role in project development (e.g., should the developer convene a steering committee),²⁶⁶ how many jobs will be created (temporary and permanent) and the

258 Chad Walker & Jamie Baxter, “Procedural Justice in Canadian Wind Energy Development: A Comparison of Community-based and Technocratic Siting Processes,” *Energy Research & Social Science* vol.29 (2017): 160-169, <https://doi.org/10.1016/j.erss.2017.05.016>.

259 Sarah Banas Mills, Douglas Bessette, & Hannah Smith, “Exploring Landowners’ Post-Construction Changes in Perceptions of Wind Energy in Michigan,” *Land Use Policy* 82 (2019): 754–62, <https://doi.org/10.1016/j.landusepol.2019.01.010>.

260 Leah C. Stokes, “Electoral Backlash against Climate Policy: A Natural Experiment on Retrospective Voting and Local Resistance to Public Policy,” *American Journal of Political Science* 60, no. 4 (2016): 958–74, <https://doi.org/10.1111/ajps.12220>.

261 Clean Energy Council, “Community Engagement Guidelines for the Australian Wind Industry,” 2018.

262 “Lessons Learned - Community Engagement for Wind Energy Development in Michigan.” EGLE, January 2018. https://www.michigan.gov/egle/-/media/Project/Websites/egle/Documents/Programs/MMD/Energy/communities/Lessons_Learned_WESC_Report_Final.pdf?rev=f14779e351264adf810a5a410748b95f.

263 Douglas L. Bessette & Sarah B. Mills, “Farmers vs. Lakers: Agriculture, Amenity, and Community in Predicting Opposition to United States Wind Energy Development,” *Energy Research & Social Science* 72 (2021): 101873, <https://doi.org/10.1016/j.erss.2020.101873>.

264 Stephanie Buechler & Karina Guadalupe Martínez-Molina. “Energy Justice, Renewable Energy, and the Rural-Urban Divide: Insights from the Southwest U.S.,” *Energy and Climate Change* 2 (2021): 100048, <https://doi.org/10.1016/j.egycc.2021.100048>.

265 Roger E. Kasperson, Golding, Dominic, Tuler, Seth, “Social Distrust as a Factor in Siting Hazardous Facilities and Communicating Risks,” *Journal of Social Issues* Vol.48 Issue 4 (1992): 161-187, <https://doi.org/10.1111/j.1540-4560.1992.tb01950.x>.

266 Xan Fishman, Jon Jacobs, Owen Minott, Meron Tesfaye & Andy Winkler, “Empowering Communities While Streamlining Clean Infrastructure Permitting,” *Bipartisan Policy Center*, May 2023, <https://bipartisanpolicy.org/blog/clean-infrastructure-permitting/>.

feasibility of giving preferred hiring status to local residents, and how the constructed facility can complement the rural landscape.²⁶⁷

Stakeholder Identification and Engagement

It is important to acknowledge the disparities that communities face and offer meaningful rather than cursory opportunities for engagement. Research has shown that fairness of process may be even more important to long-term community acceptance of a project than fairness in the distribution of costs and benefits, hence the emphasis on engagement that is meaningful to those living nearby a project site.²⁶⁸ This is true enough when project siting occurs at the local level. But when the siting decisions rest instead at the state-level, opportunities for meaningful engagement are even more limited and, often, structurally ingrained,²⁶⁹ meaning that proper stakeholder identification and engagement is especially important for developers pursuing project approvals through state pathways.

Existing research on renewable energy development affirms that participating landowners have more ability to shape the project because they are in earlier and regular communication with the developer.²⁷⁰ They also stand to gain the most financially if a project is built. Those who are most often left out are non-participating landowners. More transient populations like renters and seasonal residents may be missed entirely. Developers should facilitate open and ongoing dialogue, not only with adjacent landowners but with the entire community.²⁷¹ It is a difficult task to account for each and every individual who may be interested in an upcoming project. Developers should start by opening their doors to questions from the public — both literally, by staffing an onsite office, and figuratively, by sharing contact information and building a user-friendly website.

Engagement opportunities should be used to address residents' direct concerns for development and should locate projects within their vision for the future. If meetings take place in an inconvenient location or with an incomplete list of attendees, developers will not see the full picture. This suggests that ***broad and direct*** notice to the general public for ***earlier*** engagement opportunities at a location and time ***convenient*** to local attendees makes for a more inclusive and participatory siting process.

Public Meetings

Permitting agencies will have to create space for early, frequent, and deliberative engagement throughout the siting process. During public meetings, it is important that there is a bi-directional flow of information. While providing project information and limitations is an important first step, developers should hold space for conversation with community members. Ideally each of these engagement opportunities should be aligned with a “consult-consider-modify-proceed” process, wherein developers and state officials recognize the legitimate contributions of local citizens and allow it some bearing on final decisions.²⁷²

For public meetings, developers should employ their broadest direct outreach strategies. It should be the expectation, as encouraged and communicated by the approving entity, that the public comment provided in the earliest meetings impacts what the developer ultimately proposes in their application. While the onus is often put on developers to be responsive, regulators also share the responsibility of setting realistic expectations for the public regarding how their comments will factor into the final decision. When the only opportunity for public interaction with decision-makers comes months or years into the development process, it is difficult to have much sway towards the final decision.

267 EGLE, “Lessons Learned - Community Engagement for Wind Energy Development in Michigan,” 2018.

268 Walker et al. “Procedural Justice in Canadian Wind Energy Development: A Comparison of Community-Based and Technocratic Siting Processes,” 2017.

269 Salma Elmallah & Joseph Rand, “‘After the Leases Are Signed, It’s a Done Deal’: Exploring Procedural Injustices for Utility-Scale Wind Energy Planning in the United States - ScienceDirect,” *Energy Research & Social Science* Vol. 89 (2022): 102549, <https://www.sciencedirect.com/science/article/pii/S221462962200055X>.

270 Ibid.

271 Ibid.

272 Walker et al. “Procedural Justice in Canadian Wind Energy Development: A Comparison of Community-Based and Technocratic Siting Processes,” 2017.

In recognition of this, some states are working to encourage proactive planning. For example, the Least-Conflict Solar Siting Gateway by Washington State University maps general locations best suited for solar development based on stakeholder input, balancing the often competing priorities to “help combat climate change while also ensuring important native species and habitats, productive farmlands and ranchlands, and tribal rights and cultural resources are protected.”²⁷³ Similar efforts have been conducted in California’s San Joaquin Valley, where farmland preservation and endangered species protection are, similar to Washington’s case, often at odds with solar development.²⁷⁴ This project utilized advanced mapping software to generate a series of stakeholder group maps, each showcasing diverse perspectives of high and low priority areas, and combined the results in a composite visualization of least-conflict areas. In Michigan, EGLE launched its own pilot initiative to build capacity at the local level for writing zoning ordinances that reflect community perspectives.²⁷⁵ This pilot provides a promising model for proactively generating community discussions on how and where utility-scale renewables fit into their vision of the future, and could be something to build off of as MPSC finds its balance between the expedience of state-level siting processes and deference to local development standards.

Figure CE-1 situates these best practices along an engagement timeline.

Building Relationships

While the previous section emphasized the importance of setting clear expectations for each public engagement opportunity, building long-term relationships requires follow-through. Again, while the role of the public in each engagement may vary, both developers and regulators bear the responsibility of building trust in the siting process. It is important to demonstrate consistency and reliability when working with communities, such as by showing how feedback is incorporated in final plans and publicly reporting on development progress and timeframes, siting decisions, and engagement outcomes.²⁷⁶

Expectations set in the process of approving a project should be followed through on in its construction and operations, all the way through to its decommissioning. Again, this ongoing accountability implicates both developers and regulators. A local office set up during project proposal could provide continuous access to the developer or owner should problems arise once operational,²⁷⁷ which, as mentioned in previous sections of the report, could preempt communication issues down the line if ownership changes. Having processes in place to maintain compliance and address conflicts as they arise will help take the relationship beyond cursory or extractive engagement into a long-term partnership with the community. Deep partnerships with host communities can bring long-term benefits to the renewable energy industry, as anecdotal evidence from landowners living nearby wind, solar, or battery developments is a powerful tool for building trust in communities new to hosting renewable energy developments.²⁷⁸

273 “Columbia Plateau Least-Conflict Solar Siting Gateway,” Washington State University, Accessed April 15, 2024, <https://wsuenergy.databasin.org/>.

274 Dustin Pearce, James Strittholt, Terry Watt & Ethan N. Elkind, “A Path Forward: Identifying Least-Conflict Solar PV Development in California’s San Joaquin Valley,” Berkeley Law, University of California, May 2016, <https://farmlandinfo.org/wp-content/uploads/sites/2/2019/09/A-PATH-FORWARD-May-2016.pdf>.

275 “State Wins \$1.9 Million Federal Award to Support Local Renewable Energy Planning and Deployment,” State of Michigan, April 26, 2024. <https://www.michigan.gov/egle/newsroom/press-releases/2024/04/26/state-wins-grant>.

276 Clean Energy Council, “Community Engagement Guidelines for the Australian Wind Industry,” 2018.

277 Fishman et al., “Empowering Communities While Streamlining Clean Infrastructure Permitting,” 2023.

278 Joseph Rand, Ben Hoen, Robi Nilson, Sarah Mills, Karl Hoesch, Doug Bessette & Jake White, “Perceptions of Large-Scale Solar Neighbors,” Energy Market & Policy Berkeley Lab., April 2024, https://eta-publications.lbl.gov/sites/default/files/ccsd_national_survey_iss_neighbors_results_brief_april2024.pdf

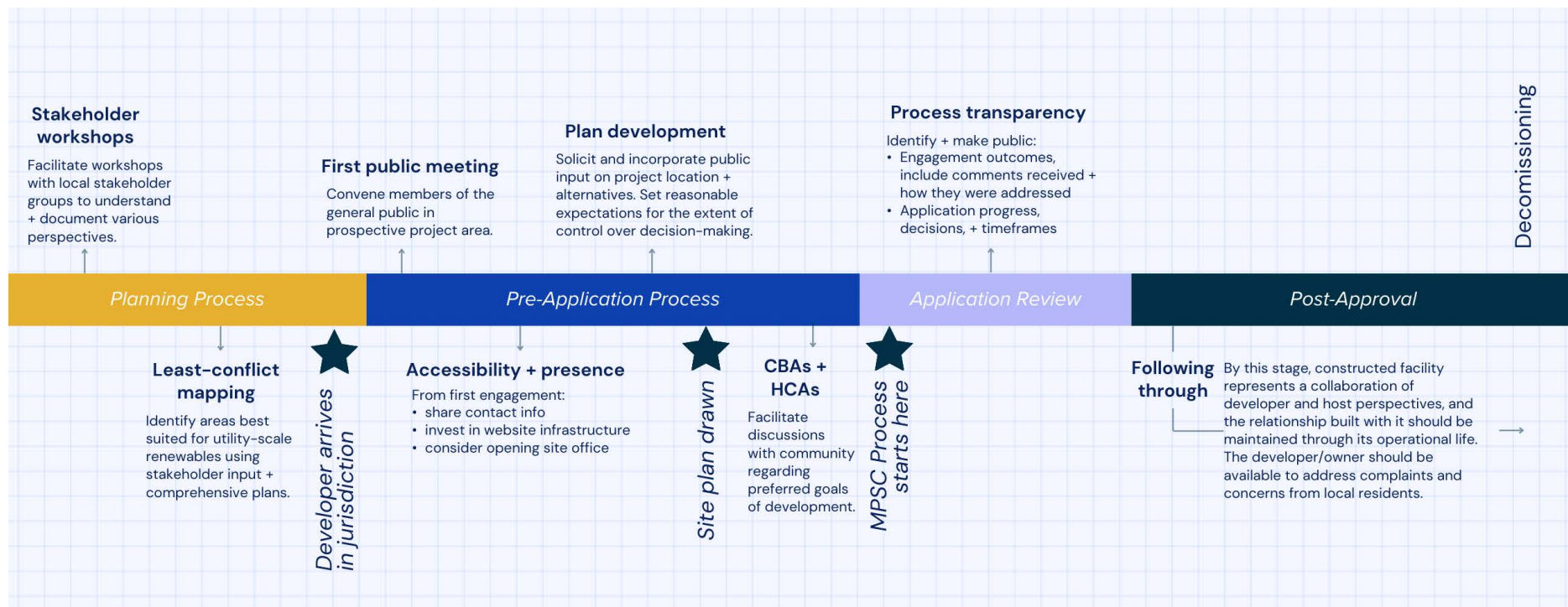


Figure CE-1: Best Practice Renewable Development Engagement Timeline

Lessons Learned

Based on the literature review's findings, this section identifies potential suggestions for introducing better community engagement when implementing PA 233. Each subsection summarizes the significance of community engagement practices and specifies possible actions of the Commission.

community-1. Considering Community Impacts and Benefits

One of the possible challenges to state-level renewable siting is that a state authority may not be able to ascertain whether the “community benefits” of a project are actually seen as such by the community. One of the ways to solidify benefits is by understanding how the project fits within — or deviates from — the community's comprehensive plan. The Commission may be able to further ascertain a fit with local land uses and future plans by requesting information about the locality's planning and zoning as part of the application's “description of the portion of the community where the energy facility will be located.” **[§ 225.1(h)]**

Further, while PA 233 requires applicants to enter into HCAs (or CBAs if HCAs fail), it does not stipulate how these agreements are coordinated. Despite being outside the scope of PA 233, the Commission may want to direct developers and local units to consider local input during the drafting of their agreement. Or, the Commission can require developers to report the (ongoing) process of the agreements as a summary of community outreach. **[§ 225.1(j)]**

community-2. Broad Direct Notice to Potential Stakeholders

Existing state-level siting processes have often ignored or devalued the role of non-participatory property owners and more transient populations like renters.²⁷⁹ However, these groups may be subject to the potential impacts of the projects (e.g., noise, fire risks, visual impacts), without sharing in the financial benefits. Incorporating such stakeholders into siting processes and addressing their concerns is essential to the long-term success of the project as well as to advancing justice within the context of state-wide decarbonization.

PA 233 requires developers to publish notice of a public meeting and public comments in a newspaper or comparable digital alternative; however, stakeholders may not always have access to local news or a reliable internet connection. To ensure that potential stakeholders do not miss such opportunities, the Commission may consider instructing developers to send direct notice of the public meeting and public comments to stakeholders (e.g., by mailing postcards) when prescribing the format and content of the notice. These notices may be sent directly to all landowners and renters in the affected township. **[§§ 223.1, 226.2]**

community-3. Accessibility of Public Meetings

To complement the actions for opening siting processes to potential stakeholders, public meetings should be held at a convenient time and location. Otherwise, stakeholders may feel left out of the siting process and opposition to the project may spiral. Publishing video or audio recordings and meeting minutes of the public meetings will be useful for keeping those unable to attend informed. These may also prove a useful tool if Commission staff are not present at the meetings.

While PA 233 does not stipulate these details with regard to public meetings, the Commission could consider providing accessibility directions to developers when prescribing the format and content of the notice. **[§ 223.1]** A video or audio recording of the meeting may be required as the summary of the community outreach in **[§§ 225.1(j)]**. Further, the Commission may wish to consider the extent to which it directs developers to follow the minutes²⁸⁰ and sound recording²⁸¹ requirements in the Michigan Open Meeting Act.

279 Elmallah et al., “Exploring Procedural Injustices for Utility-Scale Wind Energy Planning in the United States,” 2022.

280 MCL Act 267 § 15.269 (1976)

281 MCL Act 267 § 15.269a (1976)

community-4. Addressing Comments in Public Meetings

Since public meetings **[§ 223.1]** are the earliest community engagement checkpoint required by PA 233, the public will likely have an expectation that comments in the meetings should impact what the developer ultimately proposes to the Commission. That expectation will largely be placed on the developers to address these comments sincerely.

To help facilitate this, the Commission can require developers to report on the comments (e.g., through thorough meeting minutes) and whether — and how — each comment was addressed in their proposed application (i.e., how the project changed from public meeting to submission). While it is an unrealistic expectation that each comment be fully accommodated in the application, asking the developer to respond to each one will demonstrate and explain why it cannot be accommodated may encourage additional reflection. **[§ 225.1(j)]**

community-5. Addressing Public Comments

Since the public comment made during a contested case is not part of the evidentiary record in Michigan, the Commission should be transparent with the public about the role of their comments in decision making ahead of these cases. Specifically, the Commission should explicitly communicate these expectations when the developers provide notice of the application filing. **[§ 226.2]**.

If the Commission commits to taking public comment into consideration as part of the contested case, then it should address, in a parallel manner to what is suggested above in community-4, how each comment was or was not addressed in the final order and conditions of approval. **[§ 226.6]**

community-6. Least-Conflict Siting

The Commission does not have the authority to require the proactive least-conflict siting practices that have proved promising elsewhere. However, the Commission can respect and uplift proactive planning processes that constitute best practices.

When a project is proposed on an undeveloped site, PA 233 requires developers to consider feasible alternative locations. **[§ 225.1(n)]** One of the questions that may arise is whether or not the alternatives included in this analysis — but dismissed — are reasonable. One option is to request that the developer works to identify alternative sites while consulting with EGLE and other relevant agencies, as mandated in the law. **[§ 225.1(k)]** To the best of the team’s knowledge, none of these agencies have conducted least-conflict siting processes akin to those in Washington State or California. A project conducted by a student team at the University of Michigan in 2023 was informed by least-conflict siting frameworks and could provide a starting point for future work more tailored to local comprehensive planning.²⁸² If there were to be further progress on this work in the future, a combination of consulting with relevant agencies and requiring applicants to include alternatives compliant with those least-conflict studies would be a logical way to incorporate this lesson learned.

More immediately, there are opportunities to encourage local planning for utility-scale projects. A more streamlined local renewables planning process was recently introduced through the MI REDI²⁸³ program and serves as a good example of how this could work. The technical assistance that EGLE, Michigan State University, the University of Michigan, the Michigan Association of Planning, and 5 Lakes Energy are developing as part of a recently announced R-STEP grant offers another opportunity for renewables planning.²⁸⁴ In their application instructions, the Commission could make it clear to developers that, where local planning for renewables has been done, their alternatives analysis should include locally-identified alternatives. **[§ 225.1(n)]** Additional guidance from the Commission on how much energy infrastructure each local unit is expected to host, as

282 Isabella Beshouri, Nikunj Bhimsaria, Nivedita Biswal, Kira Edwards & Revati Thatte, “Farmland Solar Potential in Washtenaw County.” Graham Sustainability Institute, December 2023, <https://graham.umich.edu/media/files/dow/Dow-Masters-2023-Farmland-Solar.pdf>

283 Michigan Renewable Energy Development Initiative by University of Michigan; Winner of an American Planning Association’s 2024 Excellence in Sustainability Award.

284 “Renewable Energy Siting through Technical Engagement and Planning,” Energy.gov, Accessed April 24, 2024, <https://www.energy.gov/eere/renewable-energy-siting-through-technical-engagement-and-planning>.

referenced in **[§ 226.6]**, would further provide communities with a target they can apply in those planning efforts.

community-7. Complaint Resolution and Post-Approval Monitoring and Compliance

The importance of community engagement throughout the life of the project, and not just during approval, is a theme present throughout this report. As noted in the wind and solar chapters, some local ordinances require developers to structure and engage in a complaint resolution process and often require post-construction reporting or performance metrics, whether to confirm noise standards were being met (as in wind and BESS) or to ensure vegetation or ground cover was appropriately maintained (most relevant for solar). Furthermore, interviews with local officials underscored the importance of on-site construction monitoring to be sure that the project was built in accordance with the approved plans. What this chapter adds to the conversation is that post-approval monitoring and compliance are essential to building a healthy long-term relationship between the developer, regulator, and the community that will host the project throughout its lifetime.

The recommendations derived from community engagement best practices are similar to those presented in these early chapters:

([states-2](#)) ([battery-8](#)) submitting a report on any failure or accident in the project site and unforeseen impacts,

([wind-1](#)) ([wind-5](#)) submitting post-approval reporting of as-built-filing sound, shadow flicker, and signal interference,

([wind-5](#)) ([battery-3](#)) reporting on regular inspections,

([wind-4](#)) ([battery-8](#)) submitting a complaint resolution plan in place, and

([solar-2.5](#)) maintaining the vegetation and ground cover on the site as approved.

These may be enforced by using discretionary powers within PA 233 to condition approval. **[§ 226.6]**



CHAPTER 6: LESSONS LEARNED FOR PA 233

In the following tables, the team has compiled the key lessons drawn from the earlier chapters of this report, consolidating them into a single, accessible resource. This compilation is designed to serve as a reference tool, connecting these insights to their corresponding clauses in PA 233. To facilitate access to more detailed discussions, hyperlinks to relevant sections are included, directing readers to the specific technologies in previous chapters where these lessons are elaborated upon.

It's crucial to acknowledge that the perspectives and recommendations put forward in this chapter originate solely from the team's research. These insights do not represent the official perspective or predetermined plans of the Commission. Instead, they are intended to spark further inquiry and exploration into these areas, offering pathways that may warrant deeper investigation.

Statute	Takeaways
Sec. 223 Community Outreach and Consultation	
(1) public meeting and notices	<p>(states-4) Consider MPSC staff presence at these meetings.</p> <p>(states-4) Consider defining options for a comparable digital alternative, such as a developer-hosted website with publication of project information and map visualizations including address search capabilities and identification of sensitive receptors.</p> <p>(wind-7) Consider requiring developers to physically mark and outline the proposed site layout ahead of the public meeting.</p> <p>(community-2) Consider instructing developers to send direct notice of the public meeting to stakeholders when prescribing the format and content of the notice.</p> <p>(community-3) Consider directing developers to follow the minutes and sound recording requirements in the Michigan OMA.</p>
(2) meeting with the chief elected official	<p>(states-1) Consider requiring developers to provide a summary of the chief elected official's concerns and an itemization of how the final application is responsive – or not – to the concerns.</p>
Sec. 224.1 Site Plan Requirements	
	<p>(wind-3) Wind-project engineers, as well as energy-focused planning experts or literature, should be consulted when deciding additional site plan requirements.</p>
Sec. 225.1 Application Requirements	
(f) impacts on the environment and natural resources	<p>(states-3) Consider including long-term social and economic impacts of a project in the environmental review process.</p> <p>(wind-4) Consider impacts of utility cable depth on farming.</p>
(g) effects on public health and safety	<p>(solar-2.5) Consider regular maintenance and mowing of the vegetative cover to reduce fire risk.</p>
(h) description of the portion of the community where the energy facility will be located	<p>(states-1) Consider requiring the developer to document socioeconomic and demographic profiles and major industries in the area.</p> <p>(states-1) (wind-4.1) (solar-3) (community-1) Consider requesting the developer to reference the local comprehensive plan and zoning ordinance to ascertain a project's fit with local land uses and plans.</p>
(j) summary of the community outreach and education efforts	<p>(states-1) (states-4) Consider requesting detailed content from other meetings hosted by the developer — not only the required local official and public meetings required — and whether and how each comment was addressed in the final application.</p> <p>(solar-5) Consider requesting developers to submit copies of any information they provided in their community outreach efforts.</p> <p>Consider requiring developers to:</p> <p>(community-1) report the process of the host community agreement.</p> <p>(community-3) submit a video or audio record of the meeting.</p> <p>(community-4) report the comments made in the public meeting and whether and how each comment was addressed in the final application.</p>

(k) evidence of consultation	<p>(states-3) Consider requiring developers to provide a summary of consultation with the agencies named in PA 233; a summary of any concerns with the project identified by those agencies; and a detailed report of the developer's proposed mitigation measures, if applicable.</p> <p>(wind-4.2) Consider collaborating with MDARD to weigh in on suggested utility cable depth or conduct a study to determine ideal depth of utility cables.</p> <p>(community-6) Consider requiring developers to submit a summary of consultation with agencies about alternatives compliant with least-conflict siting studies.</p>
(n) a description of feasible alternatives	<p>(solar-3) (community-6) Consider requesting that the developer's analysis of alternatives include, where local planning for renewables has been done, locally-identified alternatives.</p>
(q) a fire response plan and an emergency response plan	<p>(battery-2) (battery-3) Consider specifying whether local fire responder training and/or periodic inspection should be included in these plans.</p> <p>(battery-7) Considering clarifying whether these plans are supplemental to the information required in NFPA 855.</p>
(r) decommissioning plan	<p>(wind-2) Consider specifying when decommissioning must commence, depth of excavation required, and the quality of soil restoration the developer should perform.</p> <p>(solar-1) Consider reviewing decommissioning plans for existing projects and incorporating similar items, which included periodic review by the local body, periodic update of the surety, and salvage value as part of cost estimation.</p> <p>(battery-6) Consider specifying the information to be included in this document, including appropriate methods of periodical cost updates and responsibilities, processes, and cost handling to remove damaged equipment following an incident.</p>
(s) other information	<p>Consider requiring developers to submit:</p> <ul style="list-style-type: none"> • (wind-1) pre-construction studies and industry-standard computer modeling to demonstrate compliance with sound and flickr • (wind-4.3) a complaint resolution plan • (solar-4.1) a glare study by a third-party qualified professional. • (solar-4.2) requirements of the County Drain Commissioner to ensure stormwater plans are adequately considered • (solar-4.3) sound isolines and vegetative screening locations on the site plan. • (solar-4.4) a ground cover vegetation establishment and management plan. • (battery-1) documentation of consultation with the local fire department. • (battery-7) additional information required in NFPA 855. • (battery-8) community outreach plan or similar document to ensure transparency and accountability for fire risks to the community.
Sec. 226.1-6 Procedures During Review Process	
(1) intervenor fund	<p>(states-5) Consider precedents from other states in allocating funds and disbursing any excess funds.</p>
(2) public comment	<p>(states-4) Consider defining options for posting in a comparable digital alternative, such as a developer-hosted website.</p> <p>(states-4) (community-2) Consider instructing developers to send direct notice of the public comment to stakeholders when prescribing the format and content of the notice.</p> <p>(states-4) (community-5) Consider explicitly communicating realistic expectations when the developers provide notice of the public comment.</p>
(4) application fees	<p>(states-1) Consider hiring consultants to ensure that MPSC can evaluate applications efficiently in the short-term until new long-term staff can be hired.</p> <p>(states-2) Consider requiring the developer to fund an independent, onsite evaluator accountable to the Commission during construction.</p>

(6) feasible alternatives	(community-6) Considering guidance on how much energy infrastructure each local unit is expected to host to encourage local units to set a target they can apply in their planning efforts.
(6) conditions of approval	<p>Consider requiring developers:</p> <ul style="list-style-type: none"> • (states-1) to accommodate standards of importance to local governments as articulated in their local zoning ordinances, the reasonableness of which may be assessed by referring to Appendix A. • (wind-1) to submit post-construction in-the-field studies that demonstrate compliance with noise, flicker, and signal interference standards. • (wind-4) to incorporate community preferences in particular with respect to setbacks from particular features, depth of utility cables, complaint resolution process, and annual inspection reporting. • (solar-2) to incorporate community preferences in particular with respect to fencing, and screening and landscaping • (solar-2.3) to place inverters closer to the center of the project or a larger distance from habitable structures. • (solar-2.4) to conduct pre-construction water and soil testing to set a baseline upon which a final decommissioning plan can be measured against. • (solar-2.5) to be responsible for regular maintenance and mowing of the vegetative cover on project site. • (wind-4.3) to submit a complaint resolution plan as an application document, or impose it as a condition of approval. • (battery-1) to create a mutually agreeable emergency response plan with local fire departments. • (battery-2) (battery-3) (battery-4) to conduct local fire responder training, periodic inspections, and/or retrofitting updated equipment to existing facilities. • (battery-5) to integrate local preferences into fencing design. • (battery-8) to make post-incident community outreach in case of future fire incidents. • (battery-9) to implement the contents of HCA/CBAs. • (community-5) Consider reporting on whether and how each public comment was addressed in the final order and conditions of approval. • (community-6) Consider providing local governments with guidance on how much energy infrastructure each local unit is expected to host.
Sec. 226.7 General Requirements	
(c) impacts on the environment and natural resources	(states-3) Consider including long-term social and economic impacts of a project in the environmental review process.
(f) impact on farmland	(wind-4.2) Consider factoring utility cable depth into assessment of agricultural impacts.
Sec. 226.8(b) Technical Requirements: Wind	
(vi) signal/radar interference	(wind-1) Consider hiring third-party qualified individuals to conduct industry-standard computer modeling to demonstrate compliance, hold developers responsible for non-compliant turbines, and evaluate if corrective actions need to be taken for noncompliance.
Sec. 226.8(c) Technical Requirements: Battery Storage	
(ii) compliance with NFPA 855	(battery-1) (battery-2) (battery-3) Consider clarifying whether consulting with local fire departments, providing local fire responder training, and conducting periodic inspections are required.
(v) other requirements	(battery-5) Consider requiring the developer to install certain fencing required under NFPA 855.

Sec. 227 Host Community Agreement	
	(battery-9) Consider requiring developers to implement the contents of HCA/CBAs as a condition of approval.
Sec. 227a Completion Report	
	(wind-5) Consider requesting a post-construction study for as-built-filling as part of a completion report.
Sec. 231 Electric Provider or Independent Power Producer	
(5) obtaining permits, license, or permission	(wind-5.1) Consider consulting with the Attorney General's Office or LARA on the applicability of building and electrical permits in PA 233. (wind-8) Consider being explicit about the agencies and external authorities who have approval authority, especially airport zoning authorities, drain commissioners, road commissions, etc.

Additional Lessons Outside the Statutory Text

We identified several insights from the team's research that fall outside the specific scope of PA 233, indicating areas of consideration that extend beyond the existing framework. To address these insights, the table below outlines a series of actions that are vital for the Commission to contemplate as part of a broader approach to implementation. These recommendations aim to enhance the overall strategy by integrating lessons that, while not directly referenced in PA 233, are crucial for comprehensive planning and execution.

Topic	Takeaways
PA 233 does not currently provide direction for complaint resolution .	
Complaint resolution	(states-4) Consider establishing a system to document and resolve complaints.
PA 233 does not include instructions for compliance and monitoring during construction and operational phases.	
Compliance and monitoring	(states-2) (wind-4.2) Consider whether to conduct periodic compliance checks or inspections. (wind-1) Consider making clear what the consequences and sequence of corrective actions will be if noise/flicker/signal interference standards are not met at any time post-construction. (wind-5) Consider possible avenues to address construction concerns, as these are likely to arise in a project jurisdiction.
Aside from intermittent engagement opportunities (i.e., public meeting and comment), PA 233 does not identify continuous communication channels between local officials and community members and state-level staff.	
Project public advisor	(states-4) Consider assigning a staff member to answer questions from the public about the permitting process.
External Approvers	(wind-8) Consider establishing relationships with external approvers including county drain commissioners, county road commissioners, etc.
PA 233 does not identify ways to navigate the relationship between developers and landowners, specifically regarding contracts and leases .	
Contract/Lease Lessons	(wind-6) Consider providing educational materials to lessee about contracts, ensuring developers are available to answer any questions and concerns.

Appendix

Appendix A. Interview Questions with Other States

Siting process questions included the following:

- Beyond those mentioned in the enabling legislation, are there additional standards your organization has come to apply in evaluating utility-scale solar and wind projects in your state?
- What proportion of projects go through state-level certification or permitting processes as opposed to local-level processes?
- Who ensures that projects are built as proposed/approved?
- Who handles complaints during the construction and maintenance phases of projects?
- Does your agency hire consultants to support certification or permitting work? If so, how many? What functions do they perform?
- What other agencies do you work with during the certification or permitting process?

Environmental review questions included the following:

- Who manages the environmental review for renewables facilities siting?
- Is addressing comments and findings from the environmental review process compulsory or just recommended?

Community engagement questions included the following:

- Do developers ever engage communities before the application is accepted?
- For required public engagements, what information does your agency require developers to provide in their state-level application?
- How often do developers modify their site plans or applications based on public comment and feedback?
- Does your agency evaluate community benefits agreements for host communities?
- What forms of community engagement have or have not worked well in your state?
- What does the public engagement process look like once an application for certification or permitting has been submitted to your agency?
- Are there in-person meetings? Where are they held?
- What are the ways in which the public can provide comment?

Intervenor fund questions included the following:

- What does the process of distributing intervenor funds look like?
- How do you determine the fund amount?
- What happens if funds are not used in full?
- How often do citizens and organizations take advantage of intervenor funds?

Appendices B through G can be accessed in the [PA 233 and Zoning Ordinances Comparison tables](https://docs.google.com/spreadsheets/d/1nNc0hf3So055mr3oqLvJe3II7nxnznKS1z7NqD8SsP0/edit?usp=sharing) made for this capstone project or by pasting the following link into your browser: <https://docs.google.com/spreadsheets/d/1nNc0hf3So055mr3oqLvJe3II7nxnznKS1z7NqD8SsP0/edit?usp=sharing>

Appendix B: Comparison of PA 233 and the 2020 MSU Sample Wind Zoning Ordinance

The tab (labeled as AppendixB_wind) compares PA 233 requirements with recommendations from the “Sample Zoning for Wind Energy Systems ” (referred to as “sample zoning’ or ‘sample ordinance’) report that was prepared in 2020 by the Michigan State University Extension. The table highlights areas of overlap and misalignment. Topic areas considered include but are not limited to setbacks, shadow flicker, height, sound, and decommissioning.

Appendix C: A Detailed Comparison of Local Zoning and Conditions of Approval to PA 233 for Wind

The tab (labeled as AppendixC_wind) compares PA 233 requirements and recommendations from the 2020 MSU sample ordinance to local government zoning requirements and final project conditions of approval for two Michigan case studies. Isabella Wind is a 383 MW facility operating in Isabella County and approved through a singular county-wide zoning ordinance. Meridian Wind is a 225 MW facility operating in Jonesfield, Mount Haley, and Porter Townships.

Appendix D: Comparison of PA 233 and the 2021 Planning and Zoning for Solar Energy Systems

The tab (labeled as AppendixD_solar) compares PA 233 requirements with recommendations from “Planning and Zoning for Solar Energy Systems” (referred to as “sample zoning’ or ‘sample ordinance’) report that was jointly prepared in 2021 by the Michigan State University Extension, Michigan State University’s School of Planning, Design and Construction and the Graham Sustainability Institute at University of Michigan. The table highlights areas of overlap and misalignment. Topic areas considered include but are not limited to setbacks, fencing, screening/landscaping, sound and decommissioning.

Appendix E: A Detailed Comparison of Local Zoning and Conditions of Approval to PA 233 for Solar

The tab (labeled as AppendixE_solar) compares PA 233 requirements and recommendations from the 2021 joint MSU U of M sample ordinance to local government zoning requirements and final project conditions of approval for two Michigan case studies. Assembly Solar is a 239 MW facility operating in Shiawassee County. Calhoun Solar is a 200 MW facility operating in Convis and Pennfield Charter Townships.

Appendix F: Comparison of PA 233 and the Draft of the Planning & Zoning for BESS (Sample Ordinance)

The tab (labeled as AppendixF_BESS) highlights the comparison of what is in PA 233 and the sample BESS zoning in the draft version of Planning & Zoning for BESS, which the Graham Sustainability Institute at University of Michigan is developing as a guidebook for Michigan local governments.

Appendix G: A Detailed Comparison of Local Zoning and Conditions of Approval to PA 233 for BESS

The tab (labeled as AppendixG_BESS) highlights the comparison of what is in PA 233 with local zoning and conditions of approval in the BESS case studies.