Plan and Recommendations for Financial Resources for Decommissioning of Utility-Scale Solar Panel Projects

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APPENDICES

1.0 EXECUTIVE SUMMARY

In January 2021, the North Carolina Department of Environmental Quality (DEQ or the Department) and the North Carolina Environmental Management Commission (EMC) submitted a report required by Session Law (SL) 2019-132 (H329) that included discussion of the decommissioning and financial assurance of utility-scale solar panel projects. The report, titled "Final Report on the Activities Conducted to Establish a Regulatory Program for the Management and Decommissioning of Renewable Energy Equipment," was developed based on input from more than 100 stakeholders representing the renewable energy industry, investor-owned utilities, local governments, materials recyclers, academia, not-for-profit organizations, and state agencies.

The Department and the EMC found that solar panels are not expected to pose a significant environmental risk to the State while in operation. They also recommended that additional time was needed to further study the feasibility and advisability of establishing a statewide standard to ensure adequate financial resources are available for the decommissioning of utility-scale solar facilities, also referred to as financial assurance (FA). It was not deemed necessary at that time because the current fleet of solar facilities would not reach the end of their useful life for about 10 years. The Department recommended that a future study on FA involve stakeholders and participation from the North Carolina Utilities Commission (NCUC), address salvage values and incentives to reuse, repower, or recycle end-of-life photovoltaic modules, and describe market forces necessary to drive the recommended end-of-life management options.

In 2021, the North Carolina General Assembly directed the Department in Section 3 of SL 2021-165 (H951 Energy Solutions for North Carolina) to submit a plan that ensures adequate financial resources are available for the decommissioning of utility-scale solar facilities. The plan is due to the General Assembly for legislative action by March 1, 2022. This document serves that purpose and represents the Department's proposed plan and recommendations to ensure adequate FA for decommissioning of utility-scale solar facilities. It is based on the data and information obtained from the Department's 2021 study and additional research conducted in the last few months.

North Carolina is one of the nation's leaders for the number of solar facilities supplying power to the electricity grid. North Carolina currently has about 5,100 megawatts (MW) of grid-connected solar power. This power is supplied by more than 660 facilities that are greater than 1 MW in size. These facilities are located in 79 counties, and the land is generally leased to the solar developer by the landowner. Based on the last three years of data obtained from the Energy Information Administration, an average of approximately 50 facilities are expected to be added in North Carolina per year, providing an additional 500 MW to the grid per year in total. Facilities are expected to get larger in the future, with more facilities expected to be greater than 5 MW.

In developing this FA plan, the Department has attempted to balance the need to restore the land for the landowner's beneficial use after the utility-scale solar facility shuts down while ensuring that North Carolina continues to encourage the development of renewable energy resources that creates jobs and increases economic development. A list of key steps the Department took to develop this plan is provided in Figure 1-1. [1]

[1] Any participation by key stakeholders in the development of this plan does not constitute an endorsement of any of the recommendations in this plan by the stakeholders and is not meant to indicate a consensus among those stakeholders.

Figure 1-1: DEQ Utility-Scale Solar Facility Financial Assurance Plan Development

- Reviewed the DEQ study conducted under SL 2019-132 (H329).
- Conducted targeted stakeholder engagement, including stakeholders representing the renewable energy industry, investor-owned utilities, North Carolina Utilities Commission (NCUC), the NCUC Public Staff, the North Carolina Electric Membership Corporation (NCEMC), and local governments.
- Reviewed current county-level requirements and requirements in other states.
- Evaluated the authority that will implement and administer decommissioning and FA requirements.
- Considered administrative and operational requirements of the program, including structure, function, and resource needs.
- Considered how and when the decommissioning requirements are initiated.
- Developed minimum requirements to ensure FA for decommissioning of utility-scale solar projects.

Representatives of solar developers relayed to the Department that it is unlikely that a grid-connected solar facility would be abandoned for multiple reasons, some of which include:

- value of the established power purchase agreement (PPA),
- the certificate of public convenience and necessity (CPCN) from the NCUC, and
- long-term backing of, and obligation to, large financial institutions via financing agreements.

The site itself can have long-term economic value, independent of its current energy resource, because of the site's interconnection to the regional grid. As energy resources develop and change over time, the site can still be utilized for any future resources.

Currently about 73% of counties with utility-scale solar facilities in operation have varying levels of requirements for decommissioning, FA, or both. This percentage does not capture the FA or decommissioning requirements in individual lease agreements or contracts between solar developers and landowners. This local-level approach leaves North Carolina with a patchwork of FA and decommissioning requirements.

The NCUC currently regulates the interconnection to the power grid for certain utility-scale solar facilities prior to construction. Local governments have authority to establish local ordinances for the siting, permitting, operation, and decommissioning of utility-scale solar facilities prior to construction. The Department has authority to require a sedimentation and erosion control permit for construction projects disturbing over one acre, where that authority has not been delegated to the local government. However, there are currently no state-level regulations that establish decommissioning and financial assurance requirements for utility-scale solar facilities.

To implement FA requirements for decommissioning of utility-scale solar projects, a requirement for decommissioning must first be established and rulemaking authority for the appropriate regulatory agency must be clarified in the North Carolina General Statutes. The allowable mechanisms for financial assurance should be based on other similar FA programs used by North Carolina state agencies. The program should also incorporate aspects of recent programs created in other states that are in the best interest of North Carolina. Considering varying FA requirements between counties in North Carolina, this Plan builds on North Carolina's existing programs and sets a uniform statewide process that is rooted in data and real-world applications.

The following key recommendations are made in the Plan to ensure financial resources are available for the decommissioning of utility-scale solar projects. Sections 2.0 through 6.0 discuss each of these recommendations in greater detail:

1. Clearly define the term "utility-scale solar facility" in the General Statutes, differentiate between new and existing facilities, and make revisions to any existing definitions as needed.
2. Set statewide minimum standards and direct a state agency, such as DEQ or the NCUC, to serve as the state-level program administrator, or designate certain components of the program to each agency according to its expertise.
3. Provide local governments with the option to enter into a memorandum of agreement to administer the program in their jurisdiction on behalf of the state program administrator. Local governments may also establish or retain ordinances that are more stringent than the statewide minimum standards.
4. Establish or clarify minimum requirements and rulemaking authority in General Statute, with further detail provided through agency rulemaking action.
5. Allow up to two years for the selected agency to set up the program and complete required rulemaking.
6. Provide resources for the selected state agency to establish and administer the program through general appropriations that provides base funding for three FTEs at a recurring cost of $350,000.00 per year, and one-time non-recurring funds for operational start-up costs in the first year of approximately $10,000.00. Authorize the administering agency to collect fees through rulemaking that covers any additional program staffing, operating, and maintenance costs.
7. Provide resources to encourage economic development of recycling or reuse of solar panels.
8. Establish an annual registration requirement for new and existing utility-scale solar facilities that discloses names of responsible parties, expected service life, project timeline, and scope and scale of the projects.
9. Establish minimum requirements for decommissioning cost estimates and FA mechanisms for new solar facilities.
10. Require FA mechanism(s) for new facilities to be established and submitted to the state program administrator five years prior to the end of the facility's expected service life as reported in the registry.
11. Allow existing facilities to operate under their existing decommissioning plans and/or mechanisms if they exist. If and when the facility makes a material or major modification, the facility would be required to submit a decommissioning plan, cost estimate, and FA mechanism that meet the same minimum standards proposed for new facilities.
12. Maintain landowner's existing right to specify decommissioning and FA requirements above and beyond the proposed state minimum standards and any local ordinances within lease agreements and contracts with the developers.

2.0 PROPOSED DEFINITION OF AFFECTED FACILITIES

A definition for a utility-scale solar facility would need to be added to G.S. 62 to distinguish these facilities from other types of energy projects, to clarify specific requirements for this type of facility related to decommissioning and FA, and to clarify the application of requirements to new projects versus existing projects.

SL 2021-165 (H951) Section 3 requires that this plan address utility-scale solar projects defined as follows:

> "a ground-mounted photovoltaic (PV), concentrating photovoltaic (CPV), or concentrating solar power (CSP or solar thermal) project capable of generating 1 megawatt (MW) or more directly connected to the electrical grid for sale to wholesale customers. A utility-scale solar project includes the solar arrays, accessory buildings, transmission facilities, and any other infrastructure necessary for the operation of the project."

The Department recommends providing some clarification to the above definition as follows:

- The phrase "for sale to wholesale customer" adds ambiguity to the definition that makes it unclear as to whether solar generation facilities owned and operated in North Carolina by Duke Energy, Dominion Energy, electric cooperatives, and municipal cooperatives are included in the definition of utility-scale solar project. These electric power suppliers both own/operate solar facilities and purchase power from merchant plant solar facilities. The definition should clarify whether solar facilities owned and operated by Duke Energy, Dominion Energy, electric cooperatives, and municipal cooperatives or their subsidiaries are included.
- There is no distinction between new and existing facilities in the above definition. The definition should establish a specific date that defines new versus existing facilities for regulatory purposes.
- The definition does not distinguish between the alternating current (AC) and direct current (DC) power of the solar facility capacity. The Department recommends including "megawatts AC" when defining the system facility capacity affected by the program. [2]
- The definition should clearly exclude commercial or residential projects by stating that solar power systems intended for consumption on-site or for net-metering are not an affected facility.

The NCUC has a more structured program for administration of proposed electricity generating projects that are considered a "merchant plant" as defined in R08-63(a)(2), which requires obtaining a CPCN from the NCUC under Rules 04 NCAC 11 R08-63 and R08-64. The NCUC also has an existing registration process under Rule R08-65 for solar projects under 2 MW that are not owned/operated by electric power suppliers, which are often smaller residential or commercial rooftop or individual use projects. In addition, projects under 2 MW represent less than 2% of the existing solar panels in the state (See Table D-5 in Appendix D). While the definition above includes all facilities above 1 MW, the Department recommends including only facilities over 2 MW in the definition for utility-scale solar facilities, to be consistent with the rules and requirements established by the NCUC for the CPCN process.

The Department recommends the following definitions for utility-scale solar projects that align with the proposed plan for decommissioning and FA:

- "Utility-scale solar facility" means ground-mounted photovoltaic (PV), concentrating photovoltaic (CPV), or concentrating solar power (CSP or solar thermal) project facility capable of generating 2 megawatts (MW) alternating current (AC) or more directly connected to the local or regional electricity grid with the ability to deliver power to the electricity grid. A utility-scale solar facility includes the solar arrays, accessory buildings, transmission facilities, and any other infrastructure necessary for the operation of the project. A utility-scale solar facility does not include renewable energy facilities owned or leased by a retail electric customer intended primarily for the

[2] 04 NCAC 11 R08-02 Definitions states in part: "Unless specifically stated otherwise, capacity of generation facilities is provided in alternating current (AC) delivered at the point of interconnection to the distribution or transmission facilities."

customer's own use or to offset the customer's own retail electrical energy consumption at the premises or for net metering.

- "New utility-scale solar facility" means a utility-scale solar facility with an agreement for an interconnection to the local or regional electricity grid executed on or after (insert date or effective date of authorizing legislation).
- "Existing utility-scale solar facility" means a utility-scale solar facility with an agreement for an interconnection to the local or regional electricity grid executed prior to (insert date or effective date of authorizing legislation).

In addition, the following definition is meant to clarify the use of the term "material or major modification" in this Plan; however, the definition should be studied and reviewed by stakeholders prior to inclusion in a law or rule:

> *For the purpose of this Plan "material or major modification" generally means a modification to the solar facility that may affect the costs or financing of the solar facility, such as the addition of new generation capacity, the addition of storage capacity, or repowering, or other changes that may affect the costs or financing of the solar facility. For the purpose of this definition, repowering means a process that involves replacing the majority of old solar panels, trackers, inverters, transformers and/or other technology with new ones at the facility.*

3.0 PROPOSED ADMINISTRATION OF FINANCIAL ASSURANCE PROGRAM

3.1 Proposal for Statutory Authority and Requirements

The Department reviewed the existing regulatory requirements that may apply to utility-scale solar facilities in North Carolina. A summary of the existing requirements can be found in Appendix A. To establish requirements for financial resources for utility-scale solar projects, the Department recommends clarifying the regulatory oversight and rulemaking authority for decommissioning and financial resources of utility-scale solar projects. Based on the information and recommendations provided in this report, the Department recommends the following set out in the North Carolina General Statutes:

1. Provide definitions of terms and affected projects to clarify applicable requirements under G.S. 62 and the rules adopted thereunder.
2. Revise any existing definitions in G.S. 62 pertaining to solar projects or facilities for clarification, if needed.
3. Assign regulatory agencies (such as NCUC or DEQ) responsibility for oversight of each aspect of the program requirements and provide resources to those agencies to create and operate the program(s).
4. Establish a base fund through general appropriations for state administration of the program.
5. Assign and/or clarify rulemaking authority for the designated regulatory agencies. Allow sufficient time for program design, rule adoption, and implementation.
6. Authorize annual registration requirements for both new and existing facilities.
7. If a registration fee is required to support the authorized agency's program costs, establish the authority to set the registration fee amount and frequency in rule.
8. Establish requirements for completing decommissioning of solar facilities, the conditions or circumstances under which decommissioning must be completed, and the parties responsible for the decommissioning (e.g., would decommissioning be required at all utility-scale solar facilities that meet the definition, or only when the land is being leased by one legal entity from the landowner, which is a different legal entity).
9. Establish conditions under which the state program administrator may issue penalties for non-compliance (if any) and clarify into which fund any such penalty amounts would be deposited (for

example, the same fund established for registration fees to fund the program, or the Civil Penalty and Forfeiture Fund in accordance with G.S. 115C-457.2).

10. Establish the authority for the state program administrator to institute an action for injunctive relief where appropriate (see G.S. 130A-18 for example statutory language).
11. Establish incentives and an economic development program, such as grant funding for state-based recyclers and for research and development on recycling and reuse of panels, to facilitate growth of North Carolina's solar panel recycling and reuse industry.

3.2 Proposal for Rulemaking Authority

The Department has initiated the rulemaking process for a proposed amendment to hazardous waste rules in 15A NCAC 13A that will define solar panels as a universal waste. The amendment, if adopted, is expected to encourage recycling (instead of disposal) by simplifying the management requirements for solar panels that are recycled when they can no longer or will no longer be used for their intended purpose.

Some of the requirements proposed in this plan require further study, discussion with stakeholders, and the opportunity for public comment to determine the appropriate requirements. The Department recommends that the following requirements be established through rulemaking, once rulemaking authority has been established or clarified, instead of being established in General Statute:

- Providing any additional clarifying definitions, such as defining a "material or major modification" or the "expected service life."[3]
- The information a solar facility is required to submit for the registry.[4]
- The types of allowable mechanisms for financial assurance, to allow the addition of other types of mechanisms that may be identified as the program develops, and the specific requirements for each type (see 15A NCAC 13B .1805 for examples of specific mechanism requirements).
- The language to be used for the FA mechanism documentation (see 15A NCAC 13B .1806 for examples of specific mechanism language).
- The schedule and due dates for the decommissioning plans, cost estimates, FA mechanisms, and subsequent updates.
- Requirements for the decommissioning schedule, triggers, notification, and procedures.
- Requirements for the content of the decommissioning plans if any minimum requirements are requested by stakeholders.
- Requirements for what type of information should be considered in the cost estimates.
- The frequency and amount of fees for state-level registration, so that fees can be updated over time to adjust for inflation and as resource needs are clarified as the new program develops.
- The percentage of salvage value that can offset decommissioning costs in the cost estimate.

3.3 Proposed State-Level Program Administration and Duties

Currently about 73% of counties with utility-scale solar facilities in operation have varying levels of requirements for decommissioning, FA, or both.[5] Since this Plan is directed to ensure there are sufficient funds to decommission utility-scale solar facilities, the Department recommends establishing minimum standards for both decommissioning and FA at the state level instead of local governments setting their own minimum standards as is the current practice. The Department recommends state-level administration of the FA program to ensure statewide consistency and compliance but allow flexibility for local governments to establish decommissioning and FA standards that are more stringent than the state minimum standards. Additionally, when surveyed, the majority of NC counties that responded indicated their preference for the administration of decommissioning and FA requirements was to be at the state-level.[6]

[3] "Expected service life" is a term used in 04 NCAC 11 R08-63 and R08-64
[4] See Sections 4.1 and 5.1 for further details on the registry.
[5] See Appendix B for a summary of existing requirements for decommissioning and FA in local government ordinance.
[6] A summary of the NC County questionnaire and responses is in Appendix E.

The Department recommends a state agency, such as DEQ or the NCUC, serve as the state-level program administrator. A review of legislation in other states indicates that some states place administration under agencies with roles similar to the NCUC, and other states under agencies with roles similar to the Department. The Department discussed options for state program administration with members of the NCUC, and both agencies understand that a program established for decommissioning and FA for solar facilities would have pre-construction aspects that may be more pertinent to the NCUC, and end-of-life aspects that may be more pertinent to the Department. Both organizations are committed to sharing information and tools to allow any program model for state administration to operate cohesively and efficiently. Developing and managing this program would require the state program administrator to perform the duties specified in Figure 3-1.[7]

Figure 3-1: Proposed Duties of State Government FA Program

Program Administrator – State Government
1. Develop and adopt rules for the decommissioning and FA program once authorizing statutes are effective. 2. Create a registration process for new and existing facilities, which could be similar to the registration process for electronics recyclers under G.S. 130A-309.134. 3. Develop and manage other recordkeeping and reporting mechanisms for the program, including any electronic tools or databases. 4. Review and approve the decommissioning plans, cost estimates, and FA mechanisms submitted by facilities. 5. Receive and review notices of intent to decommission. 6. Review federal facility-level data on electricity generation to obtain information on affected facility retirements not reported to state program. 7. If required, oversee decommissioning of any abandoned facilities through hiring and monitoring of a third-party contractor responsible for the physical decommissioning. This task may also involve time for developing a request for proposals to complete the work, review of costs, and review of the submitted proposals to select and hire contractors for the various tasks required for decommissioning. 8. Verify that sites were decommissioned according to the regulations and the decommissioning plan. 9. Provide any data and reporting on the program to the General Assembly as requested.

3.4 Proposed Optional State-Local Government Shared Administration and Duties

Many local governments currently regulate decommissioning and/or FA of utility-scale solar facilities by local ordinance, as described in Appendix B. The Department recommends structuring the FA program to allow local governments the option to establish or maintain direct oversight of the FA program for individual facilities in their jurisdiction by entering into a memorandum of agreement (MOA) with the state program administrator to enforce state-level regulations on the state's behalf, in addition to enforcement of their own existing/applicable ordinances. Under this option, facilities would still be required to participate in the state-level registry and meet other state-level requirements. The Department suggests structuring this optional decommissioning and FA program to be administered jointly by the state and local government as shown in Figure 3-2, and the specific division of duties could be negotiated in the terms of the MOA executed with each local government.

Under this program, the local government could administer most of the facility-level components of the program as outlined in Figure 3-2. This also includes establishing a process for interacting with the state program administrator. Approval of decommissioning plans and FA would be based on compliance with

[7] This list is not meant to be a comprehensive list of required duties. Duties may be added, deleted, or modified as the program is developed in more detail.

requirements in statute, administrative code, and/or local ordinance, once established. It also requires ensuring FA mechanisms are set up to allow funds to be available to the local governments to finance or provide reimbursement for any decommissioning of abandoned facilities.

Figure 3-2: Proposed Optional State-Local Government Shared Authority Program Structure

Program Administrator - Oversight State Government	Program Administrator – Facility Level Local Government
1. Set minimum decommissioning and FA requirements for facilities. 2. Provide guidance to local governments. Establish MOA with interested local governments. 3. Administer the registry. 4. Provide information on facilities that are no longer generating electricity. 5. Provide recordkeeping and reporting oversight. 6. Provide reporting to the General Assembly, as requested.	1. Establish decommissioning/FA requirements at local level that meet minimum state standards. Establish MOA with state administrator. 2. Approve decommissioning plans and FA mechanisms. 3. Receive notices of intent to decommission. 4. Verify decommissioning of sites and release FA mechanisms, as appropriate. 5. Oversee decommissioning of any abandoned facilities though hiring of a third-party contractor. 6. Provide records to state administrator.

3.5 Program Resource Needs

For a state agency to develop and establish the new program, develop the registry and other recordkeeping tools and programs, provide guidance on the new program to local governments and stakeholders, develop the optional program with shared state-local program authority, train staff, and administer the facility-level program as detailed in Figure 3.1, the agency will need additional staff and other resources. The cost estimate for decommissioning and the amount of the FA mechanism would only address and fund the work necessary to decommission the site, including transportation and disposal, recycling, refurbishing, and/or reuse. The decommissioning funds would not be able to support state government administrative or compliance duties, therefore additional funds would need to be provided by some other source.

Based on the proposed program structure, if DEQ were selected as the state program administrator, the Department estimates that an additional three permanent full-time equivalent (FTE) staff would be necessary to conduct the program duties as described in Figure 3-1. General appropriations could support these three FTEs at a recurring cost of $350,000.00 per year, and additional nonrecurring funds for operational start-up costs in the first year of approximately $10,000.00. The three proposed FTEs include an engineering supervisor for the program lead and the administration of decommissioning plans and cost estimates, a financial analyst for administration of FA mechanisms, and either a program development coordinator or an environmental program consultant for administration of the registry, rulemaking, preparation of guidance documents, creation of databases and forms, recordkeeping, and coordination with local governments. The administering agency could be authorized to collect fees through rulemaking to cover ongoing program staffing, operating, and maintenance costs beyond the proposed program administration funds provided through general appropriations.

Resources will also be needed for development of recycling and reuse markets of solar panels to ensure proper handling and management of materials at decommissioning. Incentives, such as grant funding for recycling businesses or research and development on more cost-effective methods for recycling of materials, could spur economic growth in the industry and reduce recycling costs. The Department recommends the administration of an economic development program be referred to the Department of Commerce, with technical support provided by DEQ.

4.0 PROPOSED DECOMMISSIONING AND FA REQUIREMENTS FOR NEW FACILITIES

Under other existing DEQ programs for permitted facilities that are required to establish FA for facility closure (end-of-life), such as waste management facilities, closure of the permitted facility is required to be completed in accordance with applicable requirements in statute, rule, and the facility permit. The FA amount and the triggers for when it can be used or released are dependent upon those closure requirements. Permitted facilities are required to submit a closure plan and closure cost estimate in the application for the permit to construct (PTC) for approval by DEQ, before a PTC is issued.

While the concern with utility-scale solar panel projects may be related to the project's end-of-life, proposed regulations for FA would need to govern or be a part of a project's pre-construction approval/application/registration process and its continued operation, as they are with other DEQ permitted facilities.

In order to determine the required amount for the FA mechanism, and to determine when and how the FA mechanism would need to be used for decommissioning, there first must be a requirement for decommissioning and some requirements for when decommissioning must be initiated and completed in regulation. The main purpose of the decommissioning plan requirement is to compile the information needed to support the FA requirements and FA cost estimate.

Based on a review of counties' ordinances in Appendix B, other states' laws and rules in Appendix C, and information provided by solar developers, there is a broad spectrum of approaches to decommissioning and FA. This section discusses the proposed minimum baseline requirements that could apply across the state for decommissioning, cost estimates, and the FA mechanism for new facilities. In determining decommissioning costs and materials management during decommissioning, the Department encourages following the hierarchy of management methods described in G.S. 130A-309.04.

4.1 Registration

While the NCUC currently keeps records of the CPCNs it issues to proposed solar facilities, it does not collect information or maintain records of which facilities were actually constructed or are currently operating. It is a one-time application, and the NCUC collects only limited information on the facilities. Also, the NCUC's forms and data may not currently be digitized or in a readily-accessible format.

The Department recommends that the selected state program administrator either revise this existing NCUC registration process, or establish a new registration process to allow annual registration for tracking at the state-level. The registry should track the life of the project through its construction, operation, and decommissioning. The Department recommends establishing the specific requirements for the registry during rulemaking. At a minimum, the information submitted in the registration and updates should include the identification of the legal entity that will be responsible for decommissioning and establishing the FA mechanism when required, the expected service life of the facility, and information on the decommissioning cost estimate and proposed FA mechanism.

Prior to commencing construction, a new facility would be required to begin registering annually with the state program administrator as a utility-scale solar facility and, if required, pay a registration fee. Annual updates to report the identification of the responsible party to the state program administrator may help to reduce any potential for abandonment.

4.2 Decommissioning Plan Requirements

The decommissioning plan must be prepared by a professional engineer licensed in North Carolina, and submitted to the state program administrator prior to commencing construction. The program administrator will approve the plan as meeting the minimum requirements in general statute and rule, once established. The local government would approve any portions of the plan required to comply with any additional local government ordinances.

The decommissioning plan must contain the following elements:

- *Contact Information*: The contact person's name, title, mailing address, phone number, and email address and the business name, if any, for the legal entity that is the landowner, the facility operator, and the party responsible for decommissioning.
- *Narrative Description:* A narrative description of how the decommissioning will be conducted including the decommissioning sequencing; the disposal methods (e.g., hazardous waste vs. non-hazardous waste disposal, landfilling, reuse, recycling); a schedule for completion of the decommissioning activities; and a description of the expected site conditions after removal of the solar facilities.
- *Cost Estimate:* A cost estimate that meets the requirements specified in Section 4.3 below.
- *Proposed Financial Mechanism:* The proposal for the financial mechanism should state the type of mechanism proposed to be used; and should be clear regarding which legal entity will establish the mechanism, when it will be established in accordance with the regulations, and how the state program administrator or local government will access the funds from the mechanism if needed.
- *Salvage Plan*: A salvage plan describing the proposed procedures for salvage to support the proposed salvage values as described in Section 4.3 below.
- *Restoration Plan*: A restoration plan describing the condition to which the site will be returned.

4.3 Determining the Cost Estimate Amount

The amount of financial assurance should be based on a cost estimate for decommissioning and restoration prepared by a professional engineer licensed in North Carolina that evaluates the following, with costs at present value and current commodity prices:

- A determination as to whether the materials and equipment will be required to be disposed of as hazardous waste or non-hazardous solid waste since transportation and disposal costs for hazardous waste would be higher than for solid waste. Hazardous waste disposal facilities may be a greater distance from the facility than solid waste disposal facilities.
- The cost to have a third party demolish/disassemble, transport, and dispose of all waste materials to a facility permitted to receive such waste, or transport materials to a facility for recycling or reuse, which may need to be transported out-of-state.
- The cost of the restoration of the site.
- Projected salvage values.

The Department recommends conducting a public review during rulemaking to set a limit on how much decommissioning costs can be offset by salvage to less than a certain percentage of the total estimated decommissioning cost. The amount of the decommissioning costs that salvage value can offset is important since financial resources need to be available to the state program administrator or local government at the time of decommissioning of any abandoned facility, and not tied up in materials to be salvaged. The Department recommends addressing the specific percentage of salvage that is excluded from the offset calculation during rulemaking, so that it can be revised over time as the recycling and reuse industry develops.

4.4 FA Mechanism Requirements

<u>Submission of FA Mechanism</u>

The Department recommends that the FA mechanism(s) should be established and submitted to the state program administrator five years prior to the end of the expected service life of the facility as reported by the facility to the registry.

<u>Entity Receiving FA Funds</u>

The mechanism must ensure the FA funds will be accessible by either the state program administrator, the local government in whose jurisdiction the facility is located, or both, in case the developer or

owner/operator becomes insolvent or ceases to reside, be incorporated, do business, or maintain assets in North Carolina.

Allowable FA Mechanisms

A review of the local ordinances for North Carolina counties with the FA requirements for solar facilities indicated the main mechanisms used for financial assurance were surety bonds, letters of credit, and direct funds provided to the county via certified check or cash deposited to an escrow account. See Appendix B for further detail on local government ordinances. The allowable mechanisms being proposed are based on a review of existing FA programs operated by local governments, DEQ, and the federal government.[8] The list of proposed mechanisms is given below:

- Trust funds,
- Surety bonds guaranteeing payment or performance,
- Irrevocable letters of credit,
- Insurance,
- Financial tests,
- Corporate guarantees by corporate parents who can pass the financial test, or
- Direct funds provided in escrow with the local government, or at the state-level with further program development.

Rules developed by the state program administrator would need to provide descriptions and requirements for each of the allowable mechanisms, with the exception of the direct funds in escrow that may be required or allowed under local ordinance. The agency rules should include the exact language that must be used in the mechanism documentation as is included in legislation and the Code of Federal Regulations for hazardous waste and non-hazardous waste management facilities. See G.S. 130A-295.2(b), (f), and (g) (Solid Waste Management Facilities, FA requirements) and the included reference to 40 CFR 258.74, and the supporting rules in 15A NCAC 13B .1800 as potential/example statutory and rule language.

Local governments may also be given the authority to restrict which mechanisms they are willing to accept through local ordinance. However, this approach may require developers who work in multiple counties to use different FA mechanisms in different counties. Therefore, the Department recommends allowing local programs to limit FA mechanisms, but also requiring a minimal set of FA mechanisms be offered by every local program to eliminate uncertainty for developers.

4.5 Review and Updates to the Plan and Cost Estimate

The facility would be required to submit updated decommissioning plans and cost estimates prepared by a professional engineer licensed in North Carolina to the state program administrator under the following conditions:

- once every five years to update any decommissioning plan elements that have changed, and to update the cost estimate to adjust for inflation and changes to projected costs;
- prior to establishing the FA mechanism for confirmation of the correct amount;
- whenever there is a material or major modification (as defined in Section 2.0 above) to the facility that would increase the decommissioning costs, where submittal for this change would restart the clock for the five-year timeframe; or

Additionally, if the responsible party would like to decrease the amount of FA because decommissioning costs are expected to decrease, the decommissioning cost estimate and a justification for the decrease must be submitted to the state program administrator for approval before the amount of the mechanism can be decreased.

[8] These mechanisms are similar to those allowed for waste management facilities and wind energy decommissioning. See G.S. 143-215.121 (Wind Energy Facilities, FA Requirements). G.S. 74-54 (Mining Act) and 43 CFR 2805 for facilities on federal lands allow bonds as the mechanism.

4.6 Qualifying Event for Decommissioning

The Department recommends defining in rules when a facility is required to decommission. Some possible qualifying events that would initiate decommissioning requirements are:

- submission of a notice of decommissioning to the state program administrator, or
- a 12-month consecutive period without supplying energy to the grid.[9]

When alternate timeframes for this qualifying event are specified that are less than 12 months in a lease agreement, contract, or local government ordinance, then the alternate timeframe for the qualifying event would prevail.

The following are possible exceptions to the qualifying event resulting from either the 12-month period or alternate specified period with no power supplied to the grid:

- down-time caused by transmission issues with the utility,
- maintenance or other planned activities,
- emergency or natural disaster event, and
- other force majeure occurrences.

The program administrator may grant an extension to this 12-month period for such and can be defined during rulemaking. An appeals process should be available to the owner or operator to appeal a decommissioning decision for events that are not specified in the program.

4.7 Notification of Decommissioning Commencement

Prior to commencing decommissioning activities, the party responsible for decommissioning should notify the state program administrator that decommissioning activities will begin.

4.8 Timeframe to Complete Decommissioning

The maximum amount of time to complete decommissioning of the facility could be within 12 months after the qualifying event for decommissioning. Alternate timeframes that are less than 12 months may be specified in a lease agreement, contract, or local government ordinance, or in the hazardous waste requirements of 15A NCAC 13A. In this case, the alternate timeframe that is less than 12 months would prevail.

The Department recommends including a process in rule for allowing the owner/operator of a facility to request an extension for additional time to perform specific decommissioning requirements. Extensions may be granted by the program administrator for specific events listed in Section 4.6 or to allow more preferable disposal methods such as recycling verses landfill. For any extension request, the program administrator would need to consider the hazardous waste requirements of 15A NCAC 13A.

4.9 When Hazardous Waste Requirements Apply

Solar panels become a waste, and hazardous waste requirements in 15A NCAC 13A apply, when the solar panels:

- meet the definition of a waste as described in 40 CFR 261.2, adopted by reference at 15A NCAC 13A .0106(a), and
- are a hazardous waste as described in 40 CFR 262.11, adopted by reference at 15A NCAC 13A .0107(a), and:
  - After a qualifying event that initiates decommissioning including:
    - the facility submitting a notice of decommissioning, or

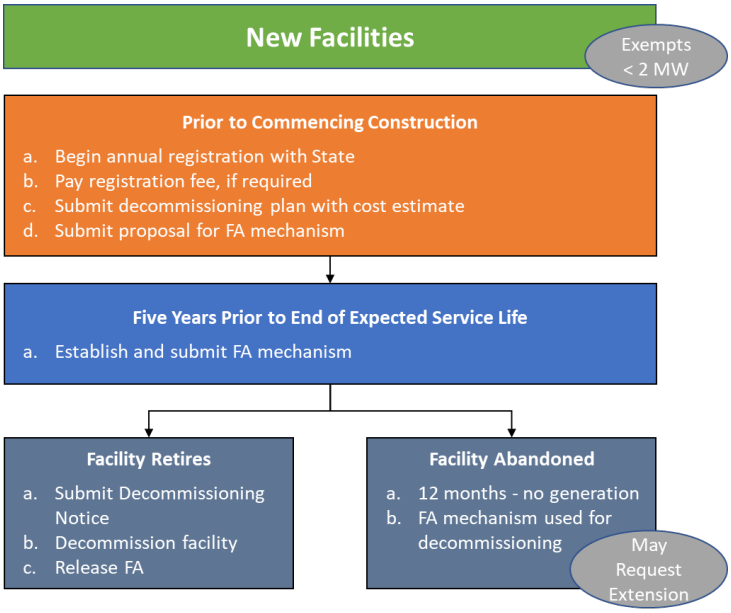
[9] The qualifying event for decommissioning is similar to the restoration requirement for wind energy facilities in the Division of Energy, Mineral, and Land Resources Guidance for Decommissioning of Wind Energy Facilities Onshore Wind Energy Program. Additionally, twenty-three NC counties with solar facility decommissioning requirements use the twelve-month consecutive period without supplying energy to the grid as a qualifying event for decommissioning. Seven additional NC counties do not specify a time period for the qualifying event but use twelve months without supplying energy to the grid as an example of the qualifying event for decommissioning.

- after a 12-month period without supplying power to the electricity grid, described above, as long as during that 12-month period prior to the qualifying event, the solar panels could still be used for their intended purpose, or
- At any point when the solar panels can no longer or will no longer be used for their intended purpose (e.g., non-functioning, broken, etc.).

4.10 Release of FA

When the facility is retired and decommissioned, the state program administrator will verify that decommissioning was completed in accordance with the regulations (once established) and the decommissioning plan. Once verified, the state program administrator would release the FA mechanism, and provide notification of this fact to the responsible party for the solar facility. For direct funds posted in escrow, if they exist, the owner or operator should be allowed to draw down money in escrow for costs associated with the decommissioning.

Figure 4-1: FA Process for New Facilities



5.0 PROPOSED DECOMMISSIONING AND FA REQUIREMENTS FOR EXISTING SOLAR FACILITIES

Addressing decommissioning and FA for existing utility-scale solar facilities in North Carolina requires additional consideration for multiple reasons, including the following:

- *Number of Existing Facilities:* Currently the Department estimates that there are approximately 661 existing solar facilities larger than 1 MW in North Carolina.[10] The Department estimates that the number of existing facilities will increase by an average of 50 facilities per year based on the recent growth patterns.[11]
- *Facilities with Existing FA under local ordinance:* There are existing local ordinances for decommissioning and FA that vary widely between each local government. A review of existing local ordinances indicates that 32 counties in North Carolina have ordinances requiring both decommissioning and FA, and an additional 28 counties have ordinances requiring decommissioning only at this time.[12] Note that most counties with large-scale solar development currently have ordinances for decommissioning and FA. In addition, the ordinances may have

[10] This estimate is based on Energy Information Administration data for 2020 and does not include facilities that came online in 2021.

[11] See Appendix D for supporting information on existing facilities.

[12] See Appendix B for supporting information on existing local ordinances.

been put into place after some facilities started operating, potentially leaving some facilities with no requirements.

- *Facilities with Existing FA under lease agreements or contracts:* Most existing facilities are located on leased land, and many of these leases include requirements related to decommissioning or restoration of the site. In addition, it is possible the facility may have an existing agreement for FA through lease agreements or contracts between the landowner, the facility operators, and/or the facility developers.[13]
- *Financial Models:* Each facility is developed by a unique set of investors that form an LLC. The financial model and financing are established in the early stages of facility construction; and would be difficult to change or revise to include FA funding after construction is completed.
- *Precedent in State Legislation:* The Department reviewed legislation from 13 other states that have passed legislation regulating decommissioning and FA for solar facilities at this time. Twelve of these states have passed legislation that impose no retroactive FA requirements on existing solar facilities. [14]
- *Lack of State-Level Data and Records:* Due to the current lack of siting and permitting of these facilities at the state level, no complete and accurate statewide list of existing grid-connected solar facilities currently exists. Federal reporting requirements to the Federal Energy Regulatory Commission and the Energy Information Administration provide a more robust inventory of grid-connected projects statewide that are within and outside of the NCUC authority. While the NCUC may obtain information during the CPCN process, facilities that receive a CPCN are not necessarily constructed.

5.1 Registration for Existing Facilities

The Department recommends that existing facilities be required to register with the state program administrator and begin paying the registration fee, if required, within 24 months of program implementation, in the same manner as new solar facilities. This would allow the state program administrator to collect information on the facility, responsible parties for decommissioning, the expected service life of the facility, expiration dates of existing contracts or agreements, and information on existing decommissioning plans and FA mechanisms.

5.2 Decommissioning Plan, Cost Estimate, and FA Mechanism Requirements for Existing Facilities

The Department's research indicates that most large-scale facilities are operating in counties with existing decommissioning and/or FA requirements. States such as California and Texas that are currently ranked the highest among states in solar capacity do not have retroactive FA requirements for existing facilities.

The Department recommends that existing facilities continue to meet any existing requirements in local government ordinance and in any existing lease agreement or contract. This includes maintaining any existing decommissioning plans and/or FA mechanisms established under those ordinances or agreements without requiring any modifications to those documents to meet the requirements for new facilities found in Sections 4.2 through 4.5 above. Within 24 months of program implementation, existing facilities would be required to submit copies of any existing decommissioning plans, cost estimates, and FA mechanisms to the state program administrator via the registry process. If there are no existing documents, the facility would not be required to submit any documentation related to decommissioning or FA at that time.

If there is a material or major modification, as defined in Section 2.0 above, to any existing facility, the facility would be required to establish and submit a decommissioning plan, cost estimate, and FA mechanism that meet the same minimum standards proposed for new facilities prior to making the material or major modification.

[13] See Appendix D for supporting information on existing facilities.

[14] See Appendix C for supporting information on legislation passed in other states.

Figure 5-1: FA Process for Existing Facilities

5.3 Decommissioning Schedule for Existing Facilities

The Department recommends that, regardless of any schedule provided in an existing decommissioning plan, and even if an existing facility does not have a material or major modification, all existing facilities over 2 MW be required to meet the same decommissioning requirements proposed in Sections 4.6 through 4.9 above for new facilities. These sections include the requirements for the qualifying event to begin decommissioning, the submittal of the notification of decommissioning commencement, the timeframe to complete decommissioning, and the circumstances where hazardous waste requirements apply.

5.4 Release of FA for Existing Facilities

At facility retirement, the state program administrator or local government will verify that decommissioning has been completed in accordance with any decommissioning plan, if established, and under the required schedule. Once verified, the FA mechanism, if any had been established, would be released and notification of this fact would be provided to the responsible party for the solar facility.

6.0. SOLAR PANEL RECYCLING

The report prepared under SL 2019-132 (H329) examined methods for managing end-of-life solar panels and associated equipment from utility-scale solar facilities. In accordance with the solid waste management hierarchy established in G.S. 130A-309.04, the Department encourages reuse and refurbishment of solar panels to the greatest extent practicable.

The SL 2019-132 report discusses costs and benefits associated with recycling and disposal as a municipal solid waste, or disposal as a hazardous waste. While recycling is the preferred management option, the technology and processes to efficiently recycle solar panels are still being researched and developed in the United States. Although solar panels contain valuable materials, they are difficult to recycle because they are designed to be durable and long-lasting. Material separation and extraction is energy-intensive, and the extraction cost may exceed their value using existing processes. The current cost to recycle a solar panel is much higher than landfill disposal. Costs to recycle a crystalline silicon solar panel have been reported in the United States in the range of $25 to $30 per panel.[15] Comparatively, a 40-pound solar panel would cost $0.88 to dispose in a local municipal solid waste landfill.[16]

In North Carolina, options for recycling are limited. One electronics recycler, Powerhouse Recycling in Salisbury, has begun accepting solar panels for recycling. The company separates the panels into recyclable components and sends the glass to a downstream recycler for further processing. End markets for panel glass are still being developed nationally and may be a limiting factor when larger volumes of solar panels reach end-of-life. Two other electronics recyclers with a North Carolina presence accept solar panels for recycling; although, the panels are transported to out-of-state facilities for processing and recycling. These include Metech Recycling in Creedmoor and Electronics Recyclers International in Badin.

North Carolina State University's Clean Energy Technology Center has started working with a company to develop a "takeback" model. This model includes a fee charged at the point-of-sale that allows decommissioned solar panels to be returned to the seller for refurbishment, reuse, or recycling. The State of Washington recently passed a rule requiring this type of program for all manufacturers and importers of solar panels.[17]

As decommissioning timelines approach for utility-scale solar facilities in the coming decade, the large quantities of end-of-life solar panels present an opportunity for new business development and economic growth. Building the state's solar panel recycling infrastructure would create jobs and recover valuable materials. Investment and innovation will be necessary to make recycling a viable and more cost-competitive management option. Incentives, such as grant funding for recycling businesses and for research and development, could support technological developments and investment that would position the state to be a leader in responsible management of this emerging waste stream.

[15] Reference: Heath, Garvin A., et al. "Research and Development Priorities for Silicon Photovoltaic Module Recycling to Support a Circular Economy." Nature Energy, vol. 5, no. 7, 2020, pp. 502–510.
[16] Based on average statewide municipal solid waste tipping fee of $44.06 in FY2019-20.
[17] Revised Code of Washington (RCW) RCW 70A.510.010: Photovoltaic module stewardship and takeback program

APPENDICES

APPENDIX A: Summary of Existing NC State Regulations that May Apply to Utility-Scale Solar Facilities

APPENDIX B: Summary of County-Level Decommissioning and Financial Assurance Requirements

APPENDIX C: Summary of Decommissioning and Financial Assurance Requirements in Other States

APPENDIX D: Summary of Information for Existing Facilities in NC

APPENDIX E: Summary of NC County Questionnaire and Responses

APPENDIX A

Summary of Existing NC State Regulations that
May Apply to Utility-Scale Solar Facilities

Summary of Existing NC State Regulations that May Apply to Utility-Scale Solar Facilities

The Department reviewed the current regulations that may be applicable to solar facilities, including their construction, their connection to the power grid, and regulations for hazardous and non-hazardous waste. This summary is not intended to represent a comprehensive list of state regulations applicable to utility-scale solar facilities; it merely provides some regulations for consideration in the development of any new regulations applicable to decommissioning and financial assurance at such facilities. For additional information, see the attached Table A-1.

North Carolina Utilities Commission

- The NCUC has existing statutory authority to adopt rules pertaining to energy-generating projects, including renewable energy, under G.S. 62. The NCUC also has existing rules under Title 04, Chapter 11 of the NC Administrative Code that regulate many aspects of electric service including renewable energy facilities.
- The NCUC currently has authority to regulate decommissioning of solar facilities owned and operated by the investor-owned utilities (IOUs): Duke Energy Carolinas, LLC (DEC), Duke Energy Progress, LLC (DEP), and Dominion Energy North Carolina.
- Note that, currently, most utility scale solar facilities are owned by separate, limited liability corporations (LLCs) and a few are affiliated with or are corporate subsidiaries of IOUs. These LLCs develop the solar facilities, and in a few cases, transfer them to an IOU after they start operating. However, Session Law 2021-165 will result in much more solar capacity owned by DEC and DEP in the future.
- The NCUC issues certificates of public convenience and necessity (CPCN) under Rule R08-61 for proposed electricity generating facilities that are constructed and owned by IOUs, electric membership corporations, and municipal power suppliers.
- The NCUC issues CPCNs under Rule R08-63 for proposed electricity generating facilities that are considered a "merchant plant" as defined in R08-63(a)2. Merchant plants are developed by independent power producers.
- The NCUC also issues CPCNs under Rule R08-64 for anyone seeking the benefits of 16 U.S.C. 824a-3 or G.S. 62-156 as a qualifying co-generator or a qualifying small power producer as defined in 16 U.S.C. 796(17) and (18), or as a small power producer as defined in G.S. 62-3(27a), except persons exempt from certification by the provisions of G.S. 62-110.1(g). These facilities include those participating in the Competitive Procurement of Renewable Energy Program established in G.S. 62-110.8.
- The NCUC also has a reporting process under Rule R08-65 for renewable energy facilities under 2 MW that are not owned or operated by electric power suppliers. These facilities are often smaller residential or commercial rooftop or individual use projects.
- The NCUC's CPCN process is limited to its authority to regulate construction and interconnection to the power grid and ensuring that the facility is necessary and would not have a negative impact on North Carolina's power grid.
- The existing NCUC general statutes and administrative code do not regulate the decommissioning or financial assurance for solar facilities owned and operated by electric membership corporations, municipal electric suppliers, or independent power producers.

NC Environmental Management Commission and NC Department of Environmental Quality

- While SL 2019-132 (H329) directed the North Carolina Environmental Management Commission (EMC) to "adopt rules to establish a regulatory program to govern (i) the management of end-of-life photovoltaic modules and energy storage system batteries and (ii) decommissioning of utility-scale solar projects and wind energy facilities," the EMC's authority to adopt rules governing the pre-construction approval process of utility-scale solar projects in that Session Law is not clear, especially in comparison to the rulemaking authority and oversight of the NCUC.
- Hazardous waste regulations may apply to utility-scale solar facilities when wastes meeting the definition of hazardous waste are generated from facility operation, maintenance, and decommissioning. DEQ initiated the rulemaking process for a proposed amendment to hazardous waste rules in 15A NCAC 13A that will add solar panels as a universal waste.
- Non-hazardous solid waste regulations apply to non-hazardous waste once it has been removed from the site and is being sent to a permitted solid waste management facility intended for disposal.
- Recovered material regulations apply to non-hazardous materials once they have been removed from the site, and are being sent to a facility for recycling, reuse, or refurbishing.
- Sedimentation and erosion control permitting regulations apply during construction of facilities over one acre.

Table A-1: Summary of Existing NC State Regulations That May Apply to Utility-Scale Solar Facilities*

State Agency	State Laws	State Rules	Permit or Approval for Solar Facility	Applies To	Focus	When Do Regulations Apply?	Purpose
North Carolina Utilities Commission (NCUC)	- G.S. 62 - SL 2007-397 (HB3) - SL 2017-192 (HB589) - SL 2019-132 (HB329) - SL 2021-165 (HB951)	04 NCAC 11 R08-61 R08-63 R08-64 R08-65	Certificate of Public Convenience and Necessity (CPCN) or Registration, depending on facility size, owner/operator, and facility use.	Renewable Energy Facilities, including solar energy facilities	Process for ensuring the need for the power generation, and to facilitate the interconnection to the regional power grid for renewable energy, including solar energy	Prior to construction	To ensure that there is a public need for the facility and connection to the power grid is necessary, reliable, and will not have a negative impact on the grid
Rule Adoption:** NC Environmental Management Commission (EMC) **Administration and Enforcement**:** NC Department of Environmental Quality (DEQ)	G.S. 113A – Administered by the DEQ Division of Energy, Mineral, and Land Resources	15A NCAC 04 - Sedimentation and Erosion Control	Sedimentation and Erosion Control Permit - (permit program delegated to local govt. in 23 counties and 27 municipalities)	Any project disturbing more than 1 acre of land	Land Disturbing Activities	During initial construction of facility	To ensure minimization of erosion and negative impacts to surface water
	G.S. 130A Article 1 and Article 9 – Administered by the DEQ Division of Waste Management (solid waste administration shared with local governments)	15A NCAC 13A - Hazardous Waste (40 CFR 260 - 273 and 279 adopted by reference)	None (Enforcement actions are issued for non-compliance)	Wastes meeting the definition of hazardous waste from facility operation, maintenance, and decommissioning	Proper management and disposal/recycling of hazardous waste to prevent releases to the environment	Once material can no longer legitimately be used for its intended purpose or is abandoned and meets the definition of a hazardous waste	To ensure hazardous waste is properly managed and disposed/ recycled and not abandoned on-site
		15A NCAC 13B – Non-hazardous Solid Waste	None (Enforcement actions are issued for non-compliance)	Non-hazardous photovoltaic modules and non-hazardous components of solar panels (such as metal and glass)	Disposal of non-hazardous solid waste at permitted solid waste management facilities	After material is removed from the site and intended for disposal, and not recycling, refurbishment, or reuse. Recovered material is not a solid waste - see G.S. 130A-290(a)(35)(f) and G.S. 130A-309.05(c))	To ensure that solid waste is disposed of properly. Unused non-hazardous equipment left on the same site where it was used is not a solid waste.***

(*) This table is not intended to represent a comprehensive list of state regulations applicable to utility-scale solar facilities, but just provides some regulations for consideration in the development of any new regulations applicable to decommissioning and financial assurance at such facilities.

(**) Administration and oversight duties for most solid waste management requirements in Article 9 of Chapter 130A of the General Statutes lie with DEQ, and rulemaking authority lies with the EMC. However, where requirements exist for non-hazardous recycling and materials management (waste diverted from the solid waste stream), many of the administration and oversight duties lie with the local government, and rulemaking authority generally lies with DEQ. (see G.S. 130A-294(a)(3), (t), and (u)).

(***) G.S. 130A-294(b) states that rules adopted for solid waste management shall not apply to the management of solid waste that is generated by an individual on the individual's property and is disposed of on the individual's property. Such waste would need to be addressed under local government ordinance, if such an ordinance exists.

APPENDIX B

Summary of County-Level Decommissioning and
Financial Assurance Requirements

Summary of County-Level Decommissioning and Financial Assurance Requirements

North Carolina local governments have authority for the siting of utility-scale solar facilities. In general, local governments provide approval for zoning, planning and development, and/or special use permits. Any project that will disturb more than one acre is also required to obtain a sedimentation and erosion control permit. The authority to issue this permit lies either with DEQ, or with local governments to whom DEQ has delegated that authority[1].

Some North Carolina counties have ordinances in place for solar facilities that require either decommissioning or decommissioning with FA. Table B-1 below presents the number of counties with only decommissioning requirements, both decommissioning and FA requirements, and no requirements for decommissioning or FA. Since the SL 2019-132 (H329) final report[2] was submitted on January 1, 2021, four counties have adopted ordinances with solar decommissioning requirements and eight counties have adopted ordinances with solar decommissioning and FA requirements. This brings the current total of North Carolina counties with decommissioning or decommissioning and FA requirements to sixty (60). Twenty-one (21) counties do not have utility-scale solar facilities located in the county. However, two (2) of 21 counties without utility-scale solar facilities in the county have decommissioning requirements and one county has decommissioning and FA requirements established. Eighteen of the counties that do not have decommissioning or FA requirements also do not have any utility-scale solar facilities. This leaves 22 counties with utility-scale solar facilities located in counties with no decommissioning or FA requirements. Figure B-1, below, is a state map showing which counties have both decommissioning and FA requirements, which counties have only decommissioning requirements, and which counties do not have decommissioning or FA requirements.

With the solar industry rapidly expanding, efforts appear to have intensified on the county level to ensure solar facilities are not abandoned. An effort was made to summarize the current county requirements for decommissioning and FA both generally in this section and more specifically in Table B-2 below. Since the county requirements are continually evolving and dynamic, the information provided in this document is a survey of the county decommissioning and FA requirements conducted in January 2022 and should not be considered comprehensive. Certain aspects of the county's decommissioning/FA requirements, including the decommissioning requirements, the qualifying event and time period to decommission, the timing for submittal of the FA mechanism, and whether salvage value can offset the decommissioning cost are summarized below.

Decommissioning Requirements

Requirements for decommissioning described in the county ordinances vary from county to county. Some counties have a brief statement indicating a qualifying event that triggers decommissioning, a time-period required to complete decommissioning, and a specified condition in which to return the property. All but eight of the 28 total counties with decommissioning requirements require a decommissioning plan. The decommissioning plan requirements also vary in complexity. Most decommissioning requirements for the counties require compliance with specific performance activities, including removal of all solar facility equipment, site restoration, and reclamation (e.g., soil regrading, revegetation, reseeding, removal of access roads). Counties that have FA requirements will often include specifics on cost estimates in the decommissioning plan and require periodic review and resubmittal of the plan.

[1] DEQ currently delegated the authority to issue sedimentation and erosion control permits to 50 local governments (23 counties and 27 municipalities).

[2] Final Report on the Activities Conducted to Establish a Regulatory Program for the Management and Decommissioning of Renewable Energy Equipment

Qualifying Event and Time Period to Decommission

The most frequently used period of time among the counties with decommissioning/FA requirements denoting a qualifying event for decommissioning is 12 months of the solar facility not providing power to the grid, and the most commonly used time period required to complete decommissioning is 12 months.

Submittal of FA Mechanism

Most counties with decommissioning or decommissioning and FA requirements have these requirements tied to a permit or approval process (typically as a condition or term of the approval) for initial project development for the utility-scale solar facility. Most counties with decommissioning or decommissioning and FA requirements require the submission of a decommissioning plan and FA mechanism (when applicable) prior to project construction.

Salvage Value Offset

While most county ordinance does not address whether decommissioning costs may be offset by salvage value, six of the 32 counties with decommissioning and financial assurance requirements specifically exclude salvage value from offsetting the decommissioning cost and two counties specifically allow salvage value to offset decommissioning costs as long as the salvage value does not exceed the decommissioning cost. Three counties each provide a "formula" to determine the amount of FA that is required when factoring in the salvage value. Examples of this formula are as follows when calculating the amount of FA required:

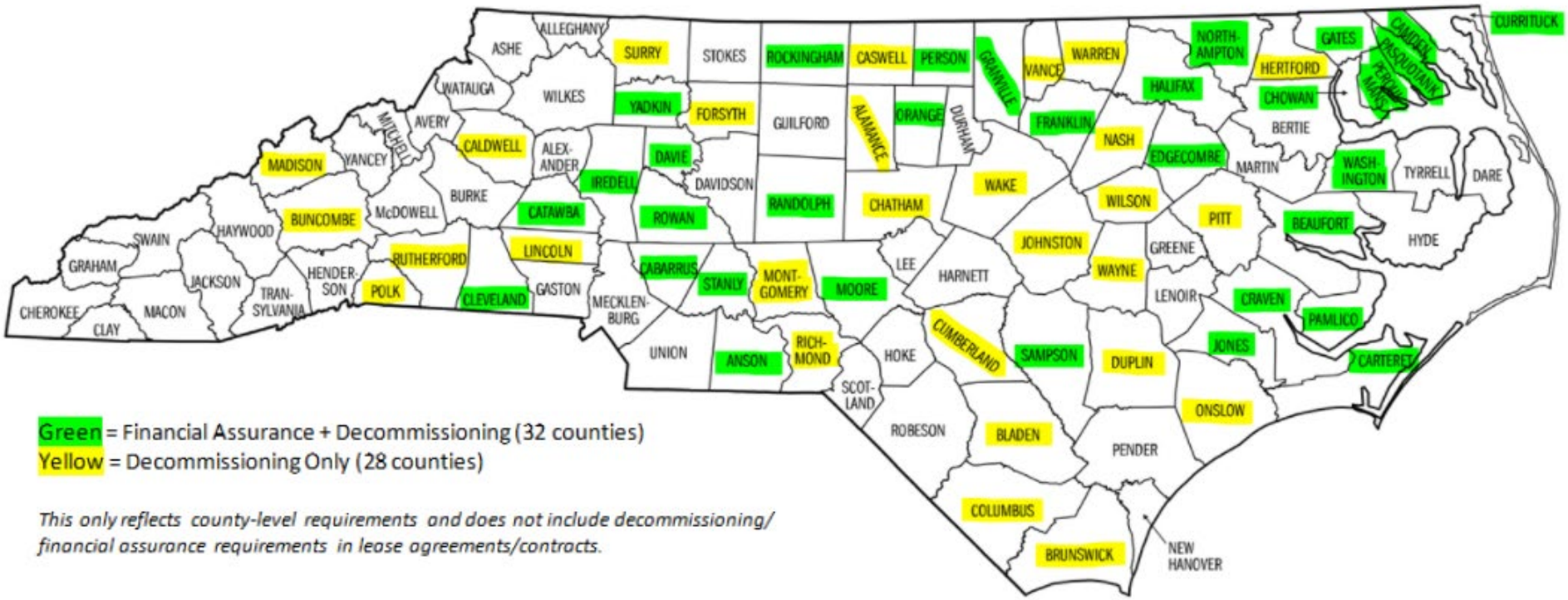
- 125% of the estimated net cost of decommissioning established within the approved decommissioning plan, or 25% of the estimated decommissioning cost excluding salvage value, whichever is greater.
- 1.25 times the estimated decommissioning cost minus the salvageable value.
- Estimated decommissioning cost minus 50% the salvageable value, or $75,000.00, whichever is greater.

Table B-1: Number of Counties in North Carolina with Decommissioning and FA Requirements

Requirement	Number of Counties
Decommissioning + FA	32
Decommissioning	28
No Decommissioning/FA	40*
Total	**100**

*18 of these counties have no utility-scale solar facilities in place.

Figure B-1: North Carolina Counties with Decommissioning/Financial Assurance Requirements



Green = Financial Assurance + Decommissioning (32 counties)
Yellow = Decommissioning Only (28 counties)

This only reflects county-level requirements and does not include decommissioning/ financial assurance requirements in lease agreements/contracts.

Table B-2: Summary of County-Level Decommissioning (DC) and Financial Assurance (FA) Requirements

County	Number of Utility-Scale Solar Facilities >1 MW	Sum of Calculated MW	Sum of Number of Solar Panels	DC Requirements	FA Requirements	Qualifying Event for DC	Timeframe to DC	Responsible Party	DC Plan Required	Allowable Forms of FA	FA Amount	Timing of FA Instrument Submittal	Timeframe for Review/Update of Cost Estimate/ DC Plan	Salvage Value Offset?	Cost Estimate/ DC Plan Prepared by Third Party Engineer?	Requirement Retroactive?	Link to County Ordinances (Linked to the Ordinance specific to solar when possible)
Alamance	7	28.2	144,969	Yes	No	The land lease ends, the system does not produce power for 12 months, or the system is damaged and will not be repaired or replaced	No more than 12 months	Owner of the Facility	Yes	N/A	N/A	N/A	Permit is reviewed every three years. Plan is a condition of the permit.	Not addressed	Not addressed	Any existing solar energy system (SES) in legal operation prior to ordinance is considered a non-conforming use.SESs in non-conforming use have one year to apply for a non-conforming permit and pay a non-conforming permit fee.	Alamance County Solar Energy System Ordinance
Alexander	3	11.2	99,564	No	No	N/A	N/A	N/A	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Alexander County Zoning Ordinance
Alleghany	0	0.0	0	No	No	N/A	N/A	N/A	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Alleghany County Ordinances
Anson	7	127.2	566,574	Yes	Yes	Out of service for more than 90 consecutive days	6-12 months	Person who owns, operates, or controls a solar energy facility (SEF) shall be strictly liable	Yes	A bond provided to the county, secured with sufficient surety as approved by the County Commissioners.	Not less than 15% of the assessed value of the real property occupied by the solar facility and the total cost of the SEF.	At time of permit application	Permit holder must notify the county within 30 days of any significant changes in identity of any person or structure of the business entity that holds the permit	Not addressed	Not specified	Not specified	Anson County Solar Energy Ordinance
Ashe	0	0.0	0	No	No	N/A	N/A	N/A	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Ashe County Ordinances
Avery	0	0.0	0	No	No	N/A	N/A	N/A	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Avery County Ordinances
Beaufort	10	142.5	736,463	Yes	Yes	Ceases to produce energy on a continuous basis for 12 months	Within 365 days of notice by the County Planner	Owners/operators	Yes	Cash, surety performance bond, irrevocable letter of credit, or other instrument readily convertible into cash at face value, either with the county or in escrow with a financial institution designated as an official depository of the county.	Equal to 125% of the entire cost of DC under the plan. Estimated DC costs including contingency costs of at least 25% (in current dollars).	Prior to issuance of permit	The Plan/FA must be reviewed every five years	Not addressed	DC plan and costs estimated by a state licensed engineer under seal, approved by the County Manager and County Attorney.	Applicability is prospective. The ordinance applies to all SEFs proposed or constructed after the ordinance effective date. Modifications to an existing SEF that increases the area by more than 20% of the original footprint or changes the solar panel type shall be subject to the county ordinance.	Beaufort County Ordinances
Bertie	5	40.0	182,727	No	No	N/A	N/A	N/A	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Bertie County Ordinances
Bladen	15	273.4	1,117,361	Yes	No	Cessation of operation	12 months	Plan signed by the party responsible for DC and the landowner	Yes	N/A	N/A	N/A	Not specified	N/A	N/A	Modifications to an existing solar energy system (SES) that increases the SES area by more than 5 percent of the original footprint or changes the solar panel type trigger requirements.	Bladen County Ordinances
Brunswick	3	11.1	54,813	Yes	No	No electricity is generated for a continuous period of 12 months	12 months	Land owner shall be held ultimately responsible	Yes	N/A	N/A	N/A	Updated upon change of ownership and re-recorded in the County's Registry of Deeds.	No	Estimated cost of removal prepared by a licensed engineer	Not specified	Brunswick County Ordinances
Buncombe	2	5.1	21,294	Yes	No	Non-operational for more than 365 consecutive days	Not specified	Not specified	Yes	N/A	N/A	N/A	Not specified	No	Not specified	No	Buncombe County Ordinances
Burke	3	11.9	59,380	No	No	N/A	N/A	N/A	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Burke County Ordinances
Cabarrus	4	89.2	445,875	Yes	Yes	Ceases to produce energy on a continuous basis for 12 months	12 months	Not specified	Yes	A performance bond	1.25 times the estimated cost of the removal of panels, inverters and any accessory equipment or structures	Prior to issuance of a zoning clearance permit	Every year cost estimate is revised for inflation.A revised bond shall be provided every 5th year that the solar project is in place.	Not addressed	Cost estimate certified by a North Carolina licensed engineer	Not specified	Cabarrus County Ordinances
Caldwell	1	1.1	5,575	Yes	No	The plan is to specify when DC period starts*	Not addressed	Plan signed by the party responsible for DC	Yes	N/A	N/A	Not specified	The DC plan is to describe when the plan will be updated.	Not addressed	Not specified	An solar energy system (SES) established prior to the effective date of this section shall remain exempt. Modifications to an existing SES that increases the SES area by more than 5% of the original footprint or changes the solar panel type (for example, photovoltaic to solar thermal) are not exempt.	Caldwell County Ordinances

Table B-2: Summary of County-Level Decommissioning (DC) and Financial Assurance (FA) Requirements

County	Number of Utility-Scale Solar Facilities >1 MW	Sum of Calculated MW	Sum of Number of Solar Panels	DC Requirements	FA Requirements	Qualifying Event for DC	Timeframe to DC	Responsible Party	DC Plan Required	Allowable Forms of FA	FA Amount	Timing of FA Instrument Submittal	Timeframe for Review/Update of Cost Estimate/ DC Plan	Salvage Value Offset?	Cost Estimate/ DC Plan Prepared by Third Party Engineer?	Requirement Retroactive?	Link to County Ordinances (Linked to the Ordinance specific to solar when possible)
Camden	3	15.0	68,619	Yes	Yes	When no electricity is generated for a continuous period of 12 months	12 months	The plan identifies the party currently responsible for DC	Yes	Bond, cash escrow deposit, or an irrevocable letter of credit issued by a Federally chartered bank with a branch office in northeastern North Carolina. Must be automatically renewable.	Equal to the estimated removal cost of the solar facility	Prior to approval of building permits	DC plan and estimated cost of removal shall be updated every 5 years or upon change of ownership and re-recorded in the County's Registry of Deeds.	Not addressed	Estimated cost of removal prepared by a third party engineer	Not specified	Camden County Ordinances
Carteret	0	0.0	0	Yes	Yes	Ceases to produce energy on a continuous basis for 6 months	Within 365 days of notice by the county	Not specified	Yes	A surety or performance bond that renews automatically or irrevocable letter of credit	1.25 times the estimated DC cost	Prior to the issuance of a development permit	Certified cost estimates must be renewed every five years and submitted to the Carteret County Planning Commission for approval.	Not addressed	Estimates for DC the site and salvage value shall be determined by a North Carolina licensed engineer.	Not specified	Carteret County Ordinances
Caswell	4	17.9	93,204	Yes	No	The plan is to specify when DC period starts*	The plan is to specify the timeframe for DC	The plan identifies the party currently responsible for DC	Yes	N/A	N/A	N/A	N/A	N/A	Not specified	N/A	Caswell County Ordinances
Catawba	13	106.5	391,460	Yes	Yes	Following a continuous 6 month period in which no electricity is generated	6 months	Permit holder	Yes	A surety or performance bond that renews automatically, a certified check, a no-contest irrevocable bank letter of credit from a banking corporation licensed to do business in the state.	For the first ten years of the solar facility's life, the amount of the guarantee shall be 1.25 times the estimated DC cost minus 50 percent the salvageable value, or $75,000.00, whichever is greater.	Prior to the issuance of a zoning compliance certificate	An updated DC plan providing DC costs and salvageable values is required at the ten-year mark and every five years thereafter.	Only 50% of salvage value may be offset	Estimates for DC the site and salvage value shall be determined by a North Carolina licensed engineer or a licensed contractor.	Not specified	Catawba County Ordinances
Chatham	10	37.9	251,766	Yes	No	When the facility is no longer being maintained in an operable state of good repair or no longer supplying solar power.	180 days	Owner	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Chatham County Ordinances
Cherokee	3	3.0	15,204	No	No	N/A	N/A	N/A	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Cherokee County Ordinances
Chowan	3	15.0	74,014	Yes	Yes	When no electricity is generated for a continuous 12-month period	6 months	Solar Energy Facility owner	Yes	Automatically renewable bond or cash escrow deposit, in favor of the County, which shall be drawn and paid in full in immediately available funds.	Shall equal 115 percent of the estimated DC costs.	Submitted prior to issuance of a building permit.	The DC plan and cost estimate shall be reviewed/ updated every 3 years or upon change of ownership of the property/solar facility. Cost estimate is adjusted based upon current costs. In the even the DC costs decrease, the performance guarantee shall not be changed to reflect the lower cost.	Cost estimate shall not be reduced by salvage value	A DC plan, certified by a North Carolina licensed professional engineer	Not specified	Chowan County Ordinances
Clay	0	0.0	0	No	No	N/A	N/A	N/A	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Clay County Ordinances
Cleveland	21	81.3	370,968	Yes	Yes	After commercial power production ceases for a period of 12 continuous months	6 months	Landowner	Yes	Surety bond naming Cleveland County as beneficiary	125% of the estimated net cost of DC established within the approved DC plan, or 25% of the estimated DC cost excluding salvage value, whichever is greater.	Prior to the issuance of any building permits or electrical permits	The DC plan and surety bond must be renewed, signed, and notarized by the facility owner/operator and the land owner every 5 years from the time the permit is issued, or upon any change of the solar facility ownership or land ownership and should account for inflation, deflation, and depreciation.	When FA amount is 25% of estimated DC cost, salvage value is excluded	A DC plan and cost estimate shall be signed and sealed by a professional engineer licensed pursuant to GS § 89C	Not specified	Cleveland County Ordinances
Columbus	13	60.0	370,968	Yes	No	Determination by the Planning Department that the facility is no longer being maintained in an operable state of good repair or is no longer supplying solar power.	180 days	Property owner/solar farm owner	No	N/A	N/A	N/A	Not specified	Not addressed	Not specified	Not specified	Columbus County Ordinances

Table B-2: Summary of County-Level Decommissioning (DC) and Financial Assurance (FA) Requirements

County	Number of Utility-Scale Solar Facilities >1 MW	Sum of Calculated MW	Sum of Number of Solar Panels	DC Requirements	FA Requirements	Qualifying Event for DC	Timeframe to DC	Responsible Party	DC Plan Required	Allowable Forms of FA	FA Amount	Timing of FA Instrument Submittal	Timeframe for Review/Update of Cost Estimate/ DC Plan	Salvage Value Offset?	Cost Estimate/ DC Plan Prepared by Third Party Engineer?	Requirement Retroactive?	Link to County Ordinances (Linked to the Ordinance specific to solar when possible)
Craven	6	29.0	145,070	Yes	Yes	Ceases to produce energy on a continuous basis for 12 months	360 days of notice by the county	The plan identifies the party currently responsible for DC	Yes	Cash, a surety performance bond, irrevocable letter of credit or other instrument readily convertible into cash at face value, either with the county or in escrow with a financial institution designated as an official depository of the county.	A form of surety equal to 125 percent of the entire cost of decommission under the plan. Surety required hereunder shall be a minimum of $50,000.00.		The cost calculation for DC shall be reviewed annually.	Not addressed	Cost estimated by a North Carolina licensed engineer under seal, and approved by the county planning director and county attorney.	Not specified	Craven County Ordinances
Cumberland	13	130.8	569,548	Yes	No	When power production ceases for a period of 6 months	9 months	Owner	No	N/A	N/A	N/A	Not specified	Not addressed	Not specified	Not specified	Cumberland County Ordinances
Currituck	4	162.4	733,112	Yes	Yes	When no electricity is generated for a continuous 12 month period	12 months	Yes	Yes	Cash deposit with the county; Cashier's check from a North Carolina lender in a form acceptable to the County Attorney; Irrevocable letter of credit; surety bond issued by any company authorized to do business in North Carolina in a form acceptable to the County Attorney.	Shall equal 115% of the estimated DC costs.	Submitted prior to issuance of a building permit.	The DC plan shall be updated with the Development Services Department every three years or upon change of property or SEF ownership, beyond two degrees of kinship.	FA shall not be reduced by salvage value	A DC plan certified by a North Carolina licensed engineer or a licensed contractor is required and shall include the following:	Not specified	Currituck County Ordinances
Dare	0	0.0	0	No	No	N/A	N/A	N/A	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Dare County Ordinances
Davidson	0	0.0	0	No	No	N/A	N/A	N/A	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Davidson County Ordinances
Davie	4	30.4	149,921	Yes	Yes	No electricity is generated for a continuous period of 12 months. The land owner or tenant must notify the County when the site is abandoned.	12 months	Solar farm owners	Yes	A surety or performance bond, a certified check deposited with the county finance director, as escrow agent, who will deposit the check in an interest-bearing account of the County, with all interest accruing to the applicant; a no-contest irrevocable bank letter of credit from a banking corporation licensed to do business in the State of North Carolina.	1.25 times the estimated DC cost minus the salvageable value.	Not specified	Not specified	The amount of the guarantee shall be 1.25 times the estimated DC cost minus the salvageable value.	Yes	No	Davie County Ordinances
Duplin	33	180.0	872,733	Yes	No	Cessation of operations	Remove all obsolete or unused systems within 12 months of cessation of operations	Parcel owner	No	N/A	N/A	N/A	Not specified	Not addressed	Not specified	No	Duplin County Ordinances
Durham	4	16.5	80,476	No	No	N/A	N/A	N/A	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Durham County Ordinances
Edgecombe	9	206.9	992,906	Yes	Yes	Ceases to produce any energy on a continuous basis for 12 months	120 days	DC plan identifies party responsible for DC	Yes	Bond or letter of credit	Equal to the estimated removal cost of the solar collectors, cabling, electrical components, and any other associated facilities, less the salvage value of the equipment prior to dismantling, unless it can be shown the salvage value will exceed the estimated removal cost.	Not specified	Not specified	FA is equal to DC cost, less the salvage value of the equipment prior to dismantling, unless it can be shown the salvage value will exceed the estimated removal cost.	Not specified	Not specified	Edgecombe County Ordinances
Forsyth	2	6.7	30,329	Yes	No	When Solar Farm is taken out of service	12 months	N/A	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Forsyth County Ordinances

Table B-2: Summary of County-Level Decommissioning (DC) and Financial Assurance (FA) Requirements

County	Number of Utility-Scale Solar Facilities >1 MW	Sum of Calculated MW	Sum of Number of Solar Panels	DC Requirements	FA Requirements	Qualifying Event for DC	Timeframe to DC	Responsible Party	DC Plan Required	Allowable Forms of FA	FA Amount	Timing of FA Instrument Submittal	Timeframe for Review/Update of Cost Estimate/ DC Plan	Salvage Value Offset?	Cost Estimate/ DC Plan Prepared by Third Party Engineer?	Requirement Retroactive?	Link to County Ordinances (Linked to the Ordinance specific to solar when possible)
Franklin	10	86.9	367,697	Yes	Yes	Operations ceasing or of a determination by the Administrator that the facility is no longer being maintained in an operable state of good repair or is in violation of ordinance.	180 days	Owner	No	The owner of record shall obtain a performance guarantee pursuant to NC G.S. § 160D-804(g).The financial assurance must not expire.	125% of the cost to remove the material and return the site to its original condition.	Not specified	Not specified	Salvage value will not be considered to offset the removal cost	Not specified	Not specified	Franklin County Ordinances
Gaston	5	40.3	199,688	No	No	N/A	N/A	N/A	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Gaston County Ordinances
Gates	3	15.0	65,952	Yes	Yes	After a six month period in which no electricity is generated. Or any additional conditions which may be defined or established by the Planning Dept. which DC will be initiated (i.e., end of lease, condition of a potential public safety hazard, etc.)	6 months	Permit holder	Yes	A surety or performance bond that renews automatically, A certified check deposited with the county	1.25 times the estimated DC cost, or $50,000, whichever is greater.	Not specified	Annual review of the cost estimate adjusted for inflation	The guarantee shall not be reduced by the salvage value.	Plan and cost estimate are prepared by a North Carolina licensed engineer or a licensed contractor	Not specified	Gates County Ordinances
Graham	0	0.0	0	No	No	N/A	N/A	N/A	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Graham County Ordinances
Granville	7	32.7	185,702	Yes	Yes	Following a continuous period of six months in which no electricity is generated	Six months	The owner of the solar farm, or in the solar farm owner's absence, the owner of the real property	No	The performance guaranty must be satisfactory to the county manager and may include a performance bond, irrevocable letter of credit, cash deposit or other surety approved by the county manager.	Equal to 1.25 times the estimated DC cost	Prior to issuance of zoning compliance certificate	Not specified	Not specified	DC cost as determined by a North Carolina licensed engineer.	Not specified	Granville County Ordinances
Greene	4	13.9	61,058	No	No	N/A	N/A	N/A	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Greene County Ordinances
Guilford	7	25.7	101,870	No	No	N/A	N/A	N/A	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Guilford County Ordinances
Halifax	12	203.9	981,424	Yes	Yes	When no energy is generated for a continuous period of 12 months	12 months	Plan identifies the responsible party. The landowner shall be ultimately responsible for proper DC if the responsible party fails to decommission.	Yes	Bond, cash escrow, or irrevocable letter of credit in favor of the county	Equal to 1.25 times the professionally estimated DC cost	Prior to the issuance of the conditional use permit.	The DC plan and estimated cost of removal shall be updated every five years or upon change of land ownership or solar energy system ownership. All updates to the plan shall be recorded in the county register of deeds office.	Not specified	The DC plan shall be prepared by a third party engineer not associated with the engineer or engineering firm that prepared or sealed the site plan.	Not specified	Halifax County Ordinances
Harnett	11	46.7	234,575	No	No	N/A	N/A	N/A	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Harnett County Ordinances
Haywood	2	2.5	11,593	No	No	N/A	N/A	N/A	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Haywood County Ordinances
Henderson	2	4.0	16,676	No	No	N/A	N/A	N/A	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Henderson County Ordinances
Hertford	18	176.5	797,350	Yes	No	Ceases to produce energy on a continuous basis for 6 months	6 months	System owner and if system owner fails, then property owner	Yes	Estimated DC cost in current dollars, the method for ensuring funds will be available for DC and restoration	Not specified	Not specified	Not specified	Not specified	Not specified	Not specified	Hertford County Ordinances
Hoke	3	14.8	66,806	No	No	N/A	N/A	N/A	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Hoke County Ordinances
Hyde	0	0.0	0	No	No	N/A	N/A	N/A	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Hyde County Ordinances
Iredell	2	6.4	30,095	Yes	Yes	When no electricity is generated for a continuous period of 12 months	6 months	Plan identifies party currently responsible for DC. Owner is responsible when responsible party fails.	Yes	Bond, certified check, or irrevocable letter of credit	Amount equal to 1.25 times the estimated DC cost	Prior to the issuance of a zoning permit	The DC plan and estimated cost of removal shall be updated every 5 years or upon change of ownership of either the property or the Iredell County Land Development Code 3-54 project's owner. Any changes or updates to the plan shall be recorded in the County's Register of Deeds.	Not specified	Plan and cost estimate prepared by a third party engineer and must be signed off by the party responsible for DC.	N/A	Iredell County Ordinances

Table B-2: Summary of County-Level Decommissioning (DC) and Financial Assurance (FA) Requirements

County	Number of Utility-Scale Solar Facilities >1 MW	Sum of Calculated MW	Sum of Number of Solar Panels	DC Requirements	FA Requirements	Qualifying Event for DC	Timeframe to DC	Responsible Party	DC Plan Required	Allowable Forms of FA	FA Amount	Timing of FA Instrument Submittal	Timeframe for Review/Update of Cost Estimate/ DC Plan	Salvage Value Offset?	Cost Estimate/ DC Plan Prepared by Third Party Engineer?	Requirement Retroactive?	Link to County Ordinances (Linked to the Ordinance specific to solar when possible)
Jackson	0	0.0	0	No	No	N/A	N/A	N/A	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Jackson County Ordinances
Johnston	26	94.2	482,128	Yes	No	Determination by the Zoning Administrator that the facility is no longer being operated, maintained, or used in an operable state of repair.	180 days	Not specified	No	N/A	N/A	N/A	Not specified	Not specified	Not specified	Not specified	Johnston County Ordinances
Jones	7	34.8	196,278	Yes	Yes	Ceases to produce energy on a continuous basis for 12 months	Within 360 days of notice by the Chief Building Inspector	The plan identifies the party currently responsible for DC	Yes	Cash, a surety performance bond, irrevocable letter of credit or other instrument readily convertible into cash at face value, either with the County or in escrow with a financial institution designated as an official depository of the County.	A form of surety equal to 125% of the entire cost of decommission under the plan	Not specified	Cost calculation shall be reviewed annually, and adjusted accordingly	Not specified	Plan and cost estimate are estimated by a North Carolina licensed engineer under seal, and approved by the County Chief Building Inspector and County Attorney,	Not specified	Jones County Ordinances
Lee	8	36.8	163,752	No	No	N/A	N/A	N/A	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Lee County Ordinances
Lenoir	14	156.0	453,402	No	No	N/A	N/A	N/A	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Lenoir County Ordinances
Lincoln	2	10.0	45,722	Yes	No	Ceases to produce energy on a continuous basis for 12 months	12 months	Property owner and other responsible party	Yes	N/A	N/A	N/A	Not specified	Not specified	Not specified	Not specified	Lincoln County Ordinances
Macon	0	0.0	0	No	No	N/A	N/A	N/A	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Macon County Ordinances
Madison	0	0.0	0	Yes	No	After no electricity is generated for a continuous period of 12 months	6 months	Solar Energy Facility owner	No	N/A	N/A	Not specified	Not specified	Not specified	Not specified	Not specified	Madison County Ordinances
Martin	15	102.0	531,016	No	No	N/A	N/A	N/A	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Martin County Ordinances
McDowell	0	0.0	0	No	No	N/A	N/A	N/A	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	McDowell County Ordinances
Mecklenburg	1	1.9	9,629	No	No	N/A	N/A	N/A	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Mecklenburg County Ordinances
Mitchell	0	0.0	0	No	No	N/A	N/A	N/A	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Mitchell County Ordinances
Montgomery	7	46.9	296,101	Yes	No	The land lease ends, the system does not produce power for 12 months, or the system is damaged and will not be repaired or replaced.	12 months	The owner of the Facility	Yes	N/A	N/A	N/A	This Plan may be modified from time to time and a copy of any modified plans will be provided to the planning staff and filed with the Register of Deeds by the party responsible for DC. Also updated when change of owner.	Not addressed	Not specified	Not specified	Montgomery County Ordinances
Moore	9	39.2	180,943	Yes	Yes	Following a continuous six month period in which no electricity is generated. The land owner or tenant must notify the county the site is abandoned.	6 months	Permit holder	Yes	A surety or performance bond, a certified check deposited; a no-contest irrevocable bank letter of credit from a banking corporation licensed to do business in the State of North Carolina.	The amount of the guarantee shall be 1.25 times the estimated DC cost minus the salvageable value, or $50,000.00, whichever is greater.	Prior to the issuance of a zoning compliance certificate	Not specified	Cost estimate may not be reduced by the salvage value	Estimates for DC the site and salvage value shall be determined by a North Carolina licensed engineer or a licensed contractor	Not specified	Moore County Ordinances
Nash	27	188.8	1,099,857	Yes	No	Determination by the Zoning Administrator that the facility is no longer being maintained in an operable state of good repair.	180 days	Owner	No	Not specified	Not specified	Not specified	Not specified	Not specified	Not specified	Not specified	Nash County Ordinances
New Hanover	2	2.8	13,102	No	No	N/A	N/A	N/A	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	New Hanover County Ordinances

Table B-2: Summary of County-Level Decommissioning (DC) and Financial Assurance (FA) Requirements

County	Number of Utility-Scale Solar Facilities >1 MW	Sum of Calculated MW	Sum of Number of Solar Panels	DC Requirements	FA Requirements	Qualifying Event for DC	Timeframe to DC	Responsible Party	DC Plan Required	Allowable Forms of FA	FA Amount	Timing of FA Instrument Submittal	Timeframe for Review/Update of Cost Estimate/ DC Plan	Salvage Value Offset?	Cost Estimate/ DC Plan Prepared by Third Party Engineer?	Requirement Retroactive?	Link to County Ordinances (Linked to the Ordinance specific to solar when possible)
Northampton	15	222.8	1,620,451	Yes	Yes	Following a continuous 6 month period in which no electricity is generated and transferred to the grid.	Permit holder will have 6 months to complete DC of the solar farm unless the site is damaged due to natural causes, in which the operator will have twelve (12) months to get the solar power generation facility back on-line.	Not specified	Yes	A surety or performance bond that renews automatically; or a certified check deposited with the county finance director, as escrow agent, who will deposit the check in an interest-bearing account for the County; a no-contest irrevocable bank letter of credit from a banking corporation licensed to do business in the State of North Carolina	The amount of the guarantee shall be 1.25 times the estimated DC cost minus the salvageable value, or $50,000, whichever is greater.	Not specified	The bond must be renewed annually.	Not addressed	Estimates for DC the site and salvage value shall be determined by a North Carolina licensed engineer or a licensed contractor.	Not specified	Northampton County Ordinances
Onslow	3	16.8	164,500	Yes	No	Plan describes when DC will be initiated (e.g. end of land lease, no power production for 12 months)	Must not exceed 18 months	Plan identifies responsible party	Yes	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Onslow County Ordinances
Orange	4	15.0	88,602	Yes	Yes	Noticed provided to county 60 days after cessation/ abandonment	12 months	Owner/operator	No	The owner shall provide financial security in form and amount acceptable to the County to secure the expense of dismantling and removing said structures.	The owner shall provide financial security in form and amount acceptable to the County to secure the expense of dismantling and removing said structures.	Not specified	Not specified	Not addressed	Not specified	Not specified	Orange County Ordinances
Pamlico	1	5.0	21,257	Yes	Yes	Ceases to produce energy on a continuous basis for 12 months	360 days	Parcel owner	Yes	Cash, surety performance bond, irrevocable letter of credit, or other instrument readily convertible into cash at face value, either with the county or in escrow with a financial institution designated as an official depository of the county.	125% of the entire cost of decommission under the plan	Prior to issuance of the development permit	Surety reviewed annually and adjusted for inflation	Not addressed	Cost estimate by a NC licensed engineer under seal and approved by the County	Not specified	Pamlico County Ordinances
Pasquotank	3	43.1	186,761	Yes	Yes	No electricity generated for a continuous 12 months	12 months	Owner of solar farm	Yes	Bond, cash, escrow, irrevocable letter of credit in favor of the County	1.25 times the estimated DC costs	Required with permit application	Plan and cost estimate shall be updated every 5 years and upon change of property/project ownership	Not addressed	Plan prepared by a third-party engineer	Not specified	Pasquotank County Ordinances
Pender	8	132.3	685,521	No	No	N/A	N/A	N/A	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Pender County Ordinances
Perquimans	8	51.2	233,595	Yes	Yes	Following six months of no electricity generation	6 months	Permit holder	No	Cash bond equal to this amount will be required to be held by Perquimans County until project DC.	Cash bond equal to this amount will be required to be held by Perquimans County until project DC.	Permit application	Cost estimate update every 5 years	Salvage value is not included in cost estimate	Not specified	Not specified	Perquimans County Ordinances
Person	7	22.5	114,344	Yes	Yes	Ceases to produce energy on a continuous basis for 12 months	Not to exceed 12 months	Solar energy system developer or property owner	Yes	Performance bond, irrevocable letter of credit, cash deposit or other surety approved by the Planning Director and County Attorney	Equal to 1.25 times the estimated DC cost. Contingency cost of at least 25%is included in DC cost.	At time of permit application	Not specified	Not specified	Cost estimate determined by a NC licensed engineer	Not specified	Person County Ordinances
Pitt	7	31.9	428,996	Yes	No	When not operated for a continuous period of 365 days	Within 90 days after notice from the County	Owner or if can't locate owner, the landowner on whose property the structure or equipment is located	Yes	N/A	N/A	N/A	Not specified	Not specified	Not Specified	Not specified	Pitt County Ordinances
Polk	0	0.0	0	Yes	No	When the facilities are no longer utilized for energy generation for a period of 6 months or longer	Not specified	Property Owner	No	N/A	N/A	N/A	Not specified	Not specified	Not Specified	Not specified	Polk County Ordinances

Table B-2: Summary of County-Level Decommissioning (DC) and Financial Assurance (FA) Requirements

County	Number of Utility-Scale Solar Facilities >1 MW	Sum of Calculated MW	Sum of Number of Solar Panels	DC Requirements	FA Requirements	Qualifying Event for DC	Timeframe to DC	Responsible Party	DC Plan Required	Allowable Forms of FA	FA Amount	Timing of FA Instrument Submittal	Timeframe for Review/Update of Cost Estimate/ DC Plan	Salvage Value Offset?	Cost Estimate/ DC Plan Prepared by Third Party Engineer?	Requirement Retroactive?	Link to County Ordinances (Linked to the Ordinance specific to solar when possible)
Randolph	12	46.9	319,830	Yes	Yes	Plan defines conditions upon which DC will be initiated*	Not specified	Not specified	Yes	Cash, a surety performance bond, irrevocable letter of credit or other instruments readily convertible into cash at face value, either with the County or in escrow with a financial institution designated as an official depository of the County.	100% of the cost of DC under the plan	Not specified	Not specified	Not specified	Cost estimated by a North Carolina licensed engineer under seal	Not specified	Randolph County Ordinances
Richmond	7	74.6	326,344	Yes	No	The Solar Collector Facility Owner is required to notify Richmond County immediately in writing upon abandonment or cessation of the solar operation.	6 months	The Solar Collector Facility Owner	Yes	N/A	N/A	N/A	Not specified	Not specified	Not Specified	Not specified	Richmond County Ordinances
Robeson	41	209.0	1,009,546	No	No	N/A	N/A	N/A	No	N/A	N/A	N/A	N/A	Not specified	Not Specified	Not specified	Robeson County Ordinances
Rockingham	6	29.9	141,932	Yes	Yes	Following a continuous 6 month period in which no electricity is generated. The landowner or tenant must notify the county when the site is abandoned.	6 months	Permit holder	Yes	A surety or performance bond; a certified check deposited with the county finance director, as escrow agent; a no-contest irrevocable bank letter of credit from a banking corporation licensed to do business in the state.	For the first ten years of the solar facility's life, the amount of the guarantee shall be 1.25 times the estimated DC cost minus 50 % the salvageable value, or $75,000.00, whichever is greater.	Not specified	An updated DC plan providing DC costs and salvageable values is required at the ten-year mark and every five years thereafter.	Estimated DC cost minus 50% the salvageable value, or $75,000.00, whichever is greater.	Prepared by North Carolina licensed engineer or a licensed contractor.	Not specified	Rockingham County Ordinances
Rowan	11	46.3	205,386	Yes	Yes	Does not produce energy for 360 day continuous basis	Not specified	Not specified	Yes	Not specified	1.25 times the mutually agreed cost estimate amount, which will remain in effect for the first 10 years of operation.	Not specified	An updated DC plan detailing costs shall be submitted to the planning department at least six (6) months prior to the ten-year anniversary of installation and six (6) months prior to every five (5) year anniversary thereafter. The system owner shall provide an analysis of the power produced annually by the facility; an operational efficiency and status report of the panels and equipment; and any intended upgrades or replacements of panels, equipment, etc.	Not addressed	Plan that includes a cost estimate prepared by a North Carolina Professional Engineer having professional credentials, recognized expertise or specialization in construction and removal of similar facilities detailing how the solar energy system	Not specified	Rowan County Ordinances
Rutherford	9	118.6	501,271	Yes	No	Plan defines conditions upon which DC will be initiated*	Specified in the DC plan	Responsible party indicated in the Plan	Yes	N/A	N/A	N/A	Not specified	Not addressed	Not specified	Not specified	Rutherford County Ordinances
Sampson	11	42.2	265,194	Yes	Yes	When no electricity is generated for a continuous period of 12 months.	12 months	Owner of Solar Farm	Yes	Bond, cash escrow, or irrevocable letter of credit	In an amount equal to 1.25 times the estimated DC cost.	Issuance of the Special Use Permit	The DC plan and estimated cost of removal shall be updated every ten (10) years or upon change of ownership of either the property or the project's owner. Any changes or updates to the plan shall be recorded with the County's Register of Deeds.	Not specified	Not specified	Not specified	Sampson County Ordinances
Scotland	13	133.6	773,796	No	No	N/A	N/A	N/A	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Scotland County Ordinances

Table B-2: Summary of County-Level Decommissioning (DC) and Financial Assurance (FA) Requirements

County	Number of Utility-Scale Solar Facilities >1 MW	Sum of Calculated MW	Sum of Number of Solar Panels	DC Requirements	FA Requirements	Qualifying Event for DC	Timeframe to DC	Responsible Party	DC Plan Required	Allowable Forms of FA	FA Amount	Timing of FA Instrument Submittal	Timeframe for Review/Update of Cost Estimate/ DC Plan	Salvage Value Offset?	Cost Estimate/ DC Plan Prepared by Third Party Engineer?	Requirement Retroactive?	Link to County Ordinances (Linked to the Ordinance specific to solar when possible)
Stanly	2	10.0	49,000	Yes	Yes	When the facility does not generate electricity for 12 consecutive months	12 months	Not specified	Yes	Certified funds, cash escrow, bond from a financial institution acceptable to the County, or irrevocable letter of credit.	At least equal to the greater of (1) $106,000 per installed (nameplate) MW or (2) one hundred fifty percent (150%) of the estimated cost of DC the major SEPGS as prepared by a professional third-party engineer licensed in North Carolina with experience in preparing DC estimates. Such estimated cost shall equal the total projected cost of DC plus at least a ten percent (10%) allowance for estimated administrative costs related to a default of the major SEPGS owner and at least a three percent (3%) annual inflation factor.	Not specified	Five (5) years after the major SEPGS is activated and every fifth (5th) year interval thereafter, or upon change of ownership of either the property or the major SEPGS, a review of the DC plan and a cost analysis shall be updated by a North Carolina licensed engineer in accordance with the procedure provided in Section 618.5, B., 18. above and the amount of the financial assurance held by the County shall be adjusted to the greater of (1) the inflation adjusted value of $106,000 per installed (nameplate) MW or (2) 150% of the updated cost of DC . Any changes or updates to the DC plan shall be recorded with the Stanly County Registry of Deeds.	This engineer shall be selected by Stanly County, and the cost of creating the DC analysis shall be reimbursed to the County by the major SEPGS owner.	A DC plan shall be prepared by a North Carolina licensed third party professional engineer and shall include terms/provisions that state or include the following minimum requirements: Upon completion of DC and reclamation activities the site shall be inspected by a third-party professional engineer licensed in North Carolina with experience in the DC of SEPGS sites. This engineer shall be selected by Stanly County, and the cost of creating the DC analysis shall be reimbursed to the County by the major SEPGS owner.	Not specified	Stanley County Ordinances
Stokes	2	8.9	46,613	No	No	N/A	N/A	N/A	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Stokes County Ordinances
Surry	3	7.7	39,032	Yes	No	Plan defines conditions upon which DC will be initiated*	Not specified	DC plan identifies responsible party	Yes	N/A	N/A	N/A	Not specified	Not specified	Not specified	Not specified	Surry County Ordinances
Swain	0	0.0	0	No	No	N/A	N/A	N/A	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Swain County Ordinances
Transylvania	0	0.0	0	No	No	N/A	N/A	N/A	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Transylvania County Ordinances
Tyrell	0	0.0	0	No	No	N/A	N/A	N/A	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Tyrell County Ordinances
Union	5	74.9	397,678	No	No	N/A	N/A	N/A	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Union County Ordinances
Vance	13	107.8	587,332	Yes	No	Plan defines conditions upon which DC will be initiated*	12 months	Solar system owner and landowner	Yes	N/A	N/A	N/A	Not specified	Not specified	Not specified	Not specified	Vance County Ordinances
Wake	9	30.6	125,582	Yes	No	Plan defines conditions upon which DC will be initiated*	Plan specifies the timeframe for completion of DC activities	Not specified	Yes	N/A	N/A	N/A	Not specified	Not specified	Not specified	Not specified	Wake County Ordinances
Warren	9	54.4	268,436	Yes	No	12 months	12 months	Applicant or in the event of bankruptcy or similar financial default of the solar farm, the property owner of the project site shall bear the DC costs.	Yes	N/A	N/A	N/A	Not specified	Not specified	Not specified	Not specified	Warren County Ordinances
Washington	3	99.0	498,100	Yes	Yes	Not specified	60 to 180 days unless otherwise extended by Washington County within its sole discretion for good cause shown.	Plan identifies responsible party	Yes	The terms and/or amounts of any proposed surety or performance bond, or certified funds which an applicant proposes to provide in satisfaction of the following paragraph.	The required bond amount is established in the Plan of Development for the site, which includes a commissioning and site reclamation plan, and must be approved. The minimum bond amount SHALL $10,000 per acre of land disturbance.	Not specified	Not specified	Not specified	Not specified	Not specified	Washington County Ordinances
Watauga	0	0.0	0	No	No	N/A	N/A	N/A	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Watauga County Ordinances

Table B-2: Summary of County-Level Decommissioning (DC) and Financial Assurance (FA) Requirements

County	Number of Utility-Scale Solar Facilities >1 MW	Sum of Calculated MW	Sum of Number of Solar Panels	DC Requirements	FA Requirements	Qualifying Event for DC	Timeframe to DC	Responsible Party	DC Plan Required	Allowable Forms of FA	FA Amount	Timing of FA Instrument Submittal	Timeframe for Review/Update of Cost Estimate/ DC Plan	Salvage Value Offset?	Cost Estimate/ DC Plan Prepared by Third Party Engineer?	Requirement Retroactive?	Link to County Ordinances (Linked to the Ordinance specific to solar when possible)
Wayne	23	99.8	551,943	Yes	No	Ceases to produce energy on a continuous basis for 12 months	360 days of notice by the Planning Director or his designee.	If the responsible party (or parties) fails to comply, the Planning Director or his designee may remove the SEF, sell any removed materials, and initiate judicial proceedings or take any other steps legally authorized against the responsible parties to recover the costs required to remove the SEF and restore the site to a nonhazardous pre-development condition.	Yes	N/A	N/A	N/A	Not specified	Not specified	Not specified	Not specified	Wayne County Ordinances
Wilkes	0	0.0	0	No	No	N/A	N/A	N/A	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Wilkes County Ordinances
Wilson	13	128.4	866,490	Yes	No	Cessation of operation	180 days	The system owner and the owner of the land on which the solar facilities are located shall be responsible and liable, jointly and severally	No	N/A	N/A	N/A	Not specified	Not specified	Not specified	Not specified	Wilson County Ordinances
Yadkin	4	13.5	91,804	Yes	Yes	Cases to produce energy on a continuous basis for 12 months	Not to exceed one year	DC plan identifies responsible party	Yes	Cash, a surety performance bond, irrevocable letter of credit, or other instrument readily convertible to cash at face value, either with the County or in escrow with a financial institution designated as an official depository of the County.	Equal to 125% of the entire cost of Dcunder the plan, as estimated by a NC licensed engineer under seal, approved by the County Manager and County Attorney.	Prior to the issuance of a solar energy facility building permit	The DC plan shall be updated every five years and recorded with the register of deeds.	Not specified	Estimated DC costs including contingency costs of at least 25% (in current dollars) as provided by an appropriately experienced NC licensed engineer under seal.	Not specified	Yadkin County Ordinances
Yancey	0	0.0	0	No	No	N/A	N/A	N/A	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Yancey County Ordinances

(*) The plan is to specify when DC period starts however, the example used no power production for 12 months or end of lease.

APPENDIX C

Summary of Decommissioning and
Financial Assurance Requirements in Other States

Summary of Decommissioning and Financial Assurance Requirements in Other States

The National Renewable Energy Laboratory (NREL) technical report "A Survey of Federal and State-Level Solar System Decommissioning Policies in the United States" published December 2021[3] provides a comprehensive overview of state's financial assurance programs for solar panel decommissioning. According to the NREL report, 10 states (California, Hawaii, Illinois, Louisiana, Minnesota, Montana, New Hampshire, North Dakota, Vermont, and Virginia) have legislation and/or state rules pertaining to financial assurance for solar facility decommissioning. Table C-1 below provides a summary of the states that currently have requirements for FA for decommissioning solar facilities.

In addition to the 10 states summarized in the NREL report, three additional states (West Virginia, Texas, and Maine) have enacted legislation requiring financial assurance for decommissioning solar facilities since the NREL report was compiled. The landscape of requirements for decommissioning solar facilities is rapidly evolving, and the requirements for other states described in this document is a snapshot in time and not meant to be an all-inclusive reporting.

The requirements mandated in the state legislation vary widely from state to state. Each state has structured their financial assurance program differently as far as the level of program oversight, the oversight authority, the timing for submittal of the FA instrument, and whether salvage value can offset the decommissioning cost.

Some states (Louisiana, Maine, Minnesota, Montana, New Hampshire, North Dakota, Vermont, West Virginia) enacted state-level regulations that require solar facilities to submit decommissioning plans and proof of FA to a state entity that has the authority to review, approve, and enforce the requirements. The state-level authority that administers the program varies as well. For example, in Louisiana and Montana, the Department of Natural Resources and Department of Environmental Protection, respectively, administers the program. In Vermont, the Public Utility Commission administers the program.

Four states (California, Hawaii, Illinois, and Virginia) enacted hybrid state and local financial assurance for solar decommissioning programs. In states with hybrid programs, the local government must follow state decommissioning requirements enacted through statute and/or regulation but may prescribe additional requirements, which in some cases are more stringent than the state requirements.

Establishment of FA Mechanism

Another notable difference between the other states' regulations is when the FA mechanism is required to be submitted. All but three states require the FA mechanism to be submitted prior to project construction. Three states (Illinois, Montana, and Texas) allow for the FA mechanism submittal to be delayed for 11 to 20 years. This allows the FA mechanism to be financed as part of the facility's operation rather than as a capital expense.

Salvage Value Offset

The ability to offset the cost of decommissioning with salvage value varies between the states. Illinois, Montana, Virginia, and West Virginia allow an offset of the decommissioning costs by factoring in the salvage value of the solar facility components when decommissioned. Texas allows an offset of the decommissioning cost with salvage value, but requires that the cost estimate exceed the salvage value. New Hampshire, North Dakota, and Vermont all require the decommissioning costs to exclude salvage value to ensure that enough funds are available up front when solar facilities are decommissioned.

[3] Reference: Curtis, Taylor L., et al. "A Survey of Federal and State-Level Solar System Decommissioning Policies in the United States" National Renewable Energy Laboratory. December 2021.

Table C-1: Summary of Decommissioning and Financial Assurance Requirements in Other States

State	Policy Type (Federal, Hybrid, State, Local)	Oversight Authority	Details	Relationship to Programs, Certificates, Permits, or other Approvals	Law/Statute/ Code/Regulation	Date of Legislation/ Code	Responsible Party	Decommissioning Plan Required	Decommissioning Requirements	Decommissioning Timeframe	Financial Assurance Required	Allowable Forms of FA	Amount of FA	Timing of FA Instrument Submittal	Timeframe for Review/Update of Cost Estimate	How Cost Estimate is Determined	Salvage Value Offset?	Cost Estimate/Decommission Plan Prepared by Third Party Engineer?	Requirement Retroactive?	Comments
California	Hybrid (state/local)	California Department of Conservation and local city or county government	To obtain a perpetual solar-use easement, the local government may require financial security for site restoration. A solar-use easement is a right or interest acquired by a local government in a parcel of land that will restrict the land's use to solar PV facilities. In California, as a condition for a self-renewing Solar Use Easement, the owner of a solar use easement project on land subject to the Williamson Act or farmland security zone contract must submit a decommissioning plan and financial assurance to the local city or county government with jurisdiction prior to construction. The local city or county government submits the solar use easement application documents, decommissioning plan, and financial assurance documents, to the California Department of Conservation Department for final review and approval	Condition of approval for a solar-use easement	Cal. Gov.Code § 51191.3; Cal. Code Regs. tit. 14, §§ 3101, 3102, 3108, 3111	1/1/2013	Owner of a solar use easement project	Yes	State law requires that an owner submit a decommissioning plan to the local city or county government with jurisdiction that includes the following information soil management plan; site restoration plan, description of regrading and removal of structures and equipment.	Not specified	Yes	performance bonds, letters of credit, a corporate guarantee, or other securities to fund	The amount is based on costs of site restoration and reclamation as set forth in the decommissioning plan; costs of equipment, transportation, and labor necessary for infrastructure removal; liability insurance the owner is required to maintain for the duration of decommissioning and restoration work; contingency amount not to exceed 10% of the costs of site restoration, which does not include construction and operation costs; the amount must be reviewed and resubmitted to the local government for approval every 5 years.	Prior to receiving a self-renewing easement/prior to construction	The owner must review and resubmit the financial assurance instrument to the local government every 5 years.	Costs of equipment, transportation, and labor necessary for infrastructure removal; Liability insurance the owner is required to maintain for the duration of decommissioning and restoration work; Contingency amount not to exceed 10% of the costs of site restoration, which does not include construction and operation costs	Not addressed	Not specified	No	
Hawaii	Hybrid (state/local)	County Planning Commission	In Hawaii, as a condition of a Special Use Permit, the owner of a solar energy facility located on agricultural lands with a soil productivity rating of B or C must comply with state decommissioning requirements and submit proof of financial assurance to the local county planning commission with jurisdiction prior to construction. The local county planning commission must submit all special use permit application documents, including financial assurance documents, to the Hawaii Land Use Commission.	Condition of approval for a special use permit to operate a solar facility on Class B or C agricultural land	HRS § 205-4.5	1/30/2019	Owner of a solar energy facility	No	State law does not require submittal of a decommissioning plan; however, local regulations may apply.	State law requires removal all equipment within 12 months after operations cease and restore the land to its preconstruction condition.	Yes	Not prescribed by state statute or regulation but local requirements may apply	Not prescribed by state statute or regulation but local requirements may apply	Prior to operation	Not specified	Not prescribed by state statute or regulation but local requirements may apply	Not addressed	Not specified	No	
Illinois	Hybrid (state/local)	County Government	In Illinois, the owner of a commercial renewable energy facility located on agricultural land owned by a third party must enter into an Agricultural Impact Mitigation Agreement with the Department of Agriculture outlining facility construction and deconstruction plans and submit a deconstruction plan and financial assurance to the county government with jurisdiction prior to construction.	Required element of an Agricultural Impact Mitigation Agreement	505 Ill. Comp. Stat. 147/15	6/29/2018	Owner of a commercial renewable energy facility	Yes	State law requires that an owner submit a decommissioning plan to the local city or county government with jurisdiction addressing the following: restoration of agricultural land to pre-construction state; removal of aboveground structures (supports, facilities, wires, anchors, access roads); removal of underground structures (cabling); topsoil removal and replacement; a detailed decommissioning cost estimate.	Abandonment means when deconstruction has not been completed within 12 months after the commercial solar energy facility reaches the end of its useful life. For purposes of this definition, a commercial solar energy facility shall be presumed to have reached the end of its useful life if the commercial solar energy facility owner fails, for a period of 6 consecutive months, to pay the landowner amounts owed in accordance with the underlying agreement.	Yes	Reclamation or surety bond, or other financial instrument acceptable to the county with jurisdiction.	The financial assurance must be based on the cost estimate as set forth within the decommissioning plan. Owner must submit a cost estimate prepared by a professional engineer licensed in Illinois. The cost estimate must consider the number of solar panels, racking, and related facilities; the original construction costs; size and capacity of the facility; salvage value of the facility.	Owner must submit:10% before the end of the first year of operation, 50% before the end of the sixth year of operation, 100% before the eleventh year of operation.	The owner must review and resubmit the decommissioning plan, including the cost estimate and financial assurance instrument to the county with jurisdiction 10 years after commercial operation commences.	The financial assurance must be based on the cost estimate as set forth within the decommissioning plan. Owner must submit a cost estimate prepared by a professional engineer licensed in Illinois. The cost estimate must consider the number of solar panels, racking, and related facilities; the original construction costs; size and capacity of the facility; salvage value of the facility.	Allows project owners to offset the costs of decommissioning (e.g., costs of infrastructure removal, transportation and labor, disposal, liability insurance, site restoration and reclamation) with an estimated salvage value	Cost estimate prepared by a professional engineer licensed in	No	
Louisiana	State-level	Louisiana Department of Natural Resources	In Louisiana, as a condition of approval for an Alternative Energy Source Lease (AESL), the owner of an alternative energy source facility on state land must submit a decommissioning plan and financial assurance to the Louisiana Department of Natural Resources (Department) prior to commencing decommissioning activities. Within 60 days of completing decommissioning activities, the facility owner must notify the Department and submit a decommissioning report that includes a summary of decommissioning activities and a description of any mitigation measures utilized during decommissioning.	Condition of approval for an AESL to operate a solar facility on state land	La. Admin. Code tit. 43:V, §§ 921, 953-55, 961-69.	9/1/2015	Owner of an Alternative Energy Source Lease	Yes	Decommissioning plan must include: a proposed decommissioning schedule; a description of facilities that will be removed or kept in place; a description of removal methods and site clearance activities; transportation, disposal, or salvage plans, a description of resources, conditions, or activities potentially affected by decommissioning; results of recent biological surveys conducted in the site area; mitigation measures secured to protect sensitive biological and archaeological features during decommissioning	Not specified	Yes	Lease-specific bond	In an amount set by the board, in an amount no less than $500,000;	Prior to receiving the Alternative Energy Source Lease	Not specified	The Louisiana Department of Natural Resources determines the amount, which can be no less than $500,000, and it may base the amount on e estimated costs of decommissioning; past due rent and payments incurred by the owner; any other monetary obligations, including insurance that the owner is required to maintain for the duration of the Alternative Energy Source Lease	Not addressed	Not specified	No	
Maine	State-level	Department of Environmental Protection (DEP) and Maine Land Use Planning Commission (for areas not under DEP jurisdiction)	Maine law requires developers of solar power projects that occupy 3 or more acres to have an approved decommissioning plan and accompanying financial assurance sufficient to cover the cost decommissioning as outlined in the plan. The law applies to projects on which construction starts on or after October 1, 2021, as well as to projects that undergo a transfer of ownership after October 1, 2021.	Condition of approval for permit	S.P. 113-L.D. 802	6/10/2021	Person identified in the decommissioning plan	Yes	The plan must provide for restoration of the farmland sufficient to support resumption of farming or agricultural activities; provide for the grading and revegetation of all earth disturbed during construction and decommissioning, except for areas already restored; include demonstration of current and future financial capacity, which must be unaffected by the owner's or operator's future financial condition, to fully fund decommissioning in accordance with an approved plan.	Not specified in state law	Yes	Performance bond, surety bond, irrevocable letter of credit or other form of financial assurance acceptable to the environmental permitting entity, for the total cost of decommissioning	Total cost of decommissioning	Prior to Permit Issuance	The plan requires the financial assurance be updated 15 years after approval of the plan and no less frequently than every 5 years thereafter.	Method not specified	Not addressed	Not specified	No	
Minnesota	State-level	Minnesota Public Utilities Commission	In Minnesota, as a condition of a Site License, the owner of a large electric power generating plant with a capacity of 50 MW or greater must submit a decommissioning plan and financial assurance to the Minnesota Public Utilities Commission (PUC)	Condition of a Site License	Minn. Stat. §§ 216E.001 – 216E.18.; Minn. R. 7854.0100 – 7854.1500.		Owner of a large electric power generating plant with a capacity of 50 MW or greater	Yes	Decommissioning plans must include information about the anticipated manner in which the project will be decommissioned, and the site restored. The decommissioning plan must also include a detailed cost estimate.	Not specified	Yes	Not specified	Not specified	Prior to issuance of the site license and project construction	Incremental bond schedule	No requirements are articulated within the regulations other than that the owner must provide a cost estimate. Method is not specified.	Not addressed	Not specified	No	

Table C-1: Summary of Decommissioning and Financial Assurance Requirements in Other States

State	Policy Type (Federal, Hybrid, State, Local)	Oversight Authority	Details	Relationship to Programs, Certificates, Permits, or other Approvals	Law/Statute/ Code/Regulation	Date of Legislation/ Code	Responsible Party	Decommissioning Plan Required	Decommissioning Requirements	Decommissioning Timeframe	Financial Assurance Required	Allowable Forms of FA	Amount of FA	Timing of FA Instrument Submittal	Timeframe for Review/Update of Cost Estimate	How Cost Estimate is Determined	Salvage Value Offset?	Cost Estimate/Decommission Plan Prepared by Third Party Engineer?	Requirement Retroactive?	Comments
Montana	State-level	Montana Department of Environmental Quality	In Montana, the owner of a facility with a capacity of 2 MW or greater must submit (1) a decommissioning plan within 12 months prior to operation of the facility and (2) financial assurance at any time prior to 15th year of the facility's operation to the Montana Department of Environmental Quality. Decommissioning plans must be updated every 5 years after the facility is bonded. The Department is responsible for administering the law in all organized municipalities and in the unorganized and deorganized parts of Maine typically served by the Land Use Planning Commission if (a) the solar energy development requires a permit under the Site Location of Development Law or (b) straddles an organized/unorganized boundary.	N/A	Minn. Stat. §§ 216E.01, 216E.02; Minn. R. 7854.0500; Mont. Admin. R. 17.86.102, 17.86.105-06, 17.86.110-112.	5/30/2020	Owner of a facility with a capacity of 2 MW or greater	Yes	Decommissioning plans must include: a proposed decommissioning schedule; Information about site restoration and reclamation to preconstruction topography; Information about dismantling, removal, and regrading of all aboveground and underground infrastructure, including access roads; Information about repair and reconstruction of public roads, culverts, and natural drainage damaged by decommissioning activities; a detailed cost estimate; a detailed estimate of the salvageable value of the facility		Yes			Financial assurance must be submitted at any time prior to 15th year of the facility's operation	Yes with a description of the calculation method used	A cost estimate must include a detailed estimate of the anticipated salvage value of the facility (e.g., infrastructure including modules, supports, and inverters) prepared by an independent evaluator; any other expenses related to decommissioning, which are the responsibility of the solar facility owner.	allow project owners to offset the costs of decommissioning (e.g., costs of infrastructure removal, transportation and labor, disposal, liability insurance, site restoration and reclamation) with an estimated salvage value	Prepared by an independent evaluator	No	
New Hampshire	State-level	New Hampshire Site Evaluation Committee	In New Hampshire, as a condition of approval for a Certificate of Site and Facility Application, the owner of an energy facility larger than 30 MW must submit a decommissioning plan and proof of financial assurance to the New Hampshire Site Evaluation Committee prior to construction of the facility	Condition of approval to a Certificate of Site and Facility Application	N.H. Rev. Stat. Ann. § 162-H:2, 7, 12, 16, 19; N.H. Admin. R. Site 301.08(d)(2).	8/20/2021		Yes	Decommissioning plans must include information about removal of all underground infrastructure less than four feet below ground surface and must also include a detailed cost estimate. Decommissioning plans must be prepared by a qualified, third-party		Yes	Letter of credit, performance bond, surety bond, guarantee	Not specified	Prior to issuance of the site license and project construction	Not specified	Cost estimates must exclude the anticipated salvage value (i.e., potential cost offsets) of the facility	Salvage Value Must be excluded.	Decommissioning plans must be prepared by a qualified, third-party	No	
North Dakota	State-level	North Dakota Public Service Commission	In North Dakota, as a condition of approval for a Certificate of Operation, the owner of a facility with a capacity of 500 kilowatts (kW) or greater must submit a decommissioning plan and proof of financial assurance to the North Dakota Public Service Commission prior to the operation of the facility.	N/A	N.D. Admin. Code § 69-09-10-01, -06, -08-10.	7/1/2020	Owner of a facility with a capacity of 500 kW or greater	Yes	Decommissioning plans must address: site restoration and reclamation to preconstruction topography, dismantling and removal of all aboveground infrastructure (e.g., modules, supports, and inverters) and underground infrastructure (e.g., foundations, cables, and equipment); expected effects of decommissioning on natural resources; a detailed decommissioning cost estimate Decommissioning plans must be prepared by a qualified, third-party	Not specified	Yes	Letter of credit, performance bond, surety bond, guarantee cash escrow, incremental bond schedule	The first installment must be in an amount equal to 5% of the estimated costs of construction. The second installment must be sufficient to cover the costs of decommissioning.	Owner must issue the first installment prior to construction. Owner must issue the second installment after construction is complete but prior to facility operation. When the second installment is received, the first installment is returned.	The facility owner must file an updated decommissioning cost estimate with the Public Service Commission 10 years after the decommissioning cost estimate is initially approved and then every 5 years after until decommissioning is complete.	Cost estimates must exclude the anticipated salvage value (i.e., potential cost offsets) of the facility. Does not specify the methodology for cost estimate. However, a facility owner must include a description of the cost estimate calculation method used6	Salvage Value Must be excluded.	Decommissioning plans must be prepared by a qualified, third-party	No	
Texas	State	Landowner	Requirements for the solar power facility agreement between the landowner and the grantee, and only applies to solar power facility agreements entered into on or after the effective date of the Act.	Requirements for the solar power facility agreement between the landowner and the grantee	S.B. 760, 2021 Leg., Reg. Sess. (Tex. 2021); Texas Utilities Code, Title 6, Chapter 302	5/19/2021	Grantee	Yes	Decommissioning includes: Clear, clean, and remove each solar energy device, transformer, and substation; Clear, clean, and remove the foundation and buried cable from the ground to a depth of at least three feet below the surface grade of the land and ensure that each hole or cavity created by removal is filled with soil of the same or similar type as the predominant soil found on the property; and Clear, clean, and remove from the property each overhead power or communications line installed by the grantee on the property.	Decommissioning must occur on 180th day after either the solar power facility is no longer capable of generating electricity in commercial capacities or the landowner receives written notice of the grantee's intent to decommission the facility.	Yes	Parent company guaranty with a minimum investment grade credit rating for the parent company issued by a major domestic credit rating agency; a letter of credit; a bond; or another form of financial assurance reasonably acceptable to the landowner.		The 20th anniversary of the commercial operations date or the date the solar power facility agreement is terminated or (whichever is earlier)	The grantee must deliver the landowner an updated estimate of the cost of removal and salvage value prepared by an independent, third-party professional engineer licensed in Texas on or before the 10th anniversary of the commercial operations of the facility and at least once every five years after the commercial operations date for the remainder of the term of the agreement.	At least equal to the estimated amount by which the cost of removing the solar power facilities from the landowner's property and restoring the property to as near as reasonably possible the condition of the property as of the date the agreement begins exceeds the salvage value of the solar power facilities, less any portion of the value of the solar power facilities pledged to secure outstanding debt.	Cost estimate must exceed salvage value	Cost estimate prepared by independent, third-party professional engineer licensed in Texas	No	The grantee may not cancel financial assurance before the date the grantee has completed the grantee 's obligation to remove the grantee 's solar power facilities located on the landowner 's property, unless the grantee provides the landowner with replacement financial assurance at the time of or before the cancellation. In the event of a transfer of ownership of the grantee 's solar power facilities, the financial security provided by the grantee shall remain in place until the date evidence of financial security meeting the requirements.
Vermont	State-level	Vermont Public Utility Commission	In Vermont, as a condition of approval for a Certificate of Public Good, the owner of a facility with a capacity of greater than 500 kW must submit a decommissioning plan and financial assurance to the Vermont PUC prior to construction.	Condition of approval for Certificate of Public Good.	30 V.S.A. § 248; Vt. PUC Rule 5.900-907.		Owner of a facility with a capacity of greater than 500 kW	Yes	Decommissioning plans must address: labor, equipment, transportation, and disposal costs associated with facility removal (e.g., infrastructure including modules, supports, and inverters); Site restoration and reclamation to preconstruction condition, including removal of non-native soils, fences, and access roads; A detailed decommissioning cost estimate.		Yes	Letter of credit	Must cover the costs of decommissioning and site restoration as set forth in the cost estimate submitted by the owner.	Prior to issuance of the Certificate for Public Good and project construction	Every three years to account for inflation and file a report describing the adjustments	A cost estimate must include labor, equipment, transportation, and disposal costs associated with facility removal (e.g., infrastructure including modules, supports, inverters); costs of site reclamation to preconstruction condition; costs of applicable federal, state, and local permits; costs associated with decommissioning activity management, supervision, and safety. A cost estimate must exclude the anticipated salvage value (i.e., potential cost offsets) of the facility.	Salvage value must be excluded	No specified	No	

Table C-1: Summary of Decommissioning and Financial Assurance Requirements in Other States

State	Policy Type (Federal, Hybrid, State, Local)	Oversight Authority	Details	Relationship to Programs, Certificates, Permits, or other Approvals	Law/Statute/ Code/Regulation	Date of Legislation/ Code	Responsible Party	Decommissioning Plan Required	Decommissioning Requirements	Decommissioning Timeframe	Financial Assurance Required	Allowable Forms of FA	Amount of FA	Timing of FA Instrument Submittal	Timeframe for Review/Update of Cost Estimate	How Cost Estimate is Determined	Salvage Value Offset?	Cost Estimate/Decommission Plan Prepared by Third Party Engineer?	Requirement Retroactive?	Comments
Virginia	Hybrid (state/local)	Delegated to local government	In Virginia, the state legislature mandates that local governments with solar facility siting ordinances include decommissioning requirements within their regulations. Local governments must require owners of solar energy equipment, facilities, or devices owners to submit decommissioning plans and proof of financial assurance to the local entity with jurisdiction.	Condition of approval for any local government granted solar facility site license	VA Administrative Code, Title 15.2, Chapter 22, Article 6	3/21/2019	Owner, lessee, or developer of real property	Yes	State law requires the owner enter into a written agreement with the locality with jurisdiction to decommission the solar energy equipment, facilities, and devices within a specified timeframe as well as detailed cost estimate prepared by a professional engineer licensed in Virginia. Decommissioning requires the removal and proper disposal of solar energy equipment, facilities, or devices on real property and includes the reasonable restoration of real property upon which solar equipment, facilities, or devices are located, including soil stabilization and revegetation of the ground cover disturbed by the installation of the solar energy equipment, facilities, or devices.	Not specified in state code.	Yes	Bond, Letter of credit, Parent Guarantee, Certified fund, Cash Escrow	Owner must submit a cost estimate prepared by a professional engineer licensed in Virginia. The cost estimate must not exceed the total projected cost of decommissioning; may include the salvage value of equipment, facilities, or devices; may include an annual inflation factor. Additional requirements may be specified in local regulations.	Prior to Construction	Not specified in state code.	net salvage value of the equipment, facilities, or devices, plus a reasonable allowance for estimated administrative costs related to the default of the owner, lessee, or developer, and an annual inflation factor.	allow project owners to offset the costs of decommissioning (e.g., costs of infrastructure removal, transportation and labor, disposal, liability insurance, site restoration and reclamation) with an estimated salvage value	professional engineer licensed in Virginia, who is engaged by the applicant, with experience in preparing decommissioning estimates and approved by the locality	No	If the party that enters into the written agreement with the locality defaults in the obligation to decommission such equipment, facilities, or devices in the timeframe set out in the agreement, the locality has the right to enter the real property of the record title owner of such property without further consent of the owner and engage in decommissioning.
West Virginia	State-level	WV Department of Environmental Protection (DEP)	Establishes and implements a program to decommission and reclaim wind and solar electrical generation facilities upon closure. Solar generation facility" means an installation or combination of solar panels or plates, including a canopy or array, and other associated property, including appurtenant land, improvements, and personal property, that are normally operated together to capture and convert solar radiation to produce electricity, including flat plate, focusing solar collectors, or photovoltaic solar cells, and that has a nameplate capacity, singularly or in the aggregate, greater than or equal to 1.0 megawatts.	DEP permit	S.B. 492, 2021 Leg., Reg. Sess.; W.V. Code 22-32;	3/25/2021	Solar Generation Facility	Yes	In compliance with DEP standards and technical specifications including a scope of work and cost estimates for completion and salvage estimates, taking into account local siting conditions; or, if exempt, submit a copy of a properly executed and legally binding decommissioning agreement with all attachments, schedules, and addendums. The removal and proper disposal of the solar generation facility and its foundation after the end of the facility's useful life or abandonment; the removal and proper disposal of buildings, equipment, cabling, electrical components, roads, or any other associated facilities; the reclamation of the surface lands upon which buildings, equipment, and equipment foundations using backfill and compacting of soil in order to return the surface to beneficial use and to prevent adverse hydrologic effects.	Not specified	Yes	Surety bond or any other arrangement, including but not limited to letters of credit and escrow accounts.		Within 12 months prior to commencing commercial operation	Not specified	Provide the DEP with any other necessary information in accordance with this act and rules adopted pursuant to the act for the DEP to determine bond requirements. DEP shall take into account the report submitted with an application and assess a bond value based upon the total disturbed acreage of land upon which the solar generation facility is operated, less salvage value: Provided, That the amount of the bond required shall not exceed the total projected future cost of decommissioning, less salvage value.	Yes	Plan submitted by certified by a qualified independent licensed professional engineer	Yes	Submit a fee for a new application of $100 per megawatt of nameplate generation capacity or a fee for nay modification of $50 per megawatt of nameplate generation capacity to be deposited into the Wind and Solar Decommissioning Account and utilized for implementing this act and its rules. There are currently no utility-scale solar facilities in WV affected by this legislation being retroactive.

APPENDIX D

Summary of Information for Existing Facilities in NC

Summary of Information for Existing Facilities in NC

North Carolina is one of the nation's leaders for the number of solar facilities supplying power to the electricity grid. North Carolina currently has about 5,100 megawatt (MW) of grid-connected solar power. This power is supplied by more than 660 facilities that are greater than 1 MW in size. The land for these facilities is located in 79 counties and is generally leased to the solar developer by the landowner.

Existing lease agreements or contracts between the landowners, operators, and developers may also include provisions for decommissioning and/or financial assurance at existing facilities. These existing requirements are also likely to vary widely between facilities. At this time there is no state-level insight into these private contractual agreements. Also, for existing facilities, the responsible party for decommissioning may need to be identified and/or located, and it may be difficult for the responsible party to go back and refinance the project to include FA costs.

Table D-1 presents the number of solar facilities that have come online since the passage of SL 2007-397 (Senate Bill 3) and their size range.[4] The table also shows the solar industry trends resulting from SL 2017-192 (House Bill 589).[5] Key metrics developed from this table are given below.[6]

- About 8% of facilities are in the 1 to 2 MW range.
- About 84% of facilities are in the 2 MW to 20 MW range.
- About 8% of facilities are greater than or equal to 20 MW.
- About 75% of the facilities in the 1 to 2 MW range were added prior to 2016.
- All of the facilities greater than 50 MW were added in 2015 or later.

Table D-1: Year Utility-Scale Solar Facilities Came Online by Size Range

Year	1 MW – < 2MW	2 MW – < 5MW	5 MW – < 20 MW	20 MW – < 50 MW	50 MW - < 70 MW	70 MW – 100 MW	Total
2008	3						**3**
2009	1						**1**
2010	5						**5**
2011	11	3					**14**
2012	6	9	10				**25**
2013	1	12	30	2			**45**
2014	3	25	48	3			**79**
2015	10	34	79	8	1	1	**133**
2016	1	35	74	2	1	2	**115**
2017	4	15	49	4	6	2	**80**
2018	3	27	28	1	4	3	**66**
2019	5	19	28	2		3	**57**
2020		17	15	3		3	**38**
Total	**53**	**196**	**361**	**25**	**12**	**14**	**661**

Table D-2 below shows the total capacity of utility-scale solar facilities interconnected each year to North Carolina's electricity grid. Based on the last three years of data from Table D-1 and Table D-2, an average of approximately 50 facilities are expected to be added per year, that in total provide an additional 500 MW to the grid per year.

[4] Renewable Energy and Energy Efficiency Portfolio Standard (REPS). https://www.ncleg.net/Sessions/2007/Bills/Senate/PDF/S3v6.pdf
[5] Competitive Energy Solutions for NC. https://www.ncleg.gov/BillLookup/2017/h589
[6] Based on an Energy Information Administration data set for 2020, Form EIA-860 detailed data with previous form data, (EIA-860A/860B)

Table D-2: Utility-Scale Solar Capacity Added to the Electricity Grid Each Year

Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Capacity (MW)	3	1	6	24	95	224	384	914	784	997	707	480	479	**5,100**

For this plan, DEQ updated the estimate of the number of solar panels developed under the HB 329 study to include solar facilities added to the electricity grid in 2020.[7] There are currently about 25 million solar panels operating at existing utility-scale solar facilities in North Carolina. Figure D-1 shows the estimated number of solar panels and the estimated year the facility would retire those panels. This graph assumes facilities retire after 20 years and must remove panels at that time. This graph shows a significant number of panels may not be removed until after 2035.

Figure D-1: Estimated Year for Retirement of Solar Panels, Assuming a 20-Year Life

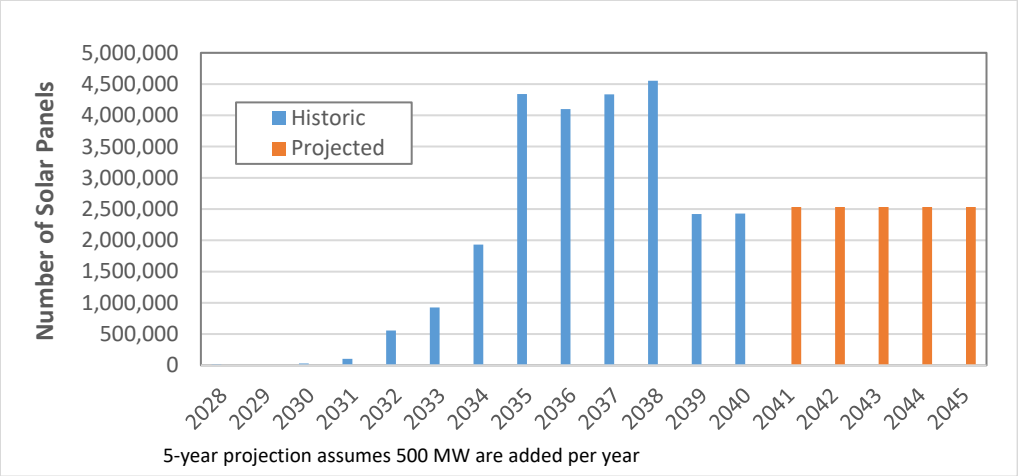


Figure D-1 also shows a projection of the number of panels that would retire from new solar facilities coming online in the next five years, assuming a 20-year lifespan. The number of new solar facilities will continue to grow in North Carolina. Using only the current growth rates in number of facilities and solar panels, DEQ estimates that by 2030 more than 1,000 facilities could be operating in North Carolina with more than 51 million solar panels providing approximately 10,000 MW of power (doubling the 2020 solar capacity in place). The panels will be decommissioned over a long period of time, on average 2.2 million panels per year, though this does not take into account potential secondary markets or reuse or the changes in newer panel composition.

DEQ reviewed a list of facilities more than 1 MW maintained by the U.S. Department of Energy Information Administration (EIA) and the Federal Energy Regulation Commission (FERC), data provided by the NCUC Public Staff, and ordinances currently established by local governments. The counties with requirements for decommissioning and/or FA, as well as the number of solar panels that may be covered by those requirements if they were installed under the current ordinances (which may not be the case), is provided in Table D-3.

[7] Energy Information administration Form 860, 2020 Data, Form EIA-860 .

Table D-3: County-Level Number of Utility-Scale Solar Facilities and Number of Solar Panels, and Presence of Decommission and FA Requirements in 2022 Local Ordinance

County	Number of Facilities	Number of Solar Panels	Decommissioning Required by Local Ordinance	Decommissioning and FA Required by Local Ordinance	County	Number of Facilities	Number of Solar Panels	Decommissioning Required by Local Ordinance	Decommissioning and FA Required by Local Ordinance
Alamance	7	144,969	Yes	No	Johnston	26	482,128	Yes	No
Alexander	3	99,564	No	No	Jones	7	196,278	Yes	Yes
Anson	7	566,574	Yes	Yes	Lee	8	163,752	No	No
Beaufort	10	736,463	Yes	Yes	Lenoir	14	453,402	No	No
Bertie	5	182,727	No	No	Lincoln	2	45,722	Yes	No
Bladen	15	1,117,361	Yes	No	Martin	15	531,016	No	No
Brunswick	3	54,813	Yes	No	Mecklenburg	1	9,629	No	No
Buncombe	2	21,294	Yes	No	Montgomery	7	293,101	Yes	No
Burke	3	59,380	No	No	Moore	9	180,943	Yes	Yes
Cabarrus	4	445,875	Yes	Yes	Nash	27	1,099,857	Yes	No
Caldwell	1	5,575	Yes	No	New Hanover	2	13,102	No	No
Camden	3	68,619	Yes	Yes	Northampton	15	1,620,451	Yes	Yes
Caswell	4	93,204	Yes	No	Onslow	3	164,500	Yes	No
Catawba	13	391,460	Yes	Yes	Orange	4	88,602	Yes	Yes
Chatham	10	251,766	Yes	No	Pamlico	1	21,257	Yes	Yes
Cherokee	3	15,204	No	No	Pasquotank	3	186,761	Yes	Yes
Chowan	3	74,014	Yes	Yes	Pender	8	685,521	No	No
Cleveland	21	370,968	Yes	Yes	Perquimans	8	233,595	Yes	Yes
Columbus	13	276,935	Yes	No	Person	7	114,344	Yes	Yes
Craven	6	145,070	Yes	Yes	Pitt	7	428,996	Yes	No
Cumberland	13	569,548	Yes	No	Randolph	12	319,830	Yes	Yes
Currituck	4	733,112	Yes	Yes	Richmond	7	326,344	Yes	No
Davie	4	149,921	Yes	Yes	Robeson	41	1,009,546	No	No
Duplin	33	872,733	Yes	No	Rockingham	6	141,932	Yes	Yes
Durham	4	80,476	No	No	Rowan	11	205,386	Yes	Yes
Edgecombe	9	992,906	Yes	Yes	Rutherford	9	501,271	Yes	No
Forsyth	2	30,329	Yes	No	Sampson	11	265,194	Yes	Yes
Franklin	10	367,697	Yes	Yes	Scotland	13	773,796	No	No
Gaston	5	199,688	No	No	Stanly	2	49,000	Yes	Yes
Gates	3	65,952	Yes	Yes	Stokes	2	46,613	No	No
Granville	7	185,702	Yes	Yes	Surry	3	39,032	Yes	No
Greene	4	61,058	No	No	Union	5	397,678	No	No
Guilford	7	101,870	No	No	Vance	13	587,332	Yes	No
Halifax	12	981,424	Yes	Yes	Wake	9	125,582	Yes	No
Harnett	11	234,575	No	No	Warren	9	268,436	Yes	No
Haywood	2	11,593	No	No	Washington	3	498,100	Yes	Yes
Henderson	2	16,676	No	No	Wayne	23	551,943	Yes	No
Hertford	18	797,350	Yes	No	Wilson	13	866,490	Yes	No
Hoke	3	66,806	No	No	Yadkin	4	91,804	Yes	Yes
Iredell	2	30,095	Yes	Yes	**Total**	**661**	**25,749,613**		

A statewide summary of the information presented in Table D-3 is provided in Table D-4. Approximately 76 percent of the facilities, with 80 percent of the solar panels, are located in counties that currently have existing ordinances requiring either decommissioning or both decommissioning and FA. Approximately 161 facilities, representing 20 percent of the total solar panels in North Carolina, are located in counties that currently do not have any ordinances requiring decommissioning or FA.

Table D-4: Number of Utility-Scale Solar Facilities and the Associated Number of Panels with Requirements for Decommissioning and FA

Requirements in Local Ordinance	Estimated Number of Facilities	Approximate Percent of Total Facilities	Estimate of Number of Solar Panels	Percent of Total Solar Panels
Decommissioning + FA	186	28%	9,260,983	36%
Decommissioning	314	48%	11,274,958	44%
No Decommissioning or FA	161	24%	5,213,672	20%
Total	**661**	**100%**	**25,749,613**	**100%**

All of these estimates assume that the projects came online after the local government decommissioning and/or FA requirements were put into local ordinance; and thus, represent the maximum number of facilities and solar panels that could be covered by such requirements. In addition, a review of existing requirements in lease agreements or contracts could not be made at this time. Therefore, these estimates do not necessarily reflect an accurate count of existing projects that currently have decommissioning plans and FA in place.

The Department further analyzed the data presented in Table D-4 to estimate the number of solar panels at existing smaller-size facilities to understand the impact of potentially exempting these facilities from the program. Table D-5 estimates the number of solar panels associated for two size categories, facilities between 1 MW and less than 2 MW and facilities between 2 MW and less than 5 MW. Exempting facilities less than 2 MW would exempt 53 facilities (8 percent of the total) while limiting the number of exempt solar panels to less than 2 percent. If the exemption were expanded to solar facilities less than 5 MW, it would further reduce the number of facilities required to participate by 139, while increasing the number of solar panels not covered by an FA requirement by 10 percent of the total existing panels.

Table D-5: Number of Solar Panels by Facility Size for Counties without Requirements for FA

Decommissioning Requirements	Number of Facilities	Percent of Total Facilities	Number of Solar Panels	Percent of Total Solar Panels
1 MW to < 2 MW				
Total	53	8%	383,509	**1.5%**
2 MW to < 5 MW				
Decommission + FA	57	9%	1,106,647	
No FA	139	21%	2,574,071	**10%**
State Total	**661**		**25,749,613**	

APPENDIX E

Summary of NC County Questionnaire and Responses

Summary of NC County Questionnaire and Responses

DEQ developed a questionnaire to gather information from North Carolina counties on aspects related to utility-scale solar facility decommissioning and FA requirements. The questions and responses are summarized below. In some counties, the municipalities (i.e., cities, towns) handle their own planning/zoning. Even though a county-only questionnaire is not fully encompassing, since most utility-scale solar facilities will not be sited within a city or town, the responses from the counties are typically the most crucial.

The questionnaire was distributed, by email, to all 100 North Carolina counties. The questionnaire was sent to the County Manager and when email addresses were available, emails were also sent to the Chair of the County Commissioners, and the County agency responsible for oversight of ordinances (e.g., Planning and Zoning or similar). The questionnaire was also shared with the North Carolina League of Municipalities and the North Carolina Association of County Commissioners for distribution to their members.

Thirty-five counties (out of 100) responded to the questionnaire. Although the questionnaire was sent to multiple people within a county to expedite the questionnaire distribution, only one person responded from the county. The questions are below along with a summary of the responses received.

Question 1: If baseline minimum standards were established statewide for utility-scale solar facility decommissioning and financial assurance, which of the following is your county's preference:

- County-level administration of the program,
- State-level administration of the program (where administration would no longer be on the county level), or
- A hybrid approach where the county administers the program, and the state provides oversight for consistency.

Figures E-1 and E-2, on the next page, summarize the results for this question. The majority of county respondents (74%) indicated their preference was for state-level program administration for utility-scale solar decommissioning and financial assurance (FA) requirements. Of the twenty-six counties that preferred the state level administration of the requirements, ten counties currently have existing decommissioning requirements, nine counties have existing decommissioning and FA requirements, and seven counties currently do not have any existing decommissioning or FA requirements. Twelve percent of respondents preferred to maintain the county-level administration of the program. The counties that preferred the county-level administration all currently have existing decommissioning and FA requirements for solar facilities. Fourteen percent of respondents preferred a hybrid approach – where the county administers the requirements for decommissioning and FA and the state provides oversight for consistency. Of the five counties that preferred the hybrid approach, one county has existing decommissioning requirements, two counties have existing decommissioning and FA requirements, and two counties currently have no existing requirements for decommissioning or FA.

Figure E-1: North Carolina County Preference for Decommissioning and Financial Assurance Program Administration

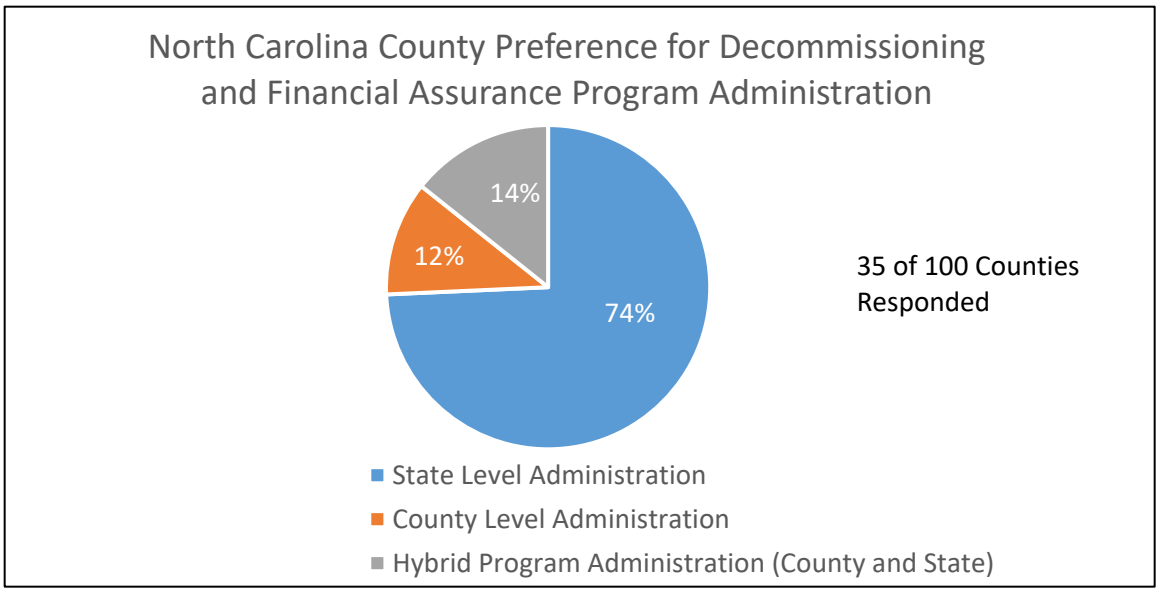
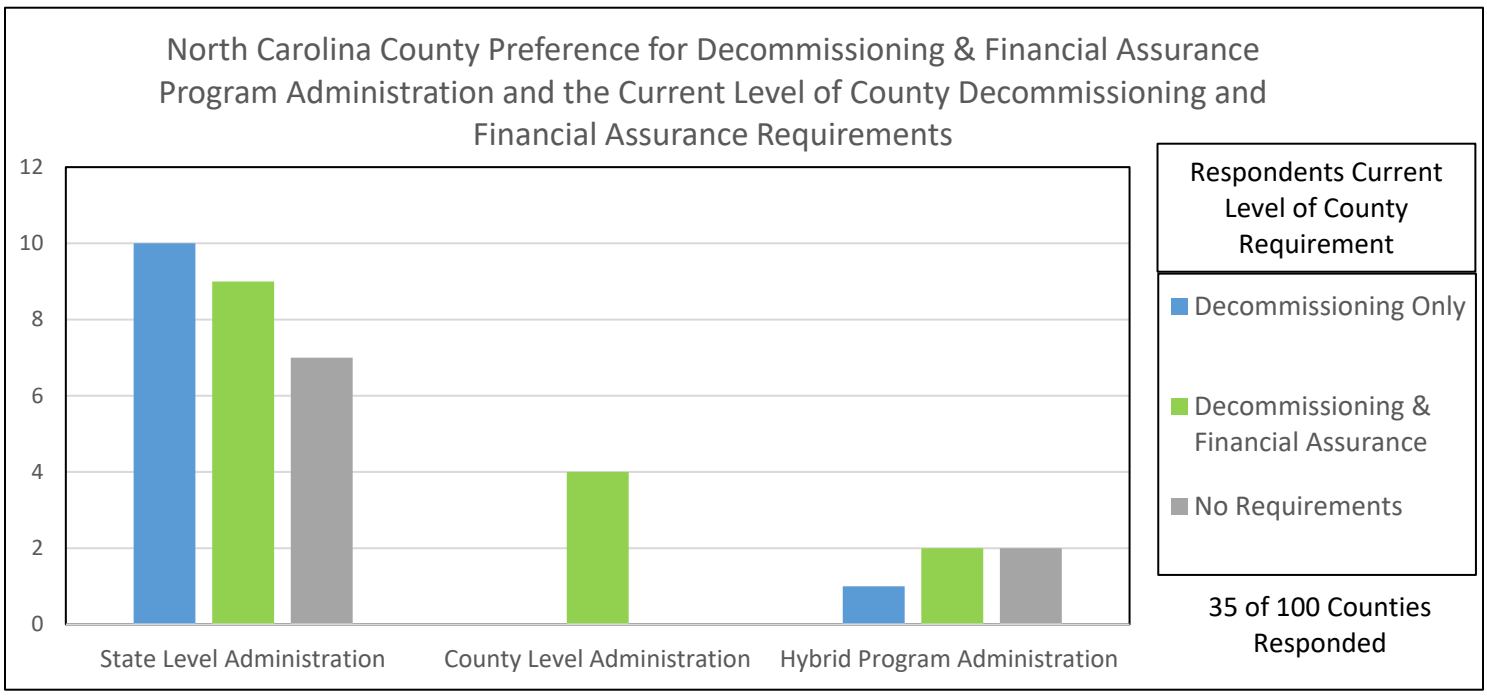


Figure E-2: North Carolina County Preference for Decommissioning and Financial Assurance Program Administration and Current Level of County Requirements for Decommissioning and FA



Question 2: Has your county experienced utility-scale solar facility abandonment issues? If yes, describe the issue(s) experienced?

- Thirty-four counties responded that they have not experienced abandonment issues as far as utility-scale solar facilities. Some counties noted that they have not had to deal with abandonment issues since the solar facilities were still in operation and most have not been in operation more than 10 years. Three counties specifically noted that they were concerned about abandonment in the future.

- One county responded that they have been dealing with an abandonment issue where a site was approved for construction but was not approved for an interconnection to the power grid. In addition to the facility not being operational, there have been other related erosion control problems and the site is currently overgrown with volunteer vegetation. County staff contact with the property owner and developer have been unsuccessful to date.

Question 3: Are you aware of lease agreements/contracts between solar developers and landowners that contain decommissioning and/or financial assurance requirements?

- Twenty counties responded that they were unaware of the particulars of any agreements/contracts between landowners and solar developers. Some of the counties indicated that their county ordinance does not require the county to review the private contact or that private agreements are between the parties and the county would not review or be a party to the agreement.

- The seven counties that responded that they were aware of the lease agreements/contacts between landowners and solar developers are counties that require the lease agreement to be submitted as part of the county application/approval process and/or decommissioning plan. One county indicated that the lease agreement/contract contains redacted information so the information that is still available to the county is not very useful.

- One county indicated that they were familiar with the lease agreement/contract because the solar developers will sometimes argue that because a contact is in place with the landowner, that the decommissioning and FA requirements should not also be required by the county. The county countered the solar developer's argument with the fact that since the county is not a party in the contract with the solar developer and landowner that there is nothing preventing modifications to the agreement so the county decommissioning and FA requirements would be required regardless of the solar developer and landowner contract.

Question 4: For counties with solar facility decommissioning or decommissioning with financial assurance requirements, how is the oversight of this program funded at the county level?

- Many counties that responded to this question indicated that there is no additional funding for program oversight for current county decommissioning or decommissioning with FA requirements. Some counties indicated that funding is done through a General Fund with tax money and/or existing staff salaries and when oversight is needed, that it is typically provided by a Planning Department (or similar) where any focus is complaint driven.

- While many counties receive a building permit fee or fee per solar panel or per amp, these funds can typically only be used by the Department conducting inspections and are not transferable to a Planning/Zoning Department for use with work associated with decommissioning or FA of solar facilities.

Question 5: For counties without solar facility decommissioning or financial assurance requirements, has your county considered instituting requirements for utility-scale solar facilities? If you answered yes, please describe conceptual requirements.

The responses to this question are as follows:

- Twelve counties without decommissioning or decommissioning and FA requirements indicated that they have not considered initiating requirements for utility-scale solar facilities.
- Two counties are interested in instituting FA requirements but are not able to find workable solutions.
- Two counties noted that they are considering adding decommissioning/FA requirements in the future.
- One county, located in the North Carolina mountains indicated that their county was not likely to have many utility-scale solar facilities, so they have not considered instituting additional requirements.
- One county stated that they very much want to put solar facility decommissioning and FA requirements in ordinance and they welcome any assistance. This county has examined the neighboring county's ordinances and would like strong FA requirements.