Indiana Renewable Energy Community Planning Survey and Ordinance Inventory Summary

Tamara M. Ogle
Regional Educator
Purdue Extension Community Development
togle@purdue.edu

Kara Salazar
AICP, CC-P, LEED AP ND, NGICP, PCED
Assistant Program Leader and Extension Specialist for Sustainable Communities
Purdue Extension
Illinois – Indiana Sea Grant
Purdue University Department of Forestry and Natural Resources
salazark@purdue.edu

PURDUE UNIVERSITY | Extension

Sea Grant ILLINOIS-INDIANA

Acknowledgments

The authors thank Hoosiers for Renewables and Indiana Farm Bureau for their support of this research project. We also thank Dr. Sarah Banas-Mills, Darrin Jacobs, and Steve Yoder for their expert review and feedback. We appreciate the time and contributions from municipal and county planning departments and plan commissions from across the state that made the report possible.

Sponsor

Background

In 2021, Purdue Extension conducted a comprehensive overview study of land use regulations for wind and solar energy. Purdue Extension's Land Use Team plays a critical role across Indiana through the work of Agriculture & Natural Resources Educators serving on Advisory and Area Plan Commissions either as voting or advisory members. Team members also serve as Community Development Educators, faculty, and specialists working on land use issues. The Land Use Team's primary purpose is to develop and deliver educational resources to assist Plan Commissions and other related institutions and organizations in making informed land use planning decisions.

The Purdue Land Use Team identified a state-wide need for research-based technical assistance information focusing on local renewable energy and land use decision making, specifically for ordinance development. Multiple feedback mechanisms informed the needs assessment and ordinance inventory study design. These included feedback survey results from the 2019 and 2021 Indiana Land Use Summits, listening sessions with Indiana Land Resource Council members and stakeholders, Purdue Extension Land Use Team advisory board members, and feedback collected during Purdue Extension land use planning program efforts.

This report provides a summary and snapshot of state-wide renewable energy ordinances and the accompanying inventory study. It is divided into the following sections:

- Introduction and overview of renewable energy planning and zoning in Indiana
- Study methods
- Summary of community perceptions
- Inventory of zoning ordinances
- Appendices
  - Survey instrument
  - How to read the snapshots
  - County snapshots

The report summaries and county snapshots can be used as a reference for plan directors and plan commission members to compare other renewable energy zoning ordinances and zoning tools used in counties across Indiana. Plan commissions can draft ordinances that effectively address concerns and development goals of the community based on dialogue between counties and with local stakeholders.

Furthermore, this report should be used for educational purposes only and should be adapted to each community's local context, as appropriate. The information is not intended to provide specific recommendations for policies or decisions. Additionally, communities continually update ordinances based on new technology and local needs.

Introduction and Overview

Indiana communities are faced with complex decisions related to land use planning, particularly for renewable energy. This complexity and the unique characteristics of each community result in a patchwork of land use policies across the state. Additionally, many local communities are experiencing an increased interest in solar due to federal, state, and utility incentives (SUFG, 2021). Based on local decisions, some Indiana communities embrace wind and solar renewable energy as a part of their land use policies, while others restrict their development. This is a theme occurring across the United States as renewable energy production increases (Ahani & Dadashpoor, 2021; Milbrandt et al., 2014; Sward et al., 2021). This increased interest in renewable energy, especially the siting of wind turbines and solar fields across the state, has highlighted a gap in research-based land use planning and technical assistance information for Indiana plan commissions and local government staff.

According to the U.S. Energy Information Administration, Indiana ranks 12th in the United States in total energy use per capita due, in part, to weather extremes. The state consumes approximately three times the amount of energy it generates, with the industrial sector accounting for one-half of energy consumption, transportation and residential using one-fifth of the state's energy, and commercial users comprising the rest of energy consumption (US EIA, 2021a). In Indiana, renewable energy generation has increased with utility-scale projects connecting to the main transmission grid. Indiana began the process for wind development in 2005 with the first 1,036 MW of wind capacity installed by the end of 2009 (Tegen et al., 2014). In 2020, wind contributed 7% of the state's electricity net generation with 2,940 megawatts (MW) of wind capacity state-wide (US EIA, 2021a). Currently, there is a similar amount of wind development proposed in the interconnection queue (3,631 MW) as was installed at the end of 2020 (2,940MW) (US EIA, 2021b; MISO, 2022; PJM, 2022). Solar currently contributes approximately 2% of the state's electricity net generation, mostly from utility-scale facilities found throughout Indiana (US EIA, 2021; SUFG, 2021). There is approximately 146 times more solar development proposed in the interconnection queue (40,979 MW) as was installed at the end of 2020 (279 MW) (US EIA, 2021b; MISO, 2022; PJM, 2022). While not all proposed renewable energy development within the queue will be built, it indicates increasing interest in renewable energy development in Indiana. Inventories of state-wide solar and wind projects can be found through the State Utility Forecasting Group's 2021 Indiana Renewable Energy Resources Study: https://www.purdue.edu/discoverypark/sufg/docs/publications/2021%20Indiana%20Renewable%20Resources%20Report.pdf. Additionally, Hoosiers for Renewables maintains a map of operational and proposed solar and wind projects throughout Indiana: www.hoosiersforrenewables.com/indiana-renewable-energy-map.

There are three types of electric utilities in Indiana, investor-owned utilities, municipal utilities, and rural electric membership cooperatives (REMCs). Investor-owned utilities serve the majority of the state and are divided into five service territories. Investor-owned utilities generate power, transmit electricity, and distribute to customers. There are 72 municipal utilities across the state, with several of these represented by the Indiana Municipal Power Agency (IMPA). IMPA is a wholesale power provider which sells electricity to its members. IMPA communities can also develop their own renewable energy projects directly distributed to customers. REMCs include two primary generation cooperative organizations in the state. The cooperatives generate and transmit electricity from facilities across Indiana and deliver it to customers in their service areas. (OED, 2022).

State-Level Renewable Energy Policy

The Indiana Office of Energy Development plans and coordinates state energy policies and administers grant programs funded by the U.S. Department of Energy (OED, 2022). Additionally, the Indiana Utility Regulatory Commission (Commission) oversees utilities that operate in Indiana for electric, natural gas, steam, water, and wastewater (IURC, 2022). The Commission approved the voluntary clean energy portfolio standard program, which outlines that utility companies choosing to participate need to acquire 10% of electricity from clean energy sources by 2025. Utilities also need to provide net metering for customers generating renewable energy of less than

1 MW of capacity (US EIA, 2021; IOUCC, 2022; IURC, 2022). For example, the average capacity for a wind turbine built in 2020 was 2.7 MW, and 1 MW of solar panels covers approximately 4-7 acres (EERE, 2021). Additionally, renewable energy projects require a Power Purchase Agreement (PPA) to contract supply with a utility company when generating more than 1 MW of capacity and more than the annual average electricity consumption (Martin, 2021).

Zoning Provisions for Local Renewable Energy Planning and Development

While state agencies guide policies and utility regulations, oversight of renewable energy development and land use planning processes currently occurs locally. Eighty-two of Indiana's 92 counties (89.1%) have adopted both planning and zoning. These zoning ordinances govern land use in the unincorporated areas of these counties and in some municipalities where area planning has been adopted by the county and one or more cities or towns within the county. Counties can create standards and processes through the zoning ordinance to regulate their jurisdiction's land use and development.

Counties create zoning districts and specify the permitted uses within that district. Uses can be classified as permitted by right, permitted by special exception (sometimes referred to as special uses or conditional uses), or not permitted. Permitted uses can apply for improvement location permits through the planning office and must follow all district and use standards. However, they do not require approval from the plan commission or board of zoning appeals (BZA).

The BZA must approve a use permitted by special exception (IC 36-7-4-918.2). This requires a public hearing and allows the county to review the details and particular application and parcel to ensure the development will be compatible with their comprehensive plan and zoning ordinance. Criteria for approving special exceptions are set in the zoning ordinance, which can be general or specific for a particular use. Special exceptions must also adhere to any zoning district or use standards.

If a use is not permitted in a district, the petitioner may apply for an amendment to the zoning map, commonly referred to as rezoning. Rezoning requires a public hearing before the plan commission, which gives either a favorable, unfavorable, or no recommendation to the legislative body. The legislative body then votes to approve or deny the rezone (IC 36-7-4-607). In a jurisdiction under advisory planning law, an applicant seeking to develop a use that is not permitted in their zoning district could also pursue a use variance from the board of zoning appeals.

Overlay districts are another zoning tool used to regulate commercial renewable energy development. Overlay districts are layered on top of the existing zoning district. The current or underlying zoning districts standards apply to all development. In addition, the overlay district standards apply to uses that are permitted in the overlay district but not the underlying district. An overlay district for renewable energy can be applied proactively to guide renewable energy development to preferred areas (Beyea, 2021). If the community establishes an overlay without proactively applying it to the zoning map, an applicant may have to go through the rezoning process to put the overlay district in place before applying for a permit for a commercial renewable energy system.

Development is primarily regulated through developmental standards in the zoning ordinance. Each zoning district will have developmental standards that apply to all uses within that district. In addition, zoning ordinances can also create standards specific to certain uses or use standards. Commonly these define a buffer or separation between the use and another conflicting land use, additional setbacks, height restrictions, and various other standards to regulate the look and impact of the use on the surrounding property. If an applicant cannot meet one or more of the standards, they can seek a variance from developmental standards from the board of zoning appeals.

The zoning ordinance may also require different plans submitted or studies conducted to permit commercial renewable energy. This includes but is not limited to economic development agreements, maintenance plans, and transportation plans. These plans can be an additional part of the process or something already required by other agencies that the planning office wants to see to determine if other

regulations are being followed. A site plan or scaled drawing of the development is generally required for any improvement location permit so that planning staff can ensure standards will be met. Some zoning ordinances may require a specific use to go through a development plan review. This process will be delineated in the zoning ordinance and may be done by staff, a committee, or the plan commission.

Solar Energy Development

The following 36-month example timeline outlines the solar siting and development process (Hoosiers for Renewables, personal communication, December 2021). The general outline below is a snapshot of milestones and overarching timelines. Delays and updates can occur within each step, which could extend the timeline. For example, although the project is still underway, a step could be stalled with no visible progress pausing the timeline. Several risks and unknowns can extend the timeline, such as completing and receiving reports back from utility companies, availability and transportation costs of materials, labor costs, and market demands. Additionally, solar developers have to post letters of credit at key milestones. A timeline may need to be restarted if there are too many changing aspects related to the development.

MONTHS 1 - 11	• Determine potential sites with transmission access & capacity • Sign contracts with landowner(s) • File for interconnection • Preliminary due diligence and site inspections
MONTHS 12 - 23	• Receive interconnection feasibility report • Finalize land control • Begin full site analysis • Begin county, state, and federal permitting process • Begin negotiations with investors
MONTHS 24 - 30	• Receive interconnection system impact report • Finalize project timeline • Complete permitting process • Finalize negotiations with investors
MONTHS 31 -36	• Execute interconnection agreement • Choose contractors for site construction
FINAL STEPS	• Construction generally runs 12 – 24 months • Project comes online

The community development process for solar energy projects also includes communication between the renewable energy development company and county government planning and zoning, outreach with landowners, local businesses, and community members.

Wind Energy Development

Wind energy development is also a long-term process. There are several phases that local government officials and community members should anticipate as part the wind energy development process (Constanti & Beltron, 2006; Martin, 2021). The U.S. Fish and Wildlife Service example, "Lifecycle of a Wind Energy Facility," from Martin (2015) describes the following timeline of wind energy from prospecting through decommissioning. The timelines from prospecting through operation can be extended or stopped due to several factors, including permitting, zoning, and market factors, among others.

YEAR 0 - 1 PROSPECTING	• Identify site • Collect wind data • Identify project boundary • Coordinate land lease agreements with landowners • Conduct environmental and feasibility assessments Identify routes for transmission lines • Create design map of turbine locations
YEAR 1 - 3 DEVELOPMENT	• Conduct evaluation of project design and plan with interdisciplinary team • Finalize permitting and approvals at federal, state, local levels • Receive Conditional Use Permit or Land Use Permit (LUP) from local government for project
YEAR 3 - 4 CONSTRUCTION/ COMMISSIONING	• Grading plan and earthwork • Construction of electric cables from turbines to substation • Road construction • Construct turbine pads • Transmission line construction • Permanent met-towers constructed • Assemble turbine towers and generators • Substation construction
YEAR 5 - 20/30 OPERATION	• Wind energy project monitored and managed daily
YEAR 20/30 DECOMMISSIONING	• Decommission wind farm • Sell parts for scrap • Option to repower with new technology

Methods

This project focused on the following question to understand local planning policies for renewable energy.

What types of land use policies and strategies have Indiana communities adopted to plan for renewable energy?

Electronic surveys were sent to 161 contacts of Indiana county and municipal planning departments and plan commissions in the summer of 2021. The survey was open for six weeks from May-June 2021 and sent through multiple modes, including direct emails and listservs such as the American Planning Association, Indiana chapter. There were 84 survey responses with a 52% response rate.

The survey was used to identify provisions in zoning ordinances specific to climate change and renewable energy, factors considered when adopting or rejecting policies, and the level of public participation and conflict. Respondents were also asked to link or upload content from wind and solar ordinances and zoning maps for the inventory. Ordinances were collected through the survey and direct county contacts from summer 2021 through winter 2022 and coded to identify common attributes of climate change and renewable energy land use policies to compare different local policies and summarize to create county snapshots. The study focused on commercial solar and wind development and looked at zoning ordinances for unincorporated areas that regulate these as unique uses.

This study draws from the methodology used by Ebner (2015) to inventory land use regulations of confined feeding operations. Ordinance provisions for commercial solar and wind were divided into four categories:

- districts and approval process;
- buffers and setbacks;
- other use standards; and
- plans and studies required.

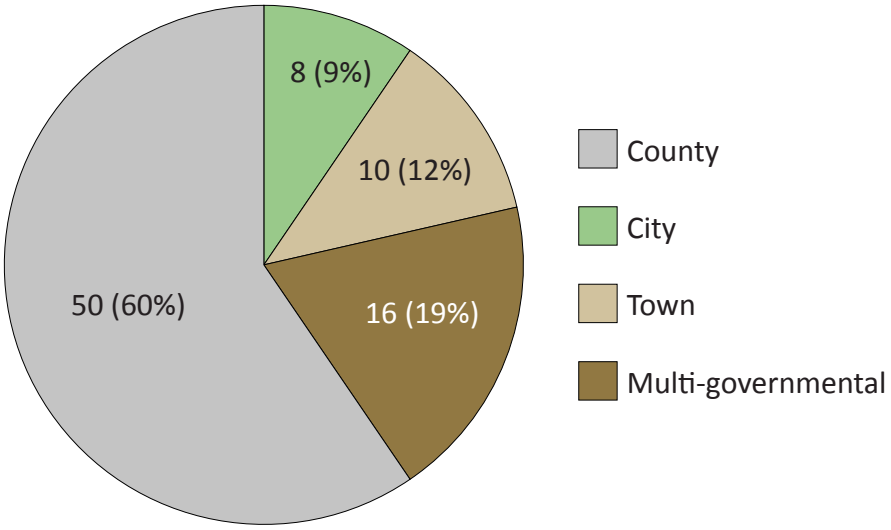
This study uses similar categories to Ebner (2015) to categorize the different review and approval methods for CWECSs and CSESs: permitted use, permitted use with additional use standards, special exception, rezoning required, and rezoning required and special exception. This study adds a category: overlay district. Several counties use overlay districts to regulate commercial renewable energy systems. In these counties, parcels would need to be rezoned to include the overlay district; standards for the overlay district and underlying zoning district would apply to the development. Counties can have different permit processes for use depending on the district. For this study, counties are categorized based on the process required of CSESs and CWECSs for land currently zoned agricultural. The categories specify the process required, not the difficulty level in siting a commercial renewable energy system.

Standards that are easily quantified, like buffers and setbacks, are classified and compared. However, for more descriptive use standards and plans and studies required, this study uses a binary approach of whether such provisions are included in the ordinance or not.

Summary of Community Perceptions

Community perception questions of renewable energy included topics related to types of conflict and conflict resolution, factors influencing policy changes, and resources needed to make informed decisions about renewable energy planning. Out of the 84 responses for community planning affiliations, 50 represented county government, 16 multi-governmental units, 10 towns, and eight cities (Figure 1). Respondents additionally represented 49 advisory plan commissions, 33 area plan commissions, and two metro plan commissions.

Figure 1: Type of government unit affiliation for community planning



Community planning representatives responded (n=41) with the extent that renewable energy regulation activities for solar ordinances, wind ordinances, solar development, and wind development resulted in conflicts over the last five years (Figure 2). No conflicts were identified with 23 community solar ordinances, 16 wind ordinances, 20 solar development projects, and 18 wind development projects. Fifteen communities experienced solar ordinance efforts resulting in conflict, while the process of developing wind ordinances also resulted in conflict in 18 communities. Solar and wind development efforts initiated conflicts in 15 communities each. Communities that experienced some level of conflict (very little, somewhat, to a great extent) were asked to respond to how conflict was resolved (or not) through policy changes (n=12) or facilitated discussions (n=11) (Figures 3 and 4). Community conflicts resulted in changing policies with eight solar ordinances, 11 wind ordinances, four solar development projects, and seven wind development projects. Facilitated forums or community discussions were used in six communities for solar ordinance development, seven with wind ordinances, two with solar development, and five with wind development projects. For communities that did not have a final agreement or policy change for renewable energy regulations, work is in progress or stalled. For example, a county wind ordinance effort resulted in a moratorium on wind development projects. In another county example, wind development projects are stalled due to the plan commission and wind company not reaching an agreement for road use or economic development.

Figure 2: Renewable energy regulation activities resulting in community conflicts within the last five years

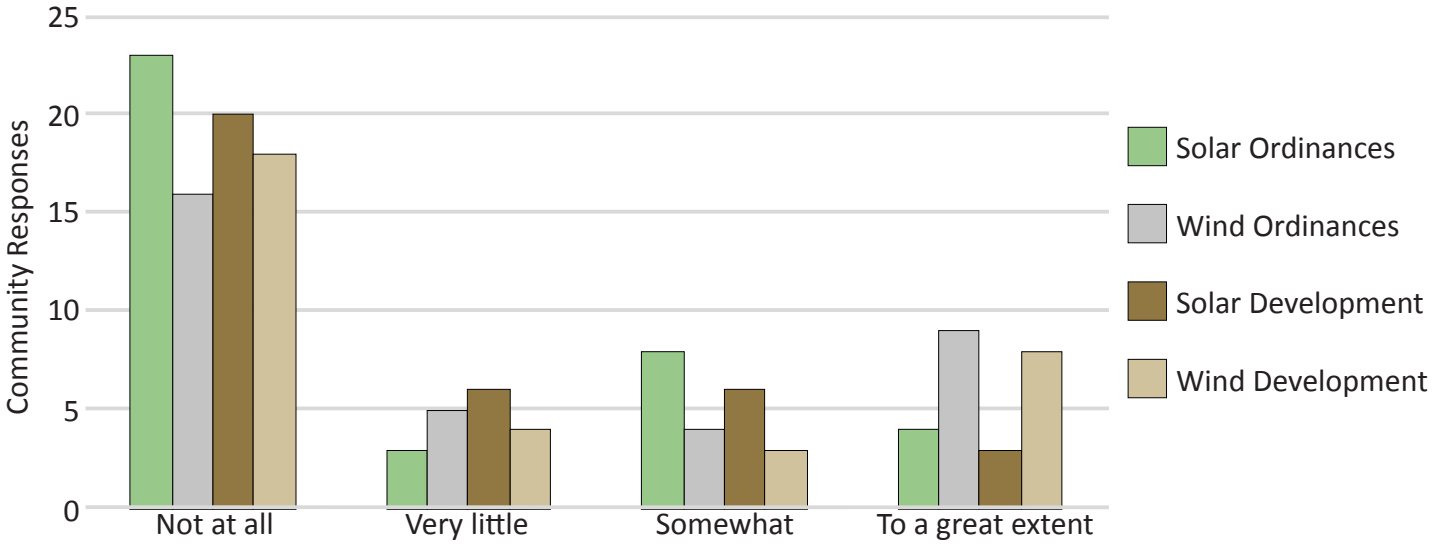


Figure 3: Community conflict leading to renewable energy policy changes in community

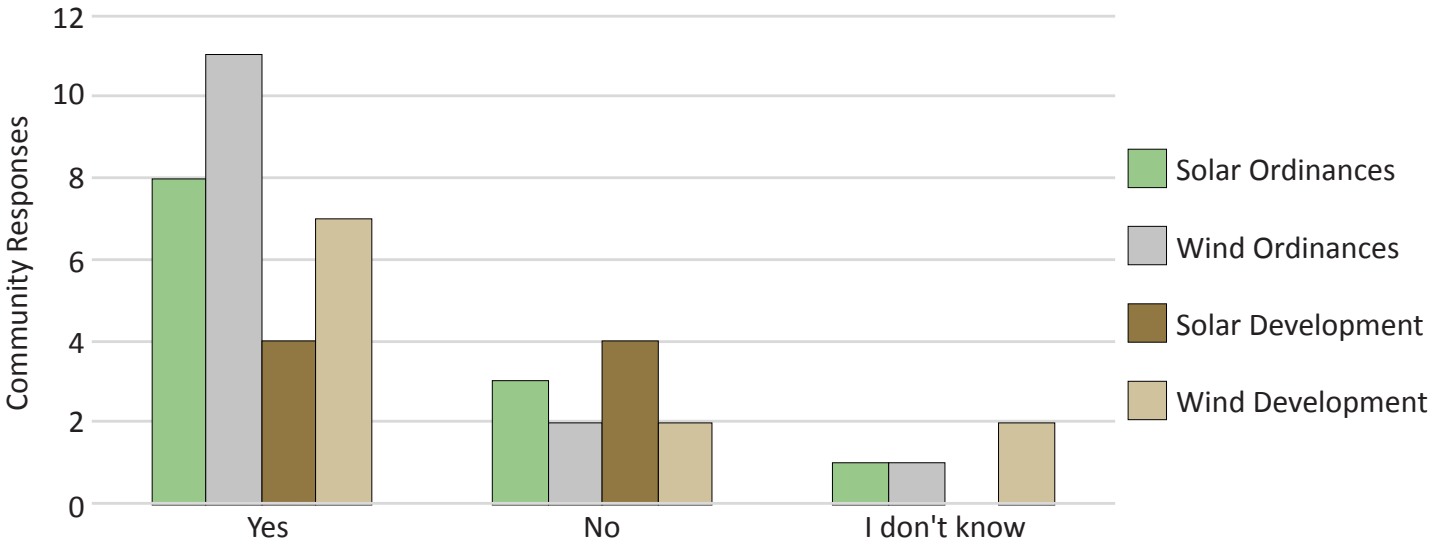
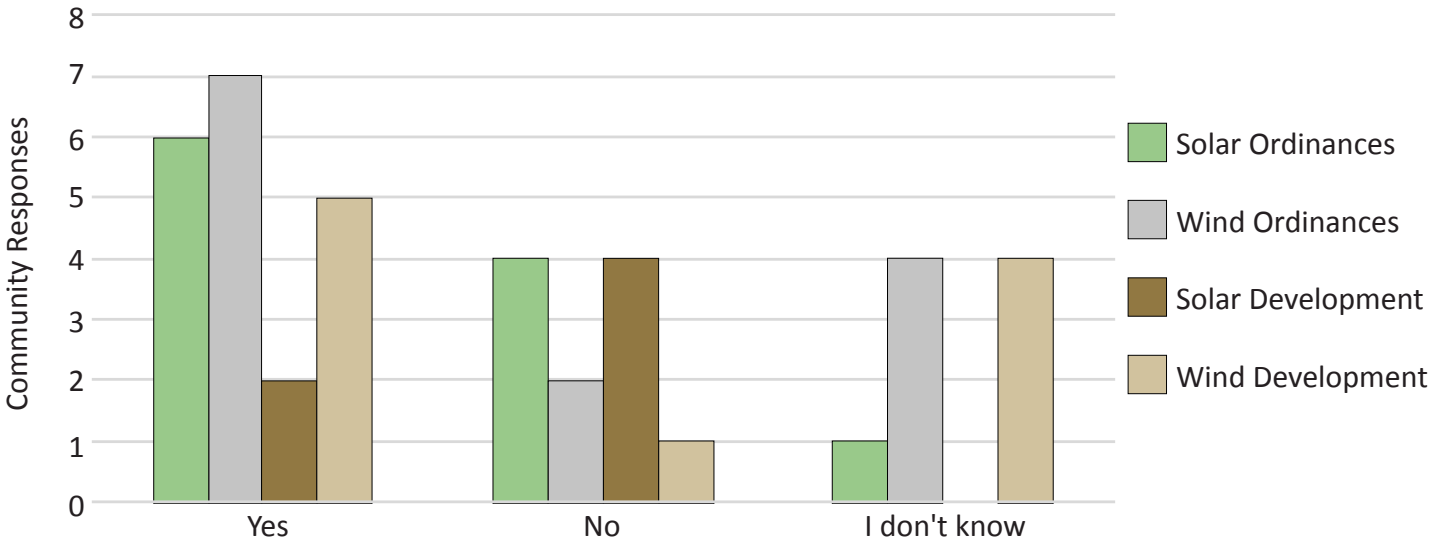
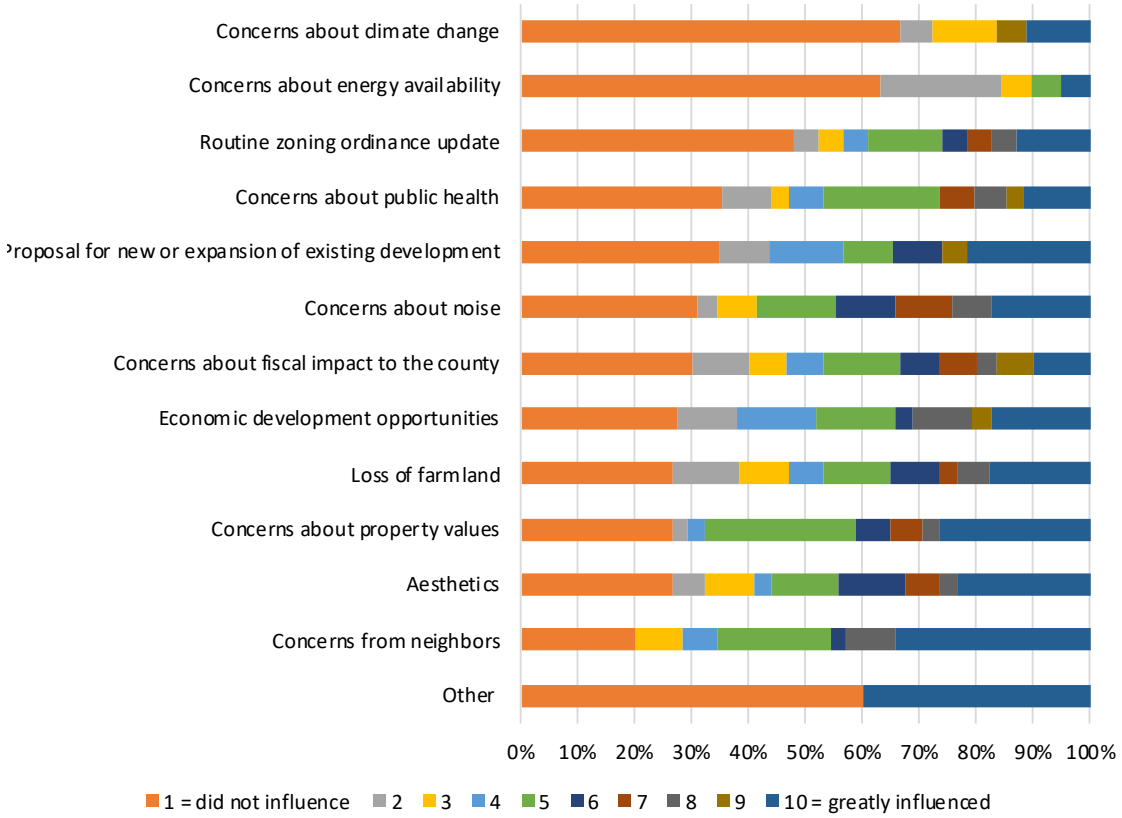


Figure 4: Facilitated forums or discussions used for renewable energy policy agreements



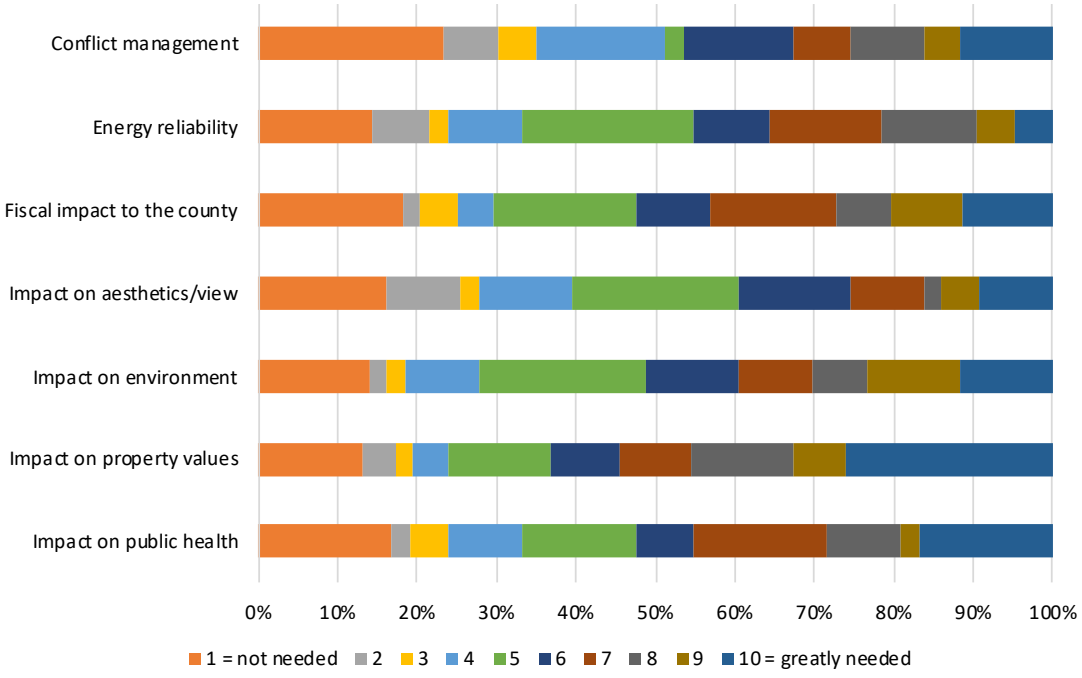
Respondents (n=49) rated factors that influenced changes to renewable energy regulations/ordinances over the last five years from 1 = did not influence at all to 10 = greatly influenced (Figure 5). Several factors did not influence changes to regulations. Concerns from neighbors (n=34) was the most frequently selected, with 34.29% indicating the factor greatly influenced changes. Concerns about climate change (n=18) and concerns about energy availability (n=19) were selected with over 60% indicating this factor did not influence changes in regulations or ordinances. Other responses not listed included adding solar to a joint zoning ordinance, receiving a sol smart award to modernize solar ordinances, and including larger setbacks from non-participating landowners.

Figure 5: Factors influencing changes to renewable energy regulations/ordinances in the last five years.



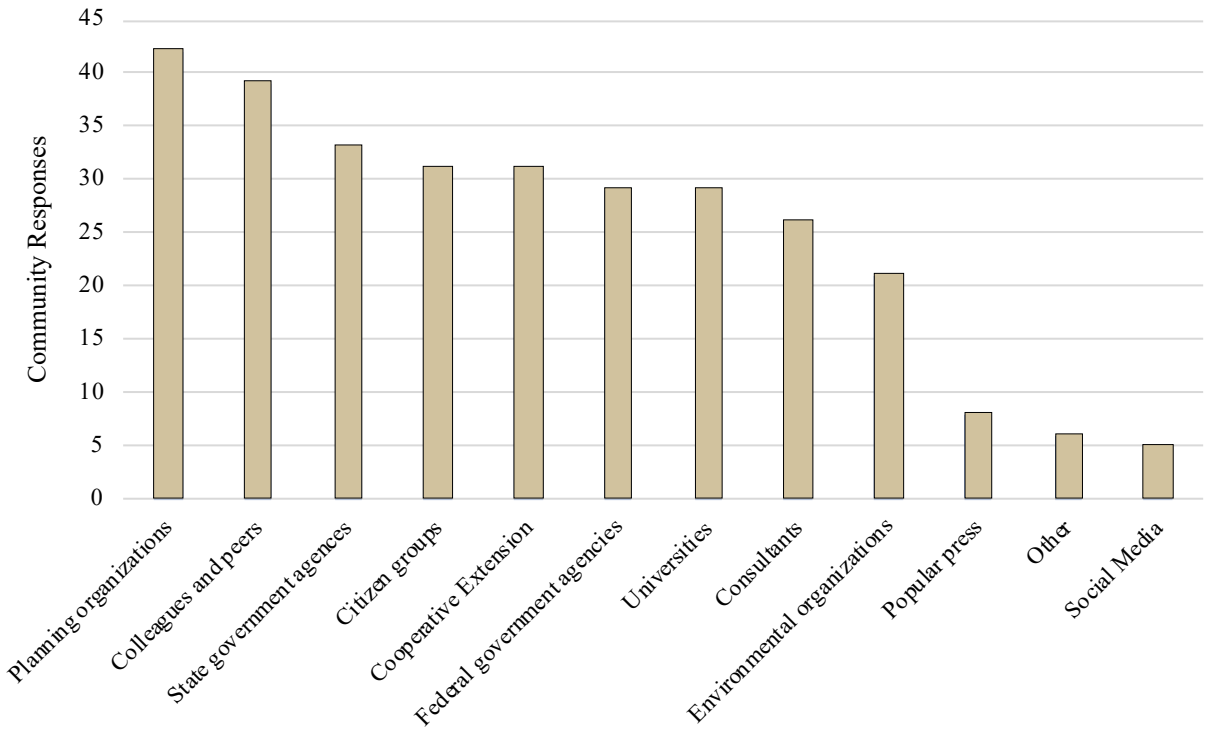
The types of information community planning representatives need to help make decisions when developing or amending renewable energy regulations/ordinances (n=47) was split in frequency between the two ends of a scale from not needed to greatly needed (Figure 6). The impact on property values had a higher frequency (n=46; 26.09%) selected as a need for more information over all other information types. Conflict management received the lowest selection for need (n=43; 23.26%).

Figure 6: Types of information needed to make renewable energy regulation/ordinance decisions



Information used to support decision-making for local renewable energy regulation and planning is found from multiple sources by local planning staff (n=54). Planning organizations (n=43), colleagues and peers (n=39), state government agencies (n=33), citizen groups (n=31), and cooperative extension (n=31) were frequently selected options. Other sources (n=5) listed examples of peer communities and renewable energy industry companies with popular press (n=8) and social media (n=5) selected among the least (Figure 7).

Figure 7: Sources of information used to make decisions for developing renewable energy regulations ordinances

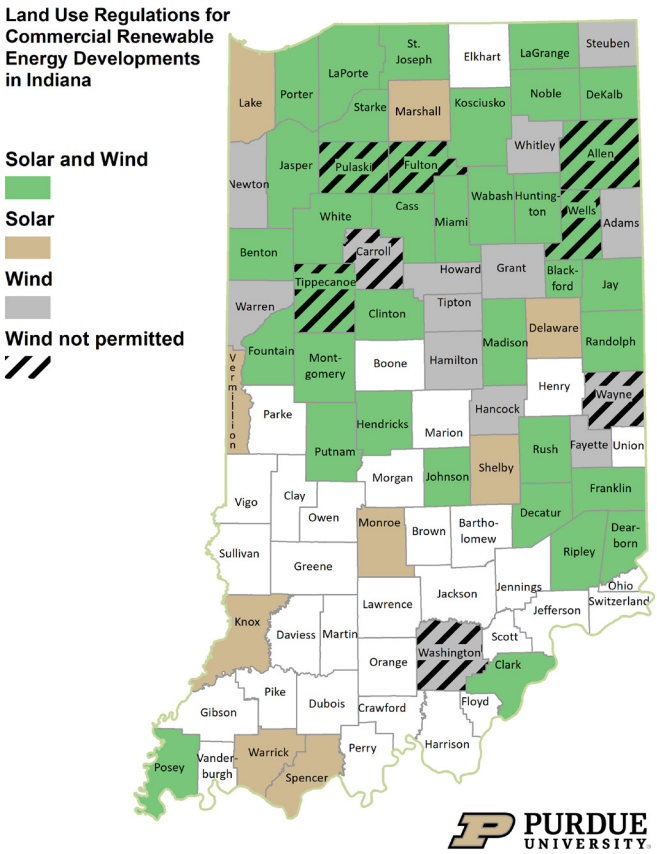


Overview of Zoning Provisions Used to Regulate CWECSs and CSESs in Indiana

Of the 82 counties with planning and zoning, this study identified 46 (56.1%) county zoning ordinances with standards specific to commercial solar energy systems and 51 (62.2%) with standards specific to commercial wind energy conversion systems. Eight of these counties currently do not permit commercial wind in any zoning districts. The ordinances vary in the tools they use to regulate renewable energy and even in how they define commercial solar and commercial wind as uses. The findings organize and compare commercial solar and wind regulations within the following four categories:

- districts and approval process;
- buffers and setbacks;
- other use standards; and
- plans and studies required.

Figure 8: Map of land use regulations for commercial renewable energy developments in Indiana



Use Definitions and Zoning District

This study looks specifically at ordinances regulating commercial wind and solar operations. Each jurisdiction can set its own definition for these uses. Some counties differentiate commercial solar energy systems (CSESs) and commercial wind energy conversion systems (CWECs) from small-scale or personal renewable energy systems.

Use Definitions for CSESs

Twenty-seven of the 46 counties (58.7%) that regulate CSESs define them by how the power produced is used. Common phrases include: "primarily for off-site utility grid use," "delivers electricity to a utility's transmission lines," and "primary purpose of wholesale or retail sale of generated electricity." Thirteen counties (28.3%) define CSESs from small-scale systems by their size, such as lot size, square footage of panels, or electricity generated. Two counties regulate all SESs similarly, and one county regulates all ground-mounted SESs as commercial solar. Two counties have standards for CSESs but do not have a specific definition for this use in their ordinance.

Use Definitions for CWECSs

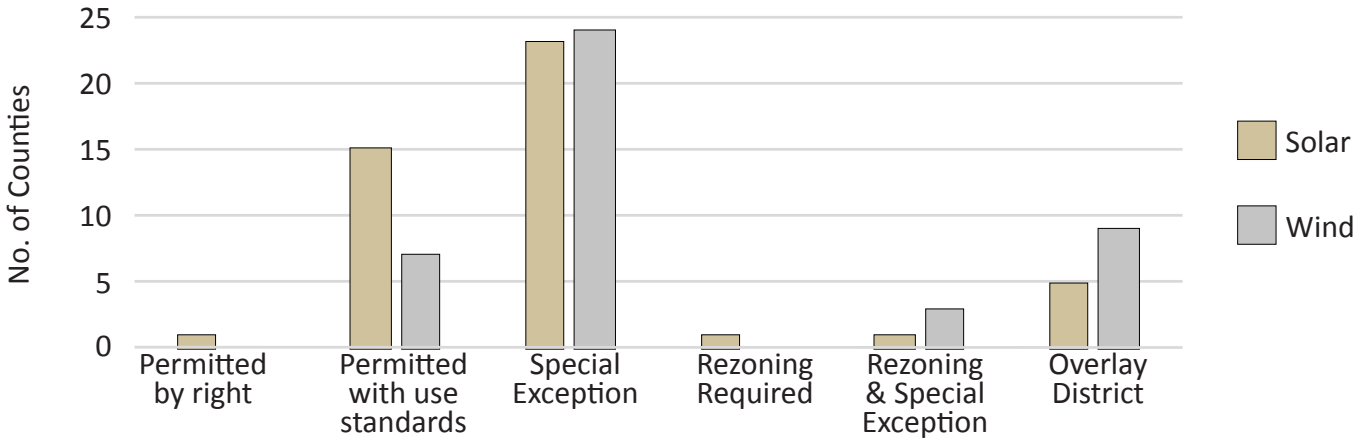
Commercial wind definitions look similar to their CSES counterparts. Just under half (n=25; 49.0%) of the counties regulating CWECS define them by how the power produced is used. These phrases are similar to those seen in CSES definitions, including: "primarily for off-site utility grid use," "delivers electricity to utility's transmission lines," and "generates electricity to be sold in retail or wholesale markets." One county regulates all wind energy conversion systems similarly. Six counties regulate CWECSs but don't define them. The other 19 counties (37.3%) use a size criterion to define commercial systems from others. Common size measures include kilowatts produced, height, and number of towers.

Zoning Districts and Approval Methods

Sixteen counties permit CSESs by right in an agricultural district (Figure 8). Of these counties, Clark County is the only county that does not require additional use standards. Twenty-three counties permit CSESs by special exception in an agricultural district. Seven counties would require rezoning to permit a CSES. Five of these counties use overlay districts, and one would need a special exception after rezoning. While an overlay district would not require rezoning if the community applied it proactively, the study did not find this was the case in counties with wind or solar overlay districts.

Seven counties permit CWECs by right in an agricultural district with additional use standards. In 24 counties, CWECs are permitted by special exception. Rezoning would be required in 12 counties. Nine of these counties use an overlay district. The other three would require both rezoning of agricultural land and special exception. Eight of the counties do not permit commercial wind projects in any district. One of these counties, Carroll County, does not specify any districts in which commercial or non-commercial wind is permitted or not permitted, but has adopted use standards for both of these uses. This may have been an oversight in the amendment.

Figure 9: Approval methods for CSESs and CWECSs [a] in general ag districts.



[a] *Eight counties do not permit wind in any district. These counties are not included in the figure.*

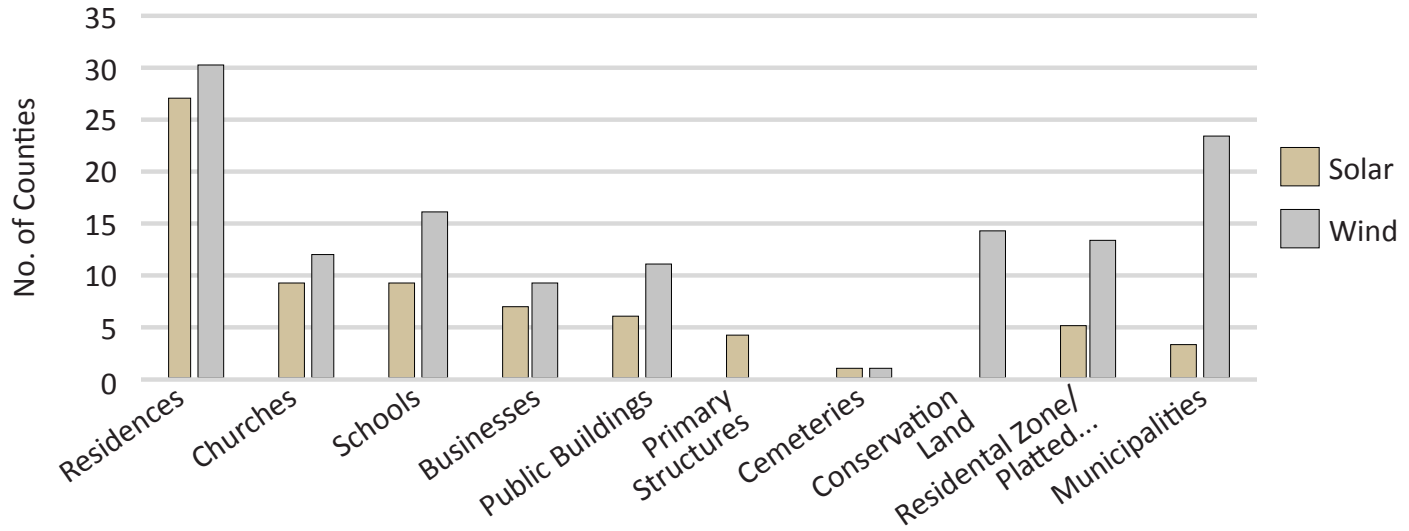
Buffers & Setbacks

Buffers and setbacks are common tools in zoning ordinances for developments. Allowing for space between conflicting land uses (or a structure) and a property line can reduce conflict between uses. This study defines a buffer as the required distance between a use and a differing use, zoning district, or municipality. A setback is a required space between a structure and a property line or right of way. While setbacks are common provisions in zoning district standards that apply to all structures built in the district, this section explores setbacks and buffers specific to commercial wind and commercial solar energy systems.

Figure 9 shows the number of counties with buffer requirements for CSESs and CWECs from various uses.

Thirty-two of the 46 counties (69.6%) with commercial solar standards require a buffer between a CSES and at least one other use. Thirty-four of the 44 ordinances (77.3%) containing standards for CWECSs require a buffer from at least one other use. The seven counties that do not permit commercial wind in any district are excluded from the analysis of developmental standards. Carroll County is included in this analysis because they do have use standards for CWECs. Commonly buffered uses for wind and solar include residences, schools, and churches. Buffers from municipalities and conservation land is also common for commercial wind developments. Additional setbacks were found in 33 of the 46 counties (71.7%) for commercial solar and 37 of the 44 counties (84.1%) for commercial wind.

Figure 10: Number of counties with buffer requirements for commercial solar (n=32) and wind developments (n=34) from various uses

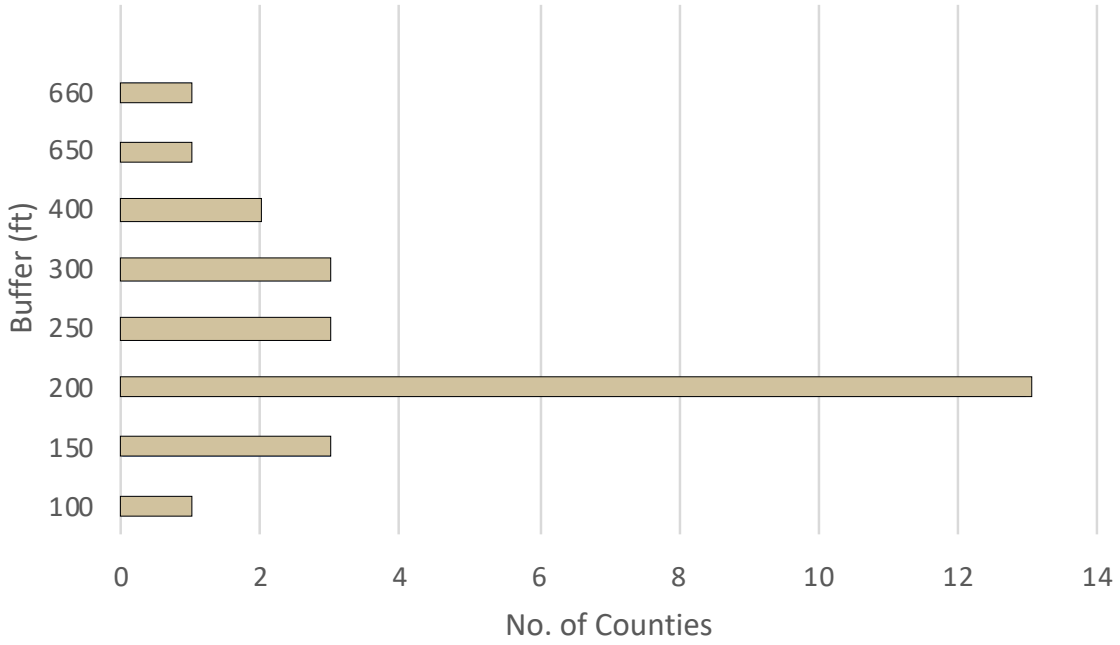


Buffered Uses from Commercial Solar

Twenty-eight of the 46 counties (60.9%) that regulate commercial solar through their zoning ordinance have a buffer for residences. Required buffers from residences range from 140-660 feet, with a median of 200 (Figure 10). Wabash County bases its buffer on the size of the CSES site (with a range of 450 ft for sites less than 5 acres to 1,320 ft for sites between 90.1-100 acres). In some ordinances, this buffer applies only to non-participating residences or can be waived by participating residences. Dekalb County has a buffer of 400 ft from residences but allows for a shorter distance if a landscaping buffer is installed. A few counties specify where the inverter should be located within the solar energy array.

Five counties specify buffers from residential zones. In two of these counties (Johnson and Montgomery), this buffer is equal to the county's required buffer between a CSES and residences. It would extend the residential buffer to property that is zoned or intended for residential use but does not currently have a residence on it. Two other counties (Fountain and White) do not have specified buffers for residences, so residences in residential zones would be buffered, but residences outside of residential zones would not. Randolph County requires a larger buffer for residential zones than for individual residences. Finally, two counties specify a buffer for platted subdivisions: Kosciusko County at 5,280 ft and Randolph at 500 ft.

Figure 11: Range of Buffer Requirements (ft) in Zoning Ordinances (n=28)[a] between CSES and Residential Uses[b]



[a] One additional ordinance specifies a range for the buffer requirement based on CSES size. It is not included in this figure.

[b] Median: 200 ft; mean: 257 ft.

Three counties require a buffer between a CSES and municipalities. Kosciusko and Posey Counties require a buffer of 5,280 ft from municipalities, while Wabash County requires a buffer of 1,320 ft. Churches and schools are buffered in 10 counties (Table 1). Businesses and public buildings are buffered in seven and six counties, respectively. Four counties specify buffer requirements for all primary structures. Wabash County buffers from businesses, public, and recreational uses with the same range as residences. Additionally, one county requires a buffer of 250 ft from cemeteries, another requires a buffer of 500 ft from airports, and one county requires a buffer from campgrounds.

Table 1: Range of Buffer Requirements in Ordinances Requiring Buffers between CSESs and Churches, Schools, Businesses, Public Buildings, and Primary Structures.

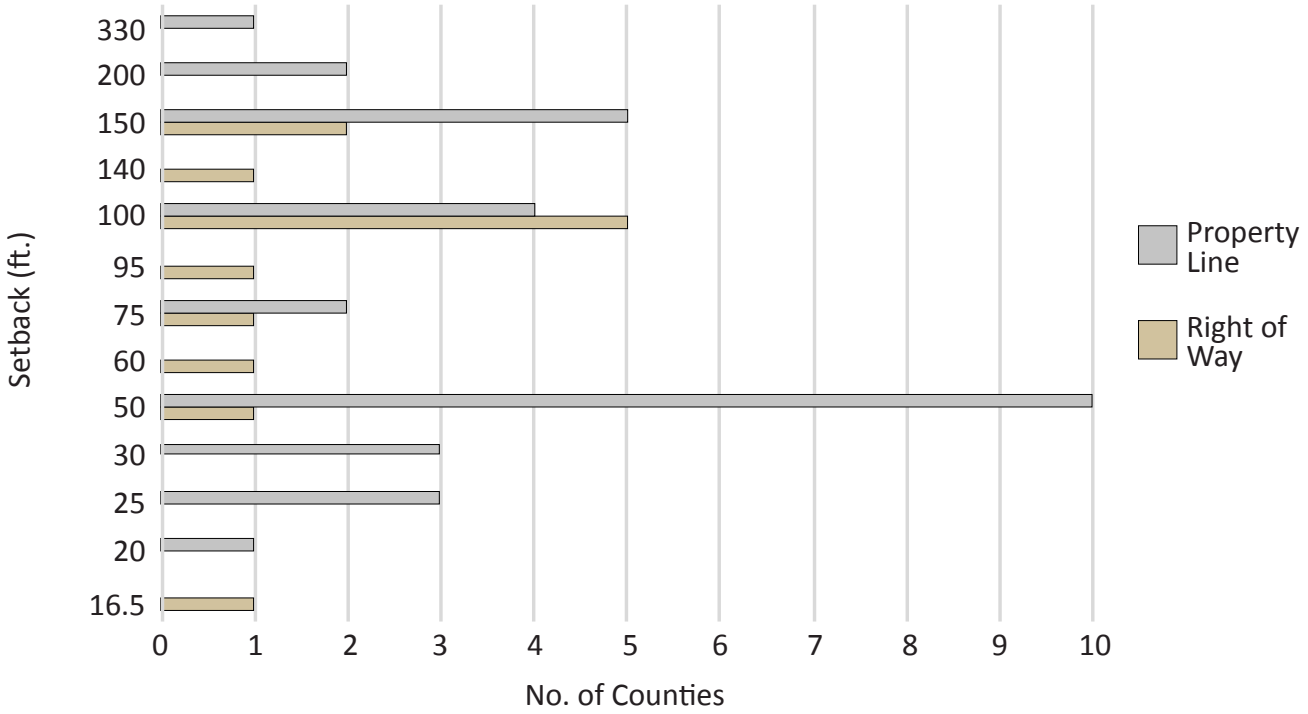
Description	Number of Ordinances	Range (ft)	Median (ft)	Mean (ft)
Churches [a]	9	100-660	200	246
Schools [a]	9	100-660	200	246
Businesses [a]	7	60-660	200	253
Public Buildings [a]	6	100-660	200	268
All Primary Structures	4	200-660	250	340

[a] *One additional ordinance specifies a range for the buffer requirement based on CSES size. It is not included in this figure.*

Commercial Solar Energy Systems Setbacks

Thirty-three counties with commercial solar regulations (71.7%) require setbacks (Figure 11). Setbacks from property lines (n=31) range from 20 - 330 ft (median: 50 ft; mean: 88 ft). Setbacks from the rights of way (n=13) range from 16.5 to 150 ft (median: 100 ft; mean: 95 ft). Two counties specify a setback from just the right of way, and 20 counties specify a setback from just the property line. Thirteen counties require specific setbacks for CSESs from rights of way and property lines. Seven of the 13 counties have a higher setback from rights of way, and four of the 13 counties have a higher setback from the property line.

Figure 12: Setback Requirements (ft) in Zoning Ordinances (n=13) Specifying Standard Setbacks between CSESs and Adjacent Property Lines (n=31) [b] and Rights of Way (n=13). [c]



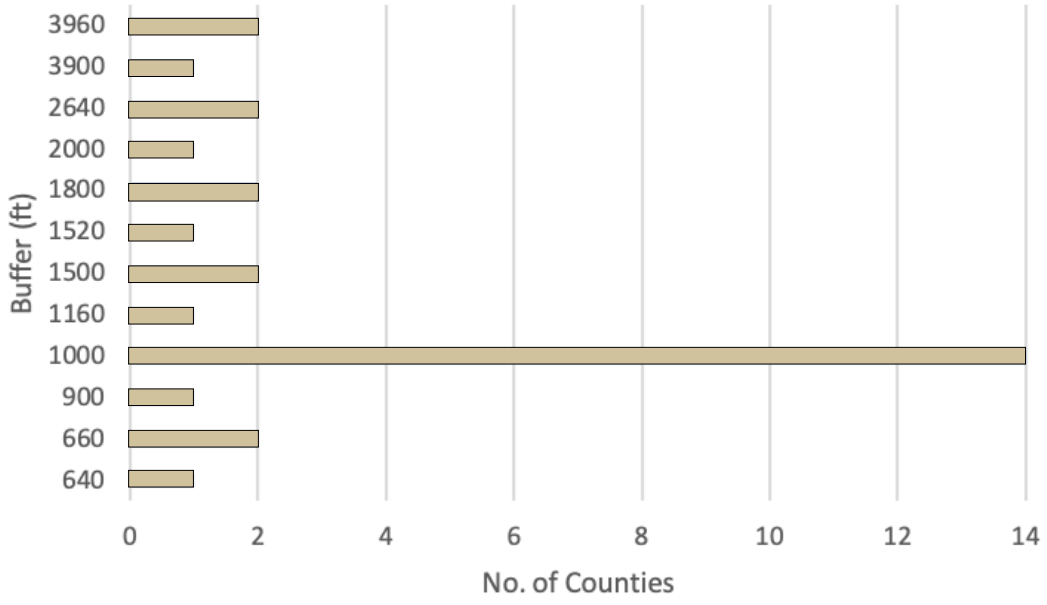
[b] *Median: 50 ft; mean: 88 ft.*

[c] *Median: 100 ft; mean 95 ft.*

Buffered Uses from Commercial Wind

Residences are a buffered use from commercial wind in 30 of the 44 counties (68.2%) with commercial wind standards. Nine of the 30 counties base the size of the buffer on a factor of the wind tower height (e.g., the buffer is 1.1 times the tower height). Six of these ordinances also include a minimum buffer. A wind tower height of 600 ft was used to compare residential buffers for the study. According to the USGS, the largest wind towers in Indiana are 591 ft tall (Hoen, 2022). Figure 12 shows the range of required buffers between residential dwellings and wind towers 600 ft tall.

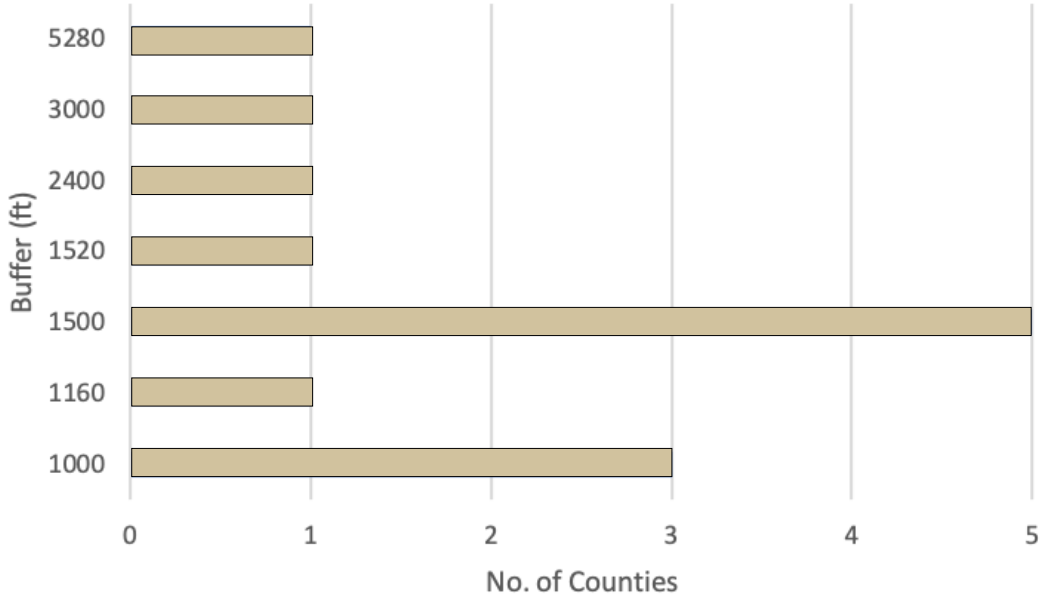
Figure 13: Range of Buffer Requirements (ft) in Zoning Ordinances (n=30) between WECS (600 ft tall) and Residential Uses [a]



[a] *Buffers are calculated for towers 600 ft tall.*

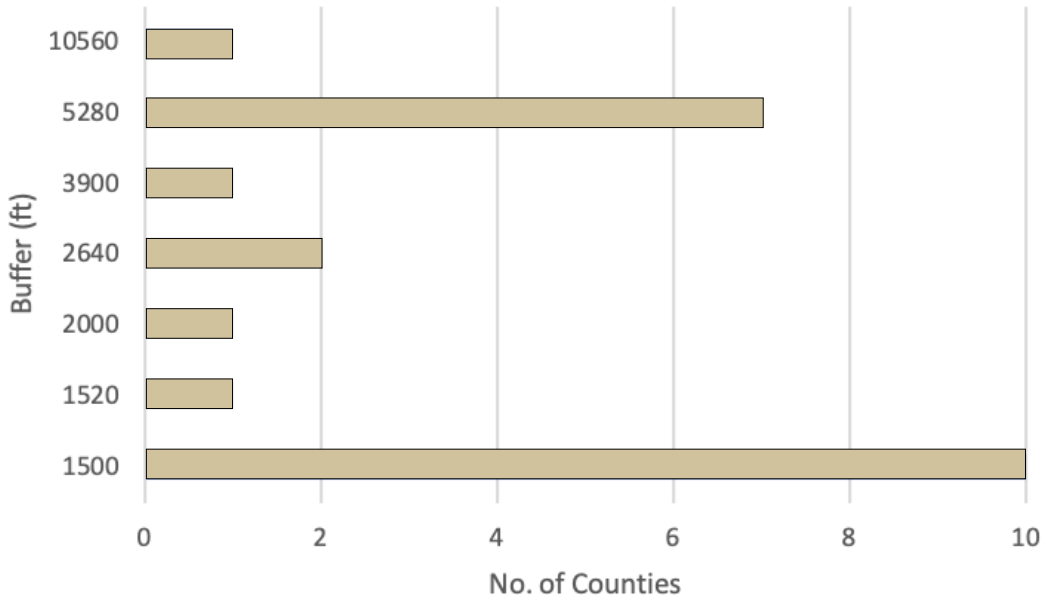
Thirteen counties include a buffer from either a residential zoning district or platted subdivision ranging from 1,000 to 5,280 feet (Figure 13). In some cases, the buffer from a residential zoning district or platted subdivision is the same as the county's buffer from residences. This likely provides a buffer for planned residential areas that have not been developed yet. In other counties, the buffer for residential zones or platted subdivisions is greater than for residences. Two counties require a buffer from residential zones and platted subdivisions but not all residences. In both situations, the county may consider residential zones and platted subdivisions a higher intensity residential use that would benefit from a larger buffer from commercial wind energy conversion systems. This also might be why 23 of the 44 counties (52.3%) that regulate commercial wind require a buffer from municipalities. These buffers range from 1,500 ft to two miles (Figure 14).

Figure 14: Range of Buffer Requirements (ft) in Zoning Ordinances (n=13) between WECS (600 ft tall) and Residential Zones or Platted Subdivisions [a]



[a] *Buffers are calculated for towers 600 ft tall.*

Figure 15: Range of Buffer Requirements (ft) in Zoning Ordinances (n=23) between WECS (600 ft tall) and Municipalities [b]



[b] *Buffers are calculated for towers 600 ft tall.*

Zoning regulations for commercial wind development also frequently contain buffers for schools (n=16, 36.4%), conservation land (n=14, 31.8%), and churches (n=12, 27.3%). Several of these are based on wind tower height, like buffers from residences. For this study, a height of 600 feet was used to compare buffer requirements across different uses and counties. Buffer requirements from schools have the largest range, from 660 feet to two miles, with a median of 1,630 feet (Table 2). The definition of conservation lands varies by county. Some counties require a buffer only from federally-owned conservation land, while others define the term more broadly. Buffers from conservation land range from 510-2,640 feet, with a median of 1,125 feet. Additionally, some counties include buffers from specific wildlife areas or rivers in their community. Buffer requirements from churches range from 1,000 to 3,960 feet, with a median of 1,500 feet. Other less frequently buffered uses include public buildings (n=11), businesses (n=9), and cemeteries (n=1).

Table 2: Range of Buffer Requirements in Ordinances Requiring Buffers between WECS and Churches, Schools, Businesses, Public Buildings, and Conservation Land [a]

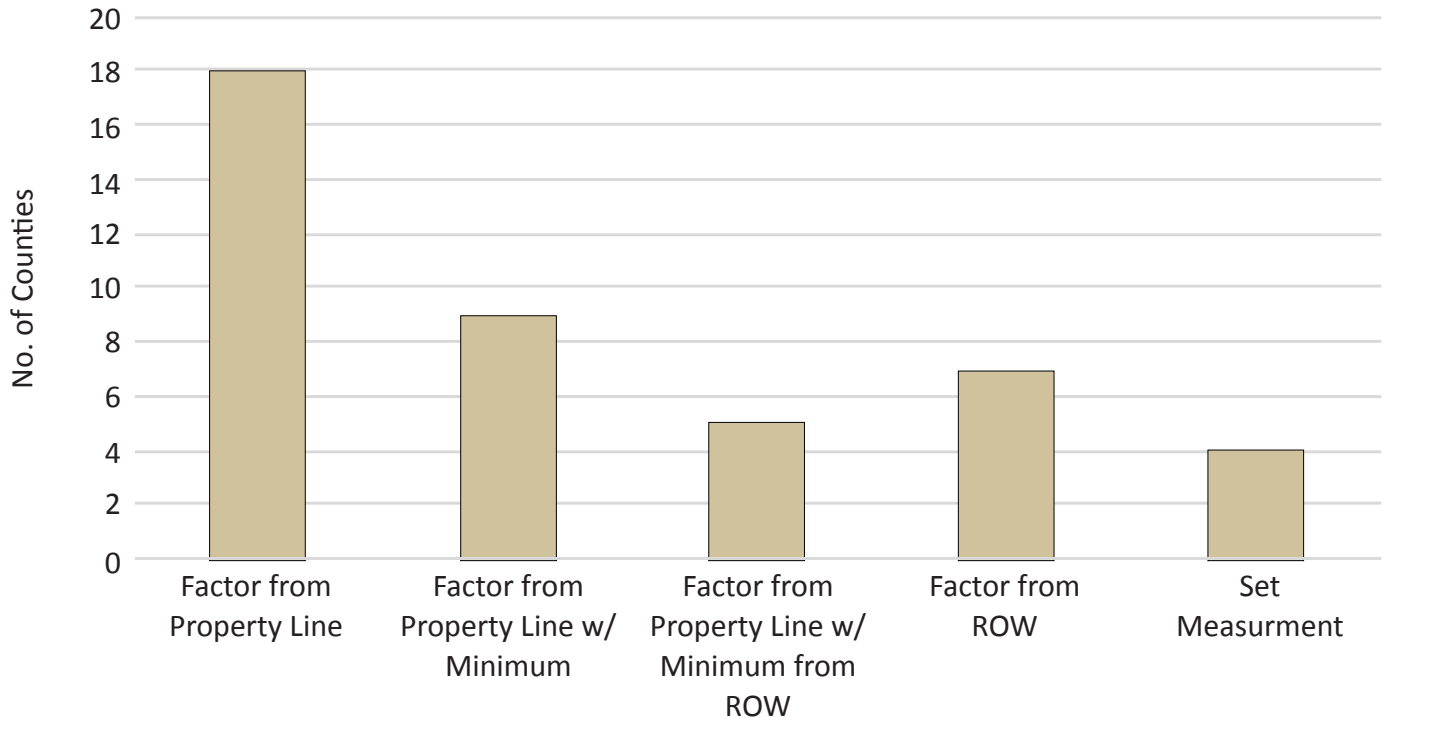
Description	Number of Ordinances	Range (ft)	Median (ft)	Mean (ft)
Churches	12	1,000-3,960	1,500	2,025
Schools	16	660-10,560	1,630	2,794
Businesses	9	660-3,960	1,160	1,631
Public Buildings	11	1,000-3,960	1,500	1,858
Conservation Land	14	510-2,640	1,125	1,254

[a] Buffers are calculated for towers 600 ft tall.

Commercial Wind Energy Conversion System Setbacks

Like use buffers, setbacks for CWECSs are frequently calculated based on a factor multiplied by the tower height. Most counties calculate tower height as the blade's tip at its highest point. This would be higher than the hub height, which is often used by industry professionals in describing a wind turbine. Figure 15 shows the various types of setbacks counties employ. Additionally, one county requires the BZA to set the setback of a WECs tower from a property line within a given range (2,640-3,200 ft). Figure 16 shows the distribution setbacks that would be required from property lines for 600 ft wind towers (range: 205 to 3,960 ft; median: 660 ft; mean: 1,067 ft).

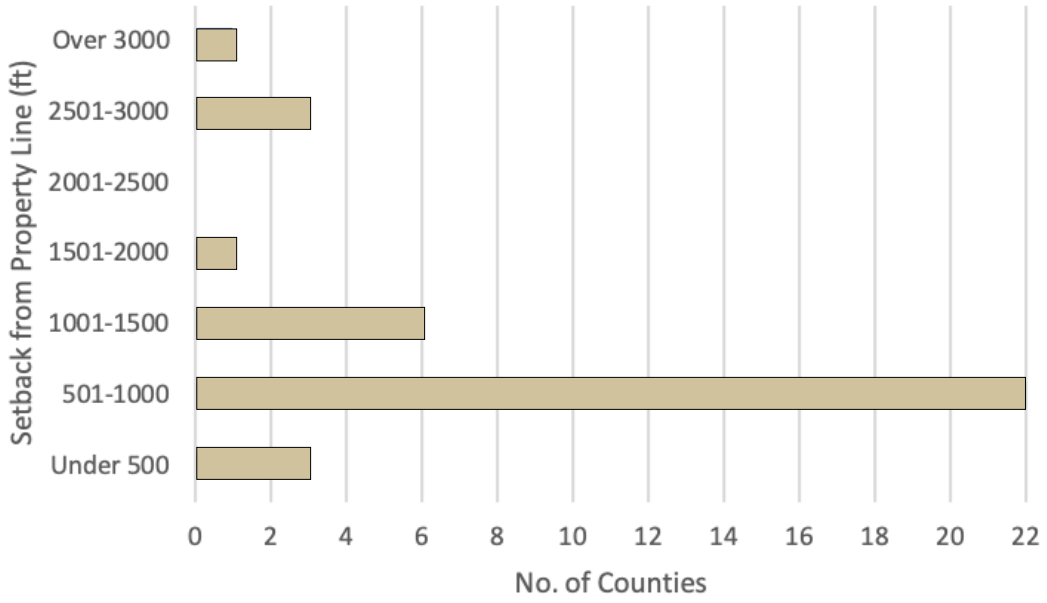
Figure 16: Types of Setback Requirements in Zoning Ordinances (n=38) [b,c] for WECs



[b] One county requires that the BZA set the setback from property lines within a given range. This county is not included in this figure.

[c] One county requires a setback from interstate ROW in addition to their property line setback. The property line setback is included in this figure, but the interstate ROW setback is not.

Figure 17: Range of Setback Requirements (ft) in Zoning Ordinances (n=37) [a] between WECS (600 ft tall) and Residential Uses [b]



[a] One county requires the BZA to set the setback of a WECs tower from a property line within a given range. This county is not included in this figure.

[b] Range: 205-3,960 ft; median: 660 ft; mean: 1,067 ft

Noise Limits

Several counties regulate noise levels for both commercial solar and wind. Counties measure sound levels in a variety of ways. Some counties set a limit based on decibels (dB), while others use A-weighted decibels (dBA), a measure of loudness perceived by human ears. Counties also differ on where the sound level is measured, such as at the property line or a nearby structure. Because of these variables, it is more challenging to compare noise restrictions across the counties.

Noise Limits for Commercial Solar

While solar panels don't create noticeable noise, the equipment necessary for converting solar energy to electricity, such as invertors, does. Twenty-one of the 46 counties (45.6%) that regulate CSESs have a noise limit. In 19 of the counties, this is a finite limit (dB or dBA). This limit ranges from 32 to 60 dBA for the counties that use the A-weighted measurements(mean: 50.2 dBA; median: 50 dBA). Randolph County uses a range depending on the adjacent property use, and Posey County sets a limit of 45 dBA or 5 dBA above the ambient baseline.

Noise Limits for Commercial Wind

Noise is regulated in 84.1% of the counties (n=37) with CWECs standards. Like solar, the noise limits imposed for counties using A-weighted decibels range from 32-60 dBA (mean: 48.1 dBA; median 50 dBA). Twenty-two counties use a finite limit. Seven counties use a range of limits--five based on the hertz of the sound produced, and two based on adjacent uses. The remaining six counties limit how much the noise produced can exceed the ambient baseline.

Other Common Commercial Solar Standards

Thirty-three counties (71.7%) have a maximum height restriction for CSESs. Allen County regulates height as they would an accessory structure. White County uses a range. Height restrictions in the remaining counties range from 12-35 ft at maximum tilt (mean: 22.6 ft; median 20 ft). Less common than height restrictions,

11 counties require a minimum lot size. Five acres is the minimum lot size in nine of the counties. Warrick County has a minimum lot size of one acre for CSESs, and Blackford County requires 10 acres.

Ground cover standards for CSESs are found in 23 ordinances (50.0%). These range from specifying the use of perennial, noxious-weed-free seed mixes to requiring the use of native plants. Eleven of these counties require pollinator-friendly ground cover. Several ordinances also contain language in the zoning ordinance regulating signage and warnings (n=30, 65.2%), fencing (n=36, 78.%), landscaping (n=35, 76.1%), and glare (n=23, 50.0%) for CSESs.

Other Common Commercial Wind Standards

Thirty-eight counties (86.4%) regulate the commercial wind tower's blade clearance from the ground. Two counties specify a minimum blade clearance of 50 ft or one-third of the tower's height. The rest of the counties have minimum blade clearances ranging from 15 - 75 ft with a mean of 31 ft and median of 25 ft. Only ten counties regulate the height of commercial wind towers. Most often in ordinances, this is measured by the blade's tip in the vertical position. Maximum heights allowed range from 200-600 ft (mean: 430; median 450).

Twenty-three counties (52.3%) have standards for shadow flicker. Some of these are statements such as "no shadow flicker," while other counties include more descriptive language on what buildings or uses are to be protected from shadow and how long shadow flicker can occur per day or year. Many counties (n=40, 90.9%) regulate the color of wind towers. The language is similar across all counties, with non-reflective white or gray turbines. Some counties specify that blades can be black to help with deicing. Other common standards include braking systems (n=34, 77.3%), signage/warnings (n=36, 81.8%), fencing or climb prevention (n=35, 79.5%), interference (n=27, 61.4%) and lighting (n=23, 52.3%).

Plans and Studies

Requiring different plans and studies before approving a renewable energy project is another tool found in zoning ordinances. Some of these plans or studies may be required by other regulatory agencies or an industry standard, while others are specific to the county and project. Often, plans and studies may be needed for the county to ensure other use standards will be met.

Decommissioning plans are required in 40 counties for CSESs (87%) and CWECs (90.9%). Decommissioning plans provide specifications on how the renewable energy structure will be removed and the land restored at the end of its useful life. Counties may have various requirements for decommissioning and often require a surety bond or letter of credit from the renewable energy company to ensure decommissioning costs are covered. Economic Development Agreements (EDAs) are often required for both CSESs (n=15, 32.6%) and CWECs (n=19, 43.2%). EDAs are an agreement between the county and developer to various conditions such as the completion of the project, payments to the county, investments in infrastructure, and incentives. Transportation or road use agreement may be a part of the EDA or required separately. Thirty-three counties require this type of agreement for CSESs (71.7%), and 39 counties require it for CWECSs (88.6%). Figure 17 shows many other standard plans required, including drainage or erosion control plans, emergency plans, vegetation plans, and (less commonly) property value protection plans.

Communication studies to look at potential interference, sound studies, environmental assessments, and visual impact analyses are commonly required for commercial renewable energy projects (Figure 18). Glare analysis is required for CSESs in some counties, and shadow flicker analysis is sometimes required for CWECSs. Liability insurance, with the county named as an insured, is required in 18 counties for CSESs (39.1%) and 32 counties for CWECSs (72.7%). Certificates of design compliance are another common requirement for both CSESs (n=15, 32.6%) and CWECSs (n=29, 65.9%). Additionally, 22 counties (50.0%) require certification by an engineer for commercial wind towers.

Figure 18: Common plans required by zoning ordinances for CSESs and CWECSs

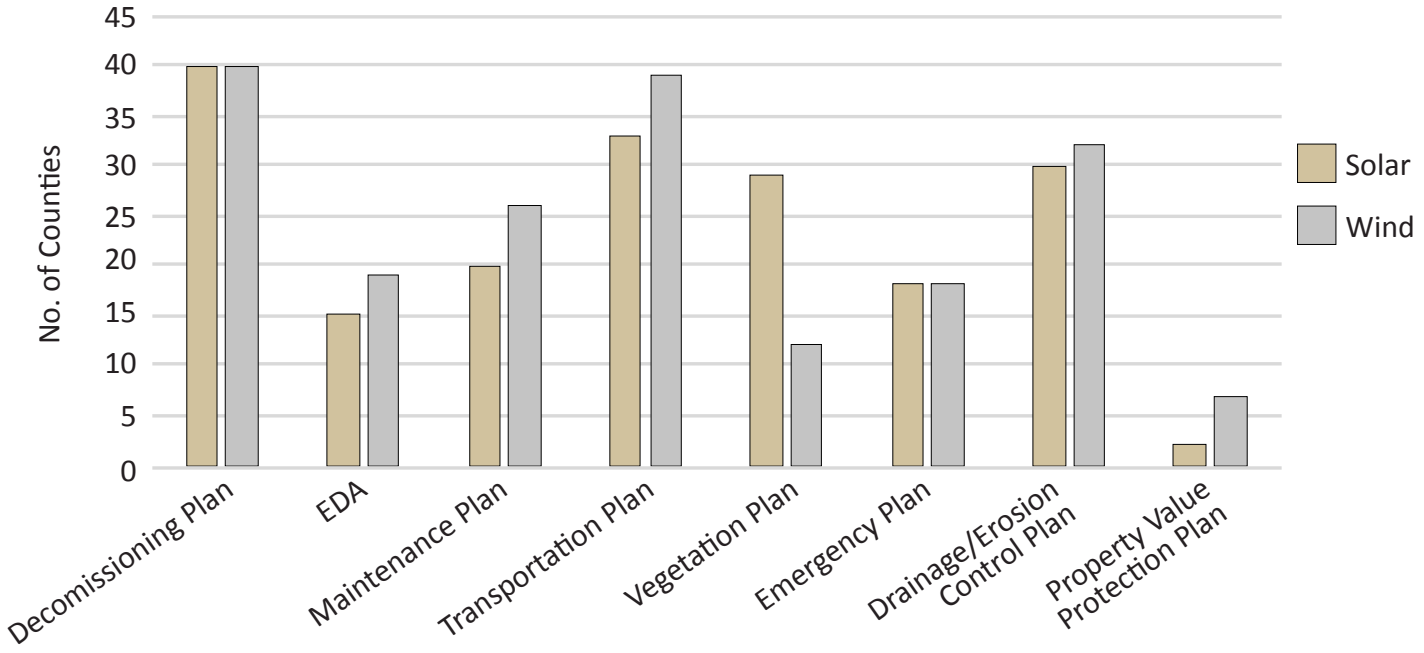
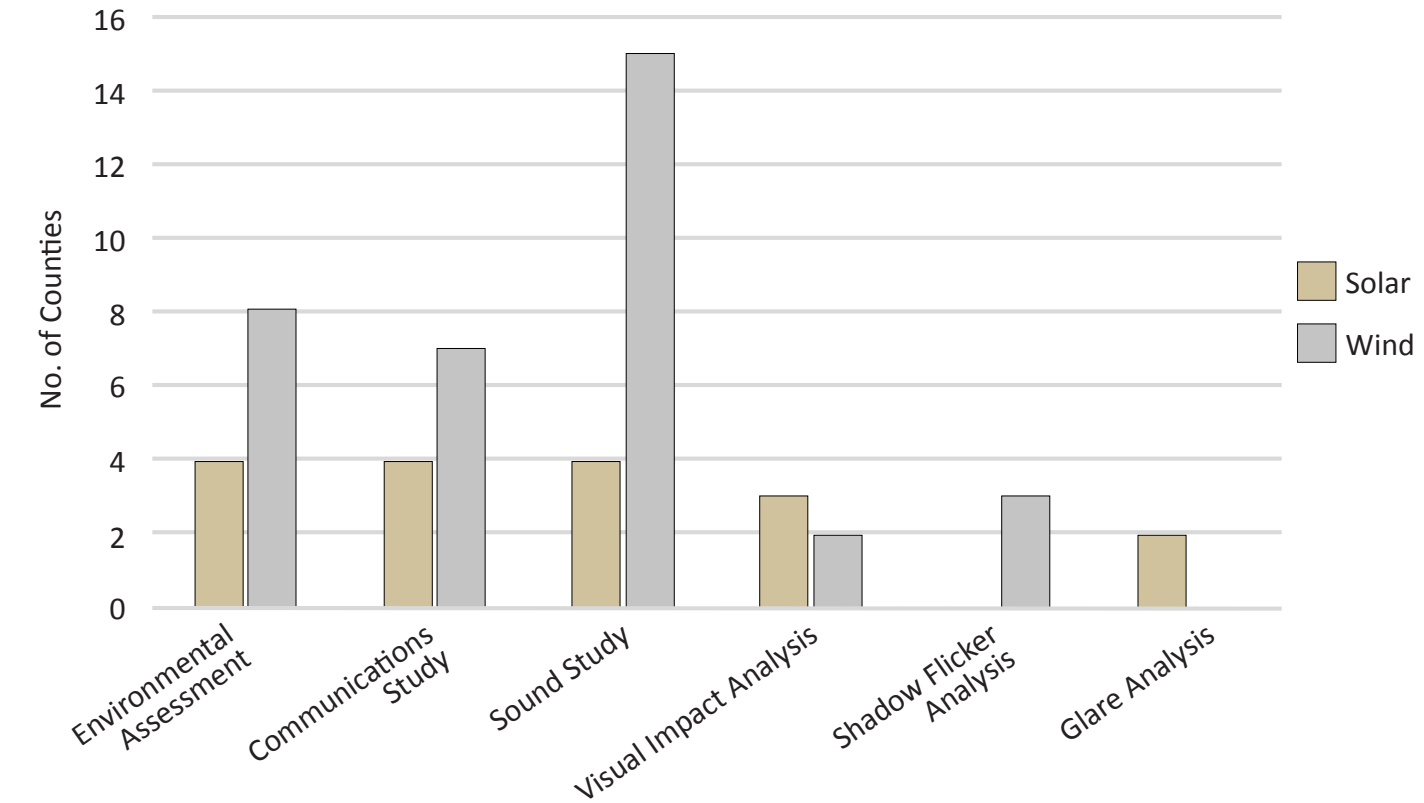


Figure 19: Common studies and assessments required by zoning ordinances for CSESs and CWECSs



References

Ahani, S. & Dadashpoor, H. (2021). Land conflict management measures in peri-urban areas: A meta-synthesis review. Journal of Environmental Planning and Management, 64(11), 1909-1939.

Bednarikova, Z., Hillberry, R., Nguyen, N., Kumar, I., Inani, T., Gordon, M., & Wilcox, M. (2020). An examination of the community level dynamics related to the introduction of wind energy in Indiana. https://cdext.purdue.edu/wp-content/uploads/2020/09/Wind-Energy_Final-report.pdf

Beyea, W. Fierke-Gmazel, H., Gould, M. C., Mills, S., Neumann, B., & Reilly, M. (2021). Planning & Zoning for Solar Energy Systems: A Guide for Michigan Local Governments. https://www.canr.msu.edu/planning/uploads/files/SES-Sample-Ordinance-final-20211011-single.pdf.

Constanti, M. and Beltron, P. (2006). Wind energy guide for county commissioners. U.S. Department of Energy - National Renewable Energy Laboratory, Wind Powering America. https://www.nrel.gov/docs/fy07osti/40403.pdf

Ebner, P., Ogle, T., Hall, T., DeBoer, L., & Henderson, J. (2016). County Regulation of Confined Feeding Operations in Indiana: An Overview. https://ag.purdue.edu/extension/cfo/Reports/_Overview.pdf.

Hoen, B. D., Diffendorfer, J. E., Rand, J. T., Kramer, L. A., Garrity, C. P., & Hunt, H. E. (2022). United States Wind Turbine Database (v4.3). U.S. Geological Survey, American Clean Power Association, &Lawrence Berkeley Nation Laboratory, https://doi.org/10.5066/F7TX3DNO.

Indiana Code [IC] 36. Article 7. Chapter 4., Local Planning and Zoning. (2021). http://iga.in.gov/legislative/laws/2021/ic/titles/036#36-7-4. Accessed December 2021.

Indiana Office of Energy Development. (2022). About OED. https://www.in.gov/oed/about-oed/

Indiana Office of Energy Development. (2022). Electricity. https://www.in.gov/oed/about-oed/

Indiana Office of Utility Consumer Counselor. (2022). Voluntary Clean Energy Standards. https://www.in.gov/oucc/electric/key-cases-by-utility/voluntary-clean-energy-standards/

Indiana Utility Regulatory Commission. (2022). Research Policy & Planning Division. https://www.in.gov/iurc/

Kumar, I. (2017). A Planning and Zoning Glossary. https://cdext.purdue.edu/wp-content/uploads/2018/05/ID-228-W.pdf.

Martin, C. 2021. Community Planning for Agriculture and Natural Resources: A Guide for Local Government, Renewable Energy Integration for Sustainable Communities. https://cdext.purdue.edu/guidebook

Martin, K. (2015). U.S. Fish and Wildlife Service Lifecycle of a Wind Energy Facility. https://www.fws.gov/midwest/endangered/permits/hcp/r3wind/pdf/DraftHCPandEIS/MSHCPDraftAppA_WindProjectLifecycle.pdf

Midcontinent Independent System Operator, Inc. (2022). Generator interconnection queue. https://www.misoenergy.org/planning/generator-interconnection/GI_Queue/

Milbrandt, A.R., Heimiller, D.M., Perry, A. D., & Field, C.B. (2014). Renewable energy potential on marginal lands in the United States. Renewable and Sustainable Energy Reviews, 29, 473-481.

Office of Energy Efficiency & Renewable Energy, U.S. Department of Energy. (2021). Wind turbines: The bigger, the better. https://www.energy.gov/eere/articles/wind-turbines-bigger-better

PJM. (2022). New services queue. https://www.pjm.com/planning/services-requests/interconnection-queues.aspx

State Utility Forecasting Group. (2021). Indiana Renewable Energy Resources Study. https://www.purdue.edu/discoverypark/sufg/docs/publications/2021%20Indiana%20Renewable%20Resources%20Report.pdf

Sward, J.A., Nilson, R.S., Katar, V. V., Stedman, R. C., Kay, D. L., Ifft, J. E., & Zhang, K. M. (2021).

Integrating social considerations in multicriteria decision analysis for utility-scale solar photovoltaic siting. Applied Energy, 288, 116543.

Tegen, S., Keyser, D., Flores-Espino, F., & Hauser, R. (2014). Economic impacts from Indiana's first 1,000 megawatts of wind power. National Renewable Energy Laboratory, U.S. Department of Energy. https://www.nrel.gov/docs/fy14osti/60914.pdf

U.S. Energy Information Administration. (2021). Indiana state profile and energy estimates: Profile analysis. https://www.eia.gov/state/analysis.php?sid=IN

U.S. Energy Information Administration. (2021). Electricity: Analysis & projections. https://www.eia.gov/electricity/data/eia860/

Definitions

These definitions were adapted from a previous Purdue Extension report (Ebner, 2015).

Buffer: Separation distance between two uses or a use and zoning district or municipality. Used as a tool to reduce land use conflict between uses often considered incompatible.

Commercial Solar Energy System (CSES): A use defined within a local zoning ordinance that generally consists of all necessary devices to convert solar energy into electricity. Commercial SESs may be defined as producing energy delivered to a utility's transmission lines or for off-site use. Their size may also delineate commercial SESs in the zoning ordinance from small-scale or personal SESs.

Commercial Wind Energy Conversion System (CWECs): A use defined within a local zoning ordinance that generally consists of all necessary devices to convert wind energy into electricity. Commercial WECs may be defined as producing energy delivered to a utility's transmission lines or for off-site use. Their size may also delineate commercial WECs in the zoning ordinance from small-scale or personal WECs.

Decommissioning Plan: Decommissioning plans provide specifications on how the renewable energy structure will be removed and the land restored at the end of its useful life. Counties may have various requirements for decommissioning and often require a surety bond or letter of credit from the renewable energy company to ensure decommissioning costs are covered.

Development plan review: A process by which a plan commission, committee, or staff reviews an applicant's development plan to ensure the predetermined standards on the zoning ordinance have been met as allowed by IC 36-7-4-1401.5.

Economic Development Agreement (EDA): An agreement between the county and developer to various conditions such as the completion of the project, payments to the county, investments in infrastructure, and incentives.

Ordinance: A law, statute or regulation enacted by a local government unit. For this study, ordinance will refer to a jurisdiction's zoning ordinance.

Reciprocal buffer: A standard that requires that new uses, i.e. residences, follow the same buffer as required of a new renewable energy development to that buffered use.

Screening: Provides a visual barrier between a use and adjoining properties. Shelterbelts, fencing, or earthen mounds are some of the methods of use.

Setback: The distance from building/improvements from the property line or specified right of way.

Special Exception: Also sometimes referred to as conditional use or special use. Generally understood to be a use of property that is allowed under a zoning ordinance under special conditions – something that needs to be considered on a site-specific base- and must be approved by the board of zoning appeals.

Standards: Provisions of the zoning ordinance regulating the characteristics of development of a particular use or zoning district.

Site plan: A scaled drawing that shows the placement of buildings and infrastructure of a development.

Zoning: Land use regulations enacted by a local jurisidiction as a tool to implement their comprehensive plan. (Kumar, 2017)

Zoning District: Designated districts based on the predominant use of land (e.g. residential, commercial, industrial, and agricultural). Each district has a set of uses that are permitted by right or by special exception and a set of standards which determine he character of the district.

Survey Instrument Sent to County Plan Directors

Renewable Energy and Climate Change Community Planning Survey

Purdue Extension, through the support of Hoosiers for Renewables, is conducting a comprehensive overview study on land use regulations for wind and solar energy and trends related to climate change planning. As a primary contact for the county plan commission or local planning department, please help us understand how Indiana communities make decisions about these complex issues and their associated impacts on local planning and policies.

You will be asked to link to or upload content from wind and solar ordinances and zoning maps. You may also need to reference Improvement Location Permits (ILPs) and Board of Zoning Appeals (BZA) records. It will be helpful to have access to these documents during the survey as applicable.

Your participation in this survey is voluntary. The survey should take approximately 15-20 minutes to complete per plan commission. We recommend responding to this survey on a computer rather than a mobile device. Please read each question and page carefully before advancing. The back button is not available throughout the survey.

For information regarding the survey, please contact Tamara Ogle or Kara Salazar. This survey research is referenced as IRB # 2021-685.

1. Please list the name of the plan commission(s) you serve. Leave any rows you don't need blank.

Type of Plan Comission	Type of Government	Name of communities plan commission serves
Select one: Area Advisory Metro	Select one: Town City County Multi-Governmental	
Select one: Area Advisory Metro	Select one: Town City County Multi-Governmental	
Select one: Area Advisory Metro	Select one: Town City County Multi-Governmental	

Renewable Energy Ordinances

2. Does the county where you serve in a planning role have land use regulations for renewable energy, specifically wind or solar?

	Solar	Wind
Small Scale	Y/N	Y/N
Commercial	Y/N	Y/N

3. Are there currently any proposed/pending ordinances or other regulations for renewable energy operations?

	Solar	Wind
Small Scale	Y/N	Y/N
Commercial	Y/N	Y/N

4. When was the commercial solar or wind ordinance last updated?

   Commercial Solar _____

   Commercial Wind _____

5. Which of the following are included in the renewable energy ordinances?

	Solar	Wind
Buffers	Y/N	Y/N
Design standards	Y/N	Y/N
Fencing requirements	Y/N	Y/N
Height restrictions	Y/N	Y/N
Noise restrictions	Y/N	Y/N
Setbacks	Y/N	Y/N
Screening	Y/N	Y/N
Vegitation types	Y/N	Y/N

6. Do development agreements for renewable energy include the following:

	Solar	Wind
Decommission plan	Y/N	Y/N
Economic development agreement	Y/N	Y/N
Maintenance plan	Y/N	Y/N
Road use and ditch maintenance agreement	Y/N	Y/N
Vegetation plan	Y/N	Y/N
Other_____	Y/N	Y/N

7. Do you have a reciprocal buffer for other development from renewable energy operations?

Solar	Y/N
Wind	Y/N

8. In which zoning districts are commercial renewable energy systems considered a permitted use or special exception. Is there land currently zoned for this district?

District Name	Solar-Permitted Use or Special Exception	Wind-Permitted Use or Special Exception	Is there land available for development zoned for this district?

9. What findings of fact do you consider in the special exception (conditional use) process?

_____

10. Have zoning districts in which commercial renewable energy systems are permited been restricted in the last five years?

Solar	Y/N
Wind	Y/N

10a. Please explain the restriction of zoning districts for permitting commercial wind energy conversion systems?_____

11. Please upload a copy of the ordinance, existing moratoriums, rules or any other related documentation pertaining to guidelines for renewable energy or include a web link below.

_____

Solar and Wind Developments

12. Has your community had any renewable energy developments proposed or built in the last five years? Y/N

12a. How many applications for Improvement Location Permits for commercial solar or wind in your in the last five years have required the following:

	Solar- Number of ILPs granted	**Solar-Number of applications denied**	**Wind-Number of ILPs granted**	**Wind-# of applications denied**
Use Variance				
Developmental standards variance				
Rezone				
Special Exception				

12b. How many commercial renewable energy projects have been approved and developed in your county in the last five years?

	Solar	**Wind**
Number of permits		
Acres		
Energy Capacity in Megawatts		

13. Does your community have or have had a moratorium on commercial solar or in the last five years?

Solar	Y/N
Wind	Y/N

13b. What was the time frame of the moratorium on commercial solar systems?

13c. What was the time frame of the moratorium on commercial wind systems?

Renewable Energy Community Perceptions

14. To what extent have the following renewable energy regulation activities resulted in conflicts in your community within the last five years? (Likert scale: 1=not at all; 2=very little; 3=somewhat; 4=to a great extent.)

Solar Ordinances	
Solar Development	
Wind Ordinances	
Wind Development	

14a. Indicate how the conflict was resolved.

	Did the conflict lead to policy changes in your community? Y/N/I don't know	**Were there facilitated forums or discussions to come to an agreement? Y/N/I don't know**	**Was there another resolution?**
Solar Ordinances			
Solar Development			
Wind Ordinances			
Wind Development			

15. If changes were made in the last five years to renewable energy regulations/ordinances which (if any) of the following factors influenced those changes? (1=did not influence at all; 10= greatly influenced)

Aesthetics	
Concerns about climate change	
Concerns about energy availability	
Concerns about fiscal impact to the county	
Concerns from neighbors	
Concerns about noise	
Concerns about property values	
Concerns about public health	
Economic development opportunities	
Loss of farmland	
Proposal for a new or expansion of existing development	
Routine zoning ordinance update	
Other _____	

Climate Change Planning

16. When was the comprehensive plan for your community last updated?_____

17. Does the current comprehensive plan include goals or objectives related to climate change? Y/N

18. Indicate whether or not the current plan addresses the following topics to specifically address climate change. Also, indicate if the following topics will address climate change in the next plan update.

	Current plan Y/N	Next Plan Y/N
Economic Development		
Energy		
Green infrastructure		
Hazards management		
Land use		
Natural resources management		
Public health		
Public infrastructure		
Social justice		
Transportation		

19. Indicate whether or not the current plan for your community includes the following adaptation strategies for addressing climate change. Also, indicate if the strategy will be addressed in the next plan update. List up to three additional adaption strategies not listed.

	Current plan Y/N	Next Plan Y/N
Shifting development from flood prone areas		
Installing green stormwater infrastructure practices, such as rain gardens, bioswales, etc.		
Incorporating natural heat reduction strategies, such as increasing tree canopy		
Using built environment heat reduction strategies, such as alternative building materials		
Updating infrastructure for extreme weather events		
Other_____		
Other_____		
Other_____		

20. Indicate whether or not the current plan includes the following mitigation strategies for addressing climate change. Also, indicate if the strategy will be addressed in the next plan update. List up to three additional adaption strategies not listed.

	Current plan Y/N	Next Plan Y/N
Constructing multi-use trails and/or complete streets		
Increasing mass transit options		
Incentivizing mass transit use		
Installing roundabouts		
Improving energy efficiency in government options		
Creating policies that incentivize energy efficiency in private properties		
Preserving green space		
Increasing green space		
Improving waste reduction in government operations		
Creating policies that incentivize waste reduction in private properties		
Other_____		
Other_____		
Other_____		

21. Please indicate to what extent the following statements occur in your community. (Likert scale: Never(0%); Rarely(1-20%); Sometimes (21-49%), Often (50-99%); Always (100%)

Decision makers in my community are well informed about climate change.	
Decision makers in my community are a barrier to making progress on climate change.	
Community members are well informed about climate change.	
Community members are a barrier to making progress on climate change.	
In my community, strategies related to climate change are well funded.	
In my community, strategies related to climate change are a political priority.	

The following survey sections were repeated for each plan commission the respondent entered in question 1.

- Renewable Energy Ordinances
- Solar and Wind Development
- Renewable Energy Community Perceptions
- Climate Change Community Planning

Renewable Energy and Climate Information Resources

22. Which of the following statements best reflects the information available to you to help make decisions when developing or amending renewable energy regulations/ordinances?

Solar

- o Reliable information is generally not available.
- o Reliable information is available for some issues, but not for many of them.
- o Reliable information is available for most issues.

Wind

- o Reliable information is generally not available.
- o Reliable information is available for some issues, but not for many of them.
- o Reliable information is available for most issues.

23. Which of the following sources of information do you use to help make decisions when developing or amending renewable energy regulations/ordinances? (Select all that apply)

- □ Citizen groups
- □ Colleagues and peers
- □ Consultants
- □ Cooperative Extension
- □ Environmental organizations
- □ Federal government agencies
- □ Planning organizations
- □ Popular press
- □ Social media
- □ State government agencies
- □ Universities
- □ Other_____

24. Please indicate whether you feel more reliable information is needed on the following issues to help you make decisions when developing or amending renewable energy regulations/ordinances. (Likert scale 1=not needed; 10=greatly needed)

Conflict management	
Energy reliability	
Fiscal impact to the county	
Impact on aesthetics/view	
Impact on environment	
Impact on property values	
Impact on public health	
Concerns about public health	

25. Which of the following sources of information do you use to help make decisions about climate change planning? (Select all that apply)

- □ Citizen groups
- □ Colleagues and peers
- □ Consultants
- □ Cooperative Extension
- □ Environmental organizations
- □ Federal government agencies
- □ Planning organizations
- □ Popular press
- □ Social media
- □ State government agencies
- □ Universities
- □ Other_____

26. Please indicate whether you feel more reliable information is needed on the following issues to help you make decisions about planning for climate change. (1 = not needed; 10 = greatly needed)

Climate change impacts	
Climate change adaption strategies	
Climate change mitigation strategies	
Communicating to the public about climate change	
Communicating to local government officials about climate change	

Community Planning Information

27. Are you a certified planner credentialed by the American Institute of Certified Planners (AICP)?

- o Yes
- o No
- o In the process of becoming certified

28. Which of the following units of government in the county employ professional planning staff credentialed by the American Institute of Certified Planners (AICP)? (Y/N/I don't know)

City	
Town	
County	

29. Please fill out the following contact information.

Name	
County	
Phone Number	
Email Address	

30. Thank you for completing this survey! Please use the space below for any comments or questions related to this survey. _____

County Snapshots

The following snapshots provide an overview of the land use regulations of commercial solar and wind developments in the unincorporated area of each county. This ordinance information is paired with demographic information such as population, farmland percentage, and county type, which may impact the likelihood or scale of renewable energy development. These snapshots reflect use standards specific to CSESs and CWECs. All development must still comply with the district standards of the zoning district where they are located. In 53 of the 82 counties with planning and zoning, county planning offices reviewed their snapshot for accuracy. The ordinances used to create the snapshots were collected from May-October 2021. Commercial renewable energy zoning standards can be detailed. Contact the county planning office for the most current and complete ordinance.