COUNTY OF LANCASTER

FOUNDED 1651 IN VIRGINIA

LANCASTER COURTHOUSE
8311 MARY BALL ROAD
LANCASTER, VIRGINIA 22503

804-462-5129
804-462-0031 (FAX)
www.lancova.com

Don G. Gill
County Administrator

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Date: January 9, 2020

To: Lancaster County Planning Commission

From: Brian D. Barnes, Environmental Codes Officer, Director of Planning and Land Use

Docket: January 16, 2020 – Discussion Item -

Issue: Solar energy ordinance development and associated research.

Recommendation: Review the provided materials, industry expert presentation, and begin to discuss what elements may be desired and/or required to be in a Lancaster Solar Ordinance.

Discussion: Renewable energy technology has advanced to the point of becoming available as a utility scale electron source. Across the Commonwealth, wind derived and solar energy is starting to find a place in providing power and the state has responded with a model ordinance, which localities may adopt to address this issue. Locally interest has been expressed in development of some lands as "solar farms".

Currently, such uses of land are not permitted except on *M-1 Industrial* zoned parcels and only with a special exception approved by the Board of Supervisors. It is desired that the Lancaster Planning Commission develop a solar energy ordinance for a proper public process, eventual approval and final adoption by the Board of Supervisors.

County staff have been meeting with renewable energy developers, concerned citizens, and county staff persons in other localities in order to gain an understanding of this issue. Scheduled at this meeting is a review of the Northumberland County Solar Ordinance and the Commonwealth Model Ordinance. We should also see a presentation from an industry solar developer. To follow is a discussion of these issues and desired components of a Lancaster ordinance.

Supervisors.

I. Any discharging of firearms on the site is prohibited unless specifically permitted by the Board of Supervisors.

§ 148-155 Solar energy facilities. [1]

[Added 6-14-2018]

A. Purpose. The purpose of this section is to provide for the siting, development, and decommissioning of solar energy projects in Northumberland County, subject to reasonable conditions that promote and protect the public health, safety and welfare of the community while promoting development of renewable energy resources.

B. Definitions. For definitions and word usage, see § **148-3A**.

C. Solar energy facility, small system:

(1) Shall require administrative plan approval by the County Zoning Administrator. Plan approval does not indicate compliance with the Building Code or the Electric Code.

(2) For ground-mounted projects, the applicant shall supply a site plan showing existing structures, property lines and setback lines.

(3) For ground-mounted projects, the applicant is required to obtain a zoning permit and comply with local and state building codes, with setbacks being the same as the principal structure in the underlying zoning district.

(4) Noise requirements shall be no more stringent than noise requirements for other types of development.

(5) Does not require a decommissioning plan.

D. Solar energy facility, medium-scale, and solar energy facility, utility-scale:

(1) Shall require conditional use approval by the Board of Supervisors in all zoning districts.

(2) Shall require a minimum setback of 25 feet.

(3) Shall comply with all applicable federal and state laws, including but not limited to building and electrical codes and erosion and sediment control as well as stormwater regulations.

(4) Solar panels should, to the extent practical, be nonreflective.

(5) Shall require a project description that is a narrative identifying the applicant, owner and operator, and describing the proposed solar energy project, including an overview of the project and its location; approximate rated capacity of the solar energy project; the approximate number, representative types and expected footprint of solar equipment to be constructed; and a description of ancillary facilities, if applicable.

(6) Shall require a site plan which shall include the following information:

(a) Property lines and setback lines.

(b) Existing and proposed buildings and structures, including preliminary location(s) of the proposed solar equipment.

(c) Existing and proposed access roads, drives, turnout locations, and parking; however, this requirement shall not exceed VDOT requirements for other types of projects in the underlying zoning district.

(d) Location of substations, electrical cabling from the solar systems to the substations, ancillary equipment, buildings, and structures (including those within any applicable setbacks).

(e) Fencing or other methods of ensuring public safety.

(f) Additional information may be required, as determined by the Zoning Administrator, such as a scaled elevation view and other supporting drawings, photographs of the proposed site, photo or other realistic simulations or modeling of the proposed solar energy project from potentially sensitive locations as deemed necessary by the Zoning Administrator to assess the visual impact of the project, landscaping and screening plan, coverage map, and additional information that may be necessary for a technical review of the proposal.

(7) Noise requirements for solar facilities shall be no more stringent than noise requirements for other types of development in the County.

(8) Documentation of right to use property for the proposed project. Documentation shall include proof of control over the land or possession of the right to use the land in the manner requested.

(9) Decommissioning plan.

(a) The application shall include a decommissioning plan.

(b) A decommissioning plan shall include the following:

[1] The anticipated life of the project;

[2] The estimated decommissioning cost in current dollars;

[3] How said estimate was determined; and

[4] The manner in which the project will be decommissioned.

(c) The decommissioning plan shall be updated and filed with the County every five years to account for changed circumstances, including inflation.

(d) The owner or owners of a solar facility shall notify the County whenever the facility is inactive for one year, at which time the owner shall have six months to decommission the facility.

(e) The owner or owners of a solar facility shall return the site to the land cover that was present before the solar facility was built.

E. Bonding requirements. Solar energy facility, utility-scale, shall require a surety in the amount required for full decommissioning of the solar facility as stated in the decommissioning plan. The surety shall be approved by the BOS or its designee.

[1] *Editor's Note: The provisions on solar energy facilities were adopted as Art. XIV, §§ 248-141 through 248-145, but were renumbered as § 248-155A through E, respectively, to avoid duplicate section numbers and to maintain the organizational structure of the County's Code.*

Model Ordinance for Larger-Scale Solar Energy Projects in Virginia

December 21, 2012

BACKGROUND:

This Model Ordinance provides suggested language for consideration by localities in framing their own local solar ordinance for larger-scale solar energy projects. It was developed by the Local Government Outreach Group (LOG), an informal group of stakeholders with representation from local governments, developers, academia, and environmental organizations, whose work was facilitated by the Department of Environmental Quality (DEQ). Preliminary work on the model ordinance was performed by DEQ staff with assistance and advice from the Solar Technical Group. When utilizing this Model Ordinance, please also refer to the document, "Introduction: DEQ's Local Government Outreach for Renewable Energy," which can be found at http://www.deq.virginia.gov/Programs/RenewableEnergy/LocalGovernmentOutreach.aspx .

Primary sources for suggested provisions in this model include the Northampton (VA) ordinance, the Delaware Township (NJ) ordinance, and, to a lesser extent, the Pima (AZ) ordinance and the Oregon Model ordinance.

To the extent practicable, explanatory comments and issues of concern are noted in footnotes. The use of **[brackets]** around certain provisions (1) indicates points at which a local government should supply locality-specific information or (2) signals a decision point at which a local government may adopt the suggested provision and/or may wish to give special consideration to local circumstances and preferences in framing the provision.

Table of Contents

1. TITLE

This ordinance shall be known as the **[Larger-Scale]** Solar Energy Project Ordinance for **[locality]**.[1]

2. PURPOSE[2]

The purpose of this ordinance is to provide for the siting, development, and decommissioning of larger-scale solar energy projects in **[locality]**, subject to reasonable conditions that promote and protect the public health, safety and welfare of the community while promoting development of renewable energy resources.

3. DEFINITIONS

"Applicant" means the person or entity who submits an application to the locality for a permit to install a solar energy project under this ordinance.

"Disturbance Zone" means the area within the site directly impacted by construction and operation of the solar energy project.

"Integrated PV" means photovoltaics incorporated into building materials, such as shingles.

"Operator" means the person responsible for the overall operation and management of a solar energy project.

"Owner" means the person who owns all or a portion of a solar energy project.

"Photovoltaic" or "PV" means materials and devices that absorb sunlight and convert it directly into electricity.

"Rated capacity" means the maximum capacity of a solar energy project based on the sum total of each photovoltaic system's nameplate capacity.

"Site" means the area containing a solar energy project.

"Solar Energy Project, **[larger-scale]**," "Solar Energy Project," or "Project" means a renewable energy project that **either**

(a) generates electricity from sunlight, consisting of one or more PV systems and other appurtenant structures and facilities within the boundaries of the site,
or

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[1] **Title.** This model ordinance uses the term "larger-scale" to refer to solar projects addressed by the ordinance. Local governments are urged to utilize terminology that best communicates the scope of their particular solar ordinances. (Note: This model ordinance generally attempts to be consistent with the substance, terminology, and format of the Commonwealth of Virginia's Small Renewable Energy Projects Act of 2009 and the LOG's Model Utility Scale Wind Energy Project Ordinance.)

[2] **Purpose.** The phrase "promoting development of renewable energy sources" conforms with Virginia's Energy Policy (specifically, §67-103 of the Code of Virginia). The legal requirements of this Energy Policy are discussed in the companion document, "Introduction: DEQ's Local Government Outreach for Renewable Energy," which appears on DEQ's website along with this model ordinance.

(b) utilizes sunlight as an energy source to heat or cool buildings, heat or cool water, or produce mechanical power by means of any combination of collecting, transferring, or converting solar-generated energy,
and
does not meet any of the following criteria: has a disturbance zone equal to or less than **[two acres]**, is mounted on or over a building or parking lot or other previously-disturbed[3] area, or utilizes integrated PV only.[4]

[3]**Previously Disturbed.** Members of the Solar Technical Group suggested that local officials may wish to define what they mean by "previously-disturbed area." This term may have different connotations in different settings. If a local government does not wish for agricultural land to be deemed "previously disturbed" because trees were removed, then it may want to define "previously disturbed" along the following lines: "Has undergone mechanical land-forming, construction, or demolition activities within the past 50 years."

[4] Localities may want to consider framing the Larger-Scale Solar Ordinance to pick up where the Smaller-Scale Solar Ordinance left off. That is, if the locality's Smaller-Scale ordinance addresses solar projects with a disturbance zone of two acres and less, then the Larger-Scale Ordinance could address projects larger than those. The suggested definition of "larger-scale project" is designed to communicate that projects meeting any of the criteria of "smaller-scale projects" should be addressed under the ordinance for "smaller-scale projects" and not under this ordinance.

4. PERMITTING[5]

A. Special use permit approval for larger-scale solar projects in residential and commercial zones.

1. Larger-scale solar energy projects may be installed if approved by a special use permit in residential and commercial zones.

2. The general procedures for applying for a special use permit as set forth in **[locality's]** zoning ordinance shall apply in addition to the applicable provisions of this ordinance.

B. Permit by Right approval for larger-scale solar projects in agricultural and industrial zones. Larger-scale solar energy projects may be installed if permitted by right in agricultural and industrial zones.

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[5] **Permitting – General Background.** Localities have several options for allowing the use of solar energy projects, with and without zoning designations. In general, these options may be described as follows:

1) **By right permitted use – This model ordinance recommends by right permitting for larger-scale projects that are located in agricultural and industrial zones.** Land uses that are permitted "by right" are those that can be approved administratively by the staff because the zoning ordinance allows it. By right development is regulated by the zoning ordinance and by the subdivision ordinance. Approval is a ministerial act typically carried out by the Zoning Administrator who implements the law or policy by applying the facts in a particular case. When the requirements of the law or policy are satisfied, approval is required. The zoning administrator has no discretion to deny an application.

   The Massachusetts Large-Scale Ground-Mounted Solar Photovoltaic Model encourages localities to adopt by right zoning policies. "[D]evelopment may proceed without the need for a special permit, variance, amendment, waiver, or other discretionary approval. As-of-right development may be subject to site plan review to determine conformance with local zoning ordinances or bylaws. Projects cannot be prohibited, but can be reasonably regulated by the inspector of buildings, building commissioner or local inspector, or if there is none in a town, the board of selectmen, or person or board designated by local ordinance or bylaw."

2) **Floating districts** – Northampton County addressed the need for development of solar energy projects by creating a floating solar energy district. The floating district, in effect, broadly identifies the need for solar energy and allows for the creation of a zoning district in a currently undetermined location if a developer submits a project design and concept development plan (subject to the requirements contained in the ordinance).

3) **Special Exception/Conditional Use/Special Use Permitting – This model ordinance recommends the special use permitting requirement for larger-scale solar energy projects in residential and commercial zones.** The three terms are synonymous and refer to land uses that are allowed in certain zoning districts with special permission or conditions. Uses allowed by special use permit are those considered to be generally consistent with the by right uses, but ones that may have a potentially greater impact on neighboring properties or the public. Approvals are conditioned upon the applicant's complying with specific requirements intended to address or mitigate anticipated impacts. These cases generally require case-by-case review by the planning commission, with recommendation for final action by the governing body. The governing body may revoke a special use permit for willful noncompliance with the zoning ordinance or the adopted conditions of the permit, or for failure to commence the use, structure, or activity within the prescribed period of time. Acting on a request for a special exception or a special use permit is a legislative act made only by the governing body, after public hearing.
   Many localities will already have language in place regarding special use permitting processes. Localities may, however, want to include additional provisions for a special use permit for larger-scale solar energy projects specifically. It is generally recommended that procedural timelines be consistent with those already in place for facilities of similar size and scope.

Table I: Permitted Uses[6]				
	Zoning District			
Project Type	[Agricultural]	[Residential]	[Commercial]	[Industrial]
Level 1 [7] [>2 acres to 4 acres]	[P]	[S]	[S]	[P]
Level 2 [>4 acres to 20 acres]	[P]	[S]	[S]	[P]
Level 3 [>20 acres]	[P]	[S]	[S]	[P]
P= Permitted by Right		S= Requires Special Use Permit		

5. APPLICATIONS AND PROCEDURES

In addition to the requirements of **[local site plan citation]** and **[local special use permit citation, if applicable]**, applications for a larger-scale solar energy project shall include the following information:

A. PROJECT DESCRIPTION

A narrative identifying the applicant, owner and operator, and describing the proposed solar energy project, including an overview of the project and its location; approximate rated capacity of the solar energy project; the approximate number, representative types and expected footprint of solar equipment to be constructed; and a description of ancillary facilities, if applicable.

B. SITE PLAN

The site plan shall conform to the preparation and submittal requirements of **[local site plan citation]**, including supplemental plans and submissions, and may include the following information:

1. Property lines and setback lines.
2. Existing and proposed buildings and structures, including preliminary location(s) of the proposed solar equipment.
3. Existing and proposed access roads, drives, turnout locations, and parking; however, this requirement shall not exceed VDOT requirements for other types of projects in the underlying zoning district.

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[6] This table is a template to be adjusted by localities as they deem appropriate. It should be noted that localities may adjust the Table above in a variety of ways, including requiring different types of permitting within a given zone according to the size of the project. Localities should substitute their own zone designations if they do not use "residential, commercial, agricultural, industrial" (*e.g.* some localities have special zones for institutions).

[7] It is suggested that strata within the Table begin where the locality's Smaller-Scale Solar Ordinance leaves off. Although the suggested Table utilizes size of disturbance zone (in acres) as the criterion for defining project categories (that is, Level 1 = >2 acres to 4 acres; Level 2 = >4 acres to 20 acres; Level 3 = > 20 acres), a locality might instead choose to utilize the project's rated capacity (for example, Level 1 = >500 kW to 1 MW; Level 2 = > 1MW to 5 MW; Level 3 = > 5MW). Members of DEQ's Technical Solar Group in 2012 advised that, in Virginia, approximately 2 ½ MW of electricity can be generated by 10 acres of PV panels, with current technology.

4. Location of substations, electrical cabling from the solar systems to the substations, ancillary equipment, buildings, and structures (including those within any applicable setbacks).
5. Fencing or other methods of ensuring public safety.
6. Additional information may be required, as determined by the **[local official],** such as a scaled elevation view and other supporting drawings, photographs of the proposed site, photo or other realistic simulations or modeling of the proposed solar energy project from potentially sensitive locations as deemed necessary by the **[local official]** to assess the visual impact of the project, landscaping and screening plan, coverage map, and additional information that may be necessary for a technical review of the proposal.

C. DOCUMENTATION OF RIGHT TO USE PROPERTY FOR THE PROPOSED PROJECT
Documentation shall include proof of control over the land or possession of the right to use the land in the manner requested. The applicant may redact sensitive financial or confidential information.

D. ["Glint and Glare" Study – provision not recommended][8]

E. DECOMMISSIONING PLAN
The application shall include a decommissioning plan and other documents required by the Decommissioning section of this ordinance.

F. LIABILITY INSURANCE [9]
The applicant shall provide proof of adequate liability insurance for a larger-scale solar energy project prior to issuance of a zoning or building permit **[or prior to beginning construction].**

[8] At this writing, glint and glare studies were not found in adopted Virginia solar ordinances, and it is believed that solar technologies that can realistically be utilized in Virginia do not create glint or glare problems. If, however, a locality wishes to consider a glint and glare provision, the following is utilized by Delaware Township, NJ: "A 'Glint and Glare Study' shall be provided to demonstrate that the panels are located and installed so that the sum of the glare is directed away from an adjoining property or public rights of way." *See also* Argonne National Laboratory: 5 Impacts of Solar Energy Development and Potential Mitigation Measures ("Solar facilities should be sited and designed properly to eliminate glint and glare effects on roadway users, nearby residences, commercial areas, or other highly sensitive viewing locations, or to reduce them to the lowest achievable levels. Regardless of the solar technology proposed, a study to accurately assess and quantify potential glint and glare effects and to determine the potential health, safety, and visual impacts associated with glint and glare should be conducted. The assessment should be conducted by qualified individuals using appropriate and commonly accepted software and procedures.")

[9] **Liability Insurance.** Localities will need to decide what "adequate liability insurance" means in the context of local land use requirements. Typically, insurance requirements will be subject to the amount of investment, including installation costs, in the facility. Rather than providing a specific dollar amount, localities might want to develop a sliding scale based upon investment amount or some other indicator used by the locality in other contexts. It is suggested that localities require no greater amount of liability insurance for large solar projects than they do for other comparable types of development.

6. LOCATION, APPEARANCE, AND OPERATION OF A PROJECT SITE[10]

A. VISUAL IMPACTS[11]

The applicant shall demonstrate through project siting and proposed mitigation, if necessary, that the solar project minimizes impacts on the visual character of a scenic landscape, scenic vista, or scenic corridor as identified in the comprehensive plan.[12]

B. SIGNAGE

Warning signage shall be placed on solar equipment to the extent appropriate. Solar equipment shall not be used for displaying any advertising except for reasonable identification of the manufacturer or operator of the solar energy project. All signs, flags, streamers or similar items, both temporary and permanent, are prohibited on solar equipment except as follows: (a) manufacturer's or installer's identification; (b) appropriate warning signs and placards; (c) signs that may be required by a federal agency; and (d) signs that provide a 24-hour emergency contact phone number and warn of any danger. Educational signs providing information about the project and benefits of renewable energy may be allowed as provided in the local sign ordinance.

C. NOISE[13]

Noise requirements for Solar Energy Projects shall be no more stringent than noise requirements for other types of development in the underlying zoning district.

D. SETBACKS[14]

Solar equipment should be set back in compliance with the setback requirements for other types of development in the zoning district.

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[10] **General Siting Requirements.** There are a variety of zoning considerations related to nuisance, appearance, and public safety. This section contains provisions for various factors typically considered in a solar ordinance, with the exception of language concerning minimum lot size. There is no minimum recommended lot size. The ordinance provisions for setbacks that ensure a safe operating environment also define the minimum lot size.

[11] **Visual Impacts.** Very large solar energy projects have a visual presence in the landscape. Some communities may be concerned about the visual impact of these facilities. The language provided is designed to enable localities to explicitly address visual impacts without restricting access to solar resources. Note: Visual impacts of renewable energy projects on historic resources are addressed by the state's Renewable Energy Permit by Rule Regulations, and provisions on this issue are not recommended as part of the model ordinance.

[12] This provision assumes designation of scenic resources in a local comprehensive plan. If no such designation has occurred, then this provision is not applicable and not recommended. If the comprehensive plan is not a useful tool for identifying which scenic resources should be protected, then a locality is encouraged to utilize another approach that it deems more appropriate.

[13] **Noise. Although noise is not an issue commonly associated with solar projects** (except, perhaps, during the construction phase), Virginia law requires that solar ordinances contain a noise provision (*see* §67-103 of the Code of Virginia). Since the Virginia Code also requires local governments to encourage renewable energy when enacting solar ordinances, it is recommended that any established noise limit(s) for solar energy projects not be more restrictive than what is already in place for other land uses.

[14] **Setbacks.** Virginia law requires that solar ordinances contain a setbacks provision (*see* §67-103 of the Code of Virginia).

E. [FENCING – NO PROVISION RECOMMENDED][15]

F. [VEGETATION – NO PROVISION RECOMMENDED][16]

7. DECOMMISSIONING[17]

A. DECOMMISSIONING PLAN

As part of the project application, the applicant shall submit a decommissioning plan, which may include the following: (1) the anticipated life of the project; (2) the estimated decommissioning cost in current dollars; (3) how said estimate was determined; and (4) the manner in which the project will be decommissioned.

B. UNSAFE OR ABANDONED PROJECTS

1. If a Solar Energy Project has been determined to be unsafe by the **[locality]** Building Code Official, the Solar Energy Project shall be required to be repaired by the owner or operator to meet federal, state and local safety standards, or be removed by the owner or operator within the time period allowed by the **[locality]** Building Code Official. If the own-

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[15] **Fencing.** No provision recommended. (*See*, instead, reference to fencing or other methods of ensuring public safety under Location, Appearance, and Operation of a Project Site.) The Pima (AZ) Ordinance, however, requires owners/operators to install fencing around ground-mounted systems ("The minimum required fencing for a ground-mounted system is a perimeter chain link fence meeting minimum setback requirements, however, the Hearing Administrator may recommend additional or alternative specific types of fencing, screening, and/or walls appropriate to the site and surrounding land use(s) not otherwise prohibited by this title."). According to experts on DEQ's Solar Regulatory Advisory Panel, only relatively benign types of solar projects (photovoltaic systems and concentrating photovoltaic systems) appear to be realistic possibilities in Virginia, so such fencing requirements are likely unnecessary. If, however, fencing is required for other types of projects in the underlying zoning district, then these requirements would likely apply to solar projects as well. Such provisions should meet the requirements of the National Electric Code.

[16] **Vegetative Buffer. No provision recommended.** The following requirements, however, are adapted from the Northampton (VA) ordinance. This is another example of the type of provision that local governments should only consider implementing if they have compelling reasons to do so, counterbalancing the requirements of Virginia's Energy Policy to encourage renewable energy.

> A vegetated buffer is required that consists of a landscaped strip at least **[50]** feet wide measured from each boundary line of the property around the entire perimeter of the property. This buffer should be made up of plant materials that are mature enough to effectively screen the view, to **[eight feet]** above ground level, of the solar panels from adjacent properties all year around. A landscape berm properly prepared to accept plants, up to **[four feet]** high, may be used to assist reaching the required screening height. The screening must be fully established within **[five years]** and effectively maintained for the life of the project. Non-invasive plant species must be used. Any fencing must be installed on the interior of the buffer. A recommendation that the screening and / or buffer creation requirements be waived may be made by the **[locality planning commission]** when the applicant proposes to use existing wetlands or woodlands, as long as the wetlands or woodlands are permanently protected for use as a buffer.
>
> Existing vegetation may be removed only as authorized during the site plan review process to permit vehicular and utility access during construction of the facility and installation of power transmission lines.

[17] **Decommissioning.** Under Virginia law, a solar ordinance must contain a decommissioning provision (*see* §67-103 of the Code of Virginia). *See also,* the requirements of other localities.

er or operator fails to remove or repair the unsafe solar energy project, the **[locality]** may pursue a legal action to have the Project removed at the owner's or operator's expense. [-Dominion suggests deleting paragraph 1. As they commented re Smaller-Scale ordinance, safety requirements apply to all types of projects, and not just solar. As in Smaller-Scale, I'm leaving it for now, because it provides comfort level to govt & citizens. Dominion also suggested inclusion of second paragraph in Smaller-Scale Decommissioning provision. I've added that paragraph as #2 below.]

2. When the owner or other responsible party decommissions a Solar Energy Project, he shall handle and dispose of the equipment and other project components in conformance with state and local requirements.

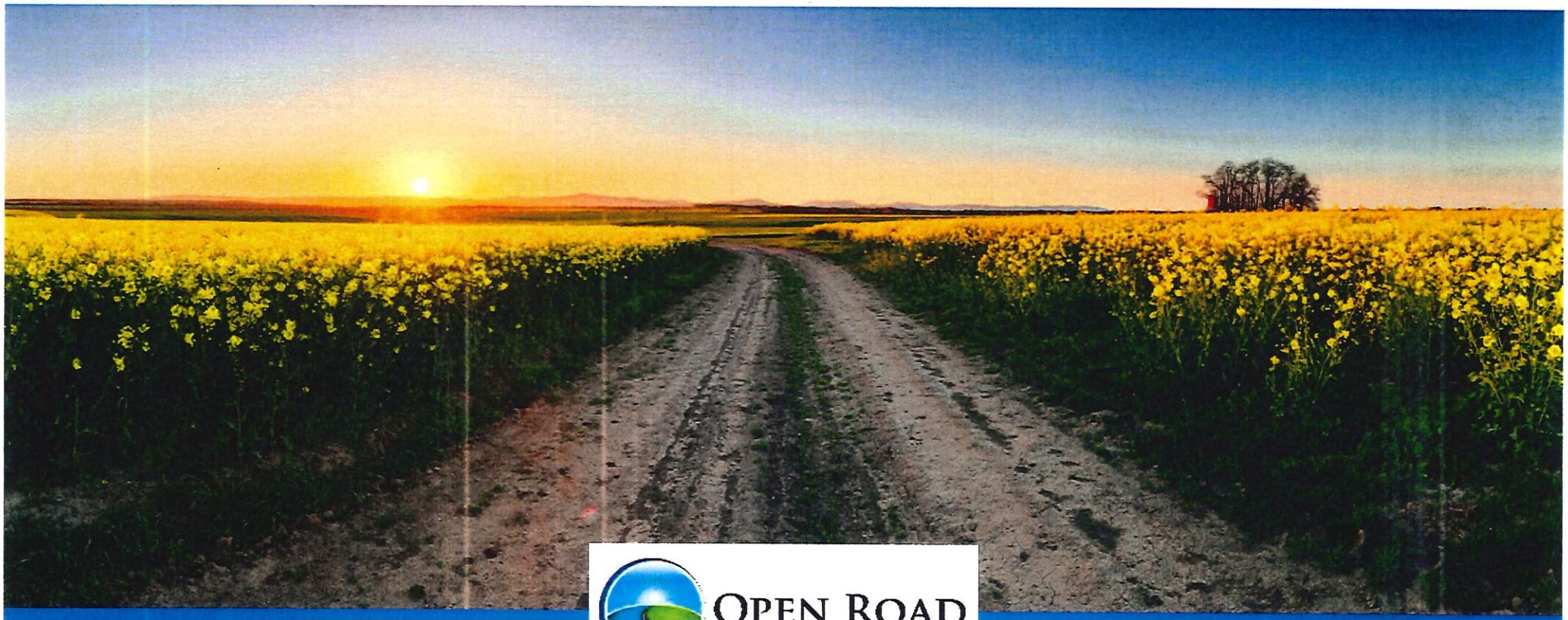
3. At such time that a solar energy project is scheduled to be abandoned, the owner or operator shall notify the **[locality's chief administrative officer or his/her designee].**[18]

4. Within **[365 days]** of the date of abandonment, the owner or operator shall complete the physical removal of the solar energy project, if requested by the **[local governing body].** This period may be extended at the request of the owner or operator, upon approval of the **[local governing body].**

5. **[For Level 3 projects,]**[19] the **[local governing body]** may require reliable methods of secured funding sources to ensure that performance obligations under the local government approvals are satisfied, up to and including the costs for decommissioning.

[18] **Abandonment.** It is assumed that local governments will utilize or adapt their normal definition of "abandoned" for solar projects.

[19] **Surety.** It is recommended that sureties be required for Level 3 projects, which would have a disturbance zone >20 acres. Some members of the Solar Technical Group expressed concern that, if projects of even modest scale (*e.g.*, under 2 MW or less than 5 acres of disturbance zone) are required to meet surety (bonding) requirements, then we may inadvertently have blocked development of medium sized projects. According to one member of the group, if we have a 550 kW project or a project on 3 acres, providing bonding on the project most likely will make the project uneconomical in Virginia, as the investor returns for projects in Virginia already have difficulty meeting minimum thresholds, given low electricity rates in VA. In contrast to these comments, a VACO representative expressed concern that local governments may want surety for all projects in the larger-scale category, and not just for Level 3 projects. Hence, there are brackets around "Level 3."



OPEN ROAD
RENEWABLES

Information about Solar Farms

December 2019

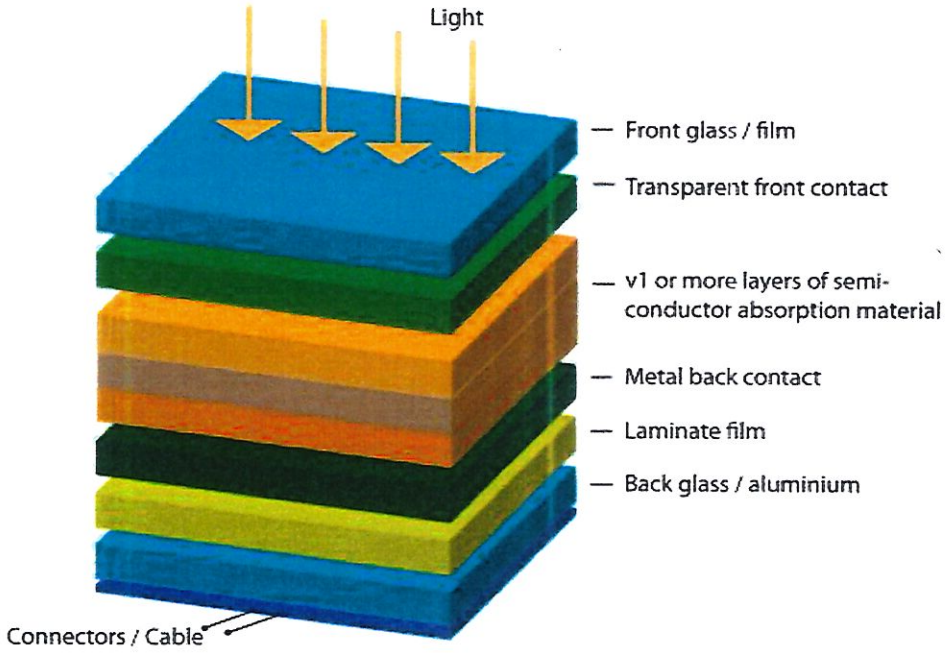
Topics

- Basics
- Photovoltaic Technology
- Safety
- Components of Solar Farms
- Impacts
- Land Use
- Appearance
- Vegetative Screening
- Decommissioning

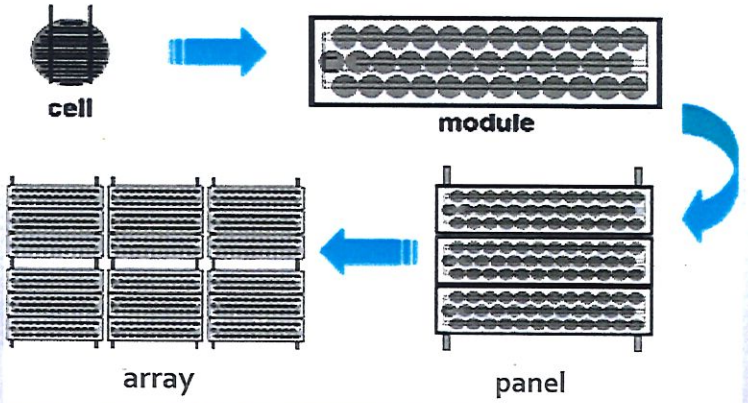
Basics

- Clean energy for thousands of homes and businesses
- Power delivered to existing transmission line
- Land is zoned agricultural
- Solar is a conditional use
- Rows of solar panels on driven posts
- Collects power through buried lines
- Will be removed in 40 years

"Photovoltaics" or "PV"



- PV: cells → modules → panels → arrays
- Non-thermal/non-combustion
- Photons from sunlight strike semiconducting material & excite electrons to generate current



Safety

- Solar is proven and mature technology
- Basic technology is >50 years old
- Contain no liquids that can spill
- Mostly metal, glass and polymers/plastics
- Very thin layer of semi-conductor material
- Encapsulated in water-tight envelope to protect function
- Glass is tempered, shatter-resistant
- Designed to withstand high winds and hail
- Natural disasters can cause a mess, but not leaks or contamination
- Can be recycled or disposed of in regular landfills

"Photovoltaic (PV) technologies and solar inverters are not known to pose any significant health dangers to their neighbors."

N.C. Clean Energy Technology Center, N.C. State University "Health and Safety Impacts of Solar Photovoltaics" (May 2017), p. 1.

Components of a Solar Farm

Primary Components

- Solar Panels
- Piles
- Racking
- Inverters
- Collection Lines
- Substation

Secondary Components

- Fencing
- Roads
- Pyranometers
- Data/Computer Building
- Stormwater Management Features

Solar Panels: 2 types

Crystalline

- Silicon-based
- Costs more, but produces more energy
- Most common type globally

Thin Film

- Cadmium Telluride-based ("CdTe")
- Costs less, but produces less energy
- Proprietary technology
- Very thin: $1/_{26}$ thickness of a human hair
- CdTe is solid, stable, and insoluble in water
- Tested for safety during breakage and fire
- EPA classifies as regular landfill waste
- Manufacturer recycles 100% of its panels

Piles

- Driven or screwed
- No foundations
- Galvanized steel
- Usually 5-10 feet deep

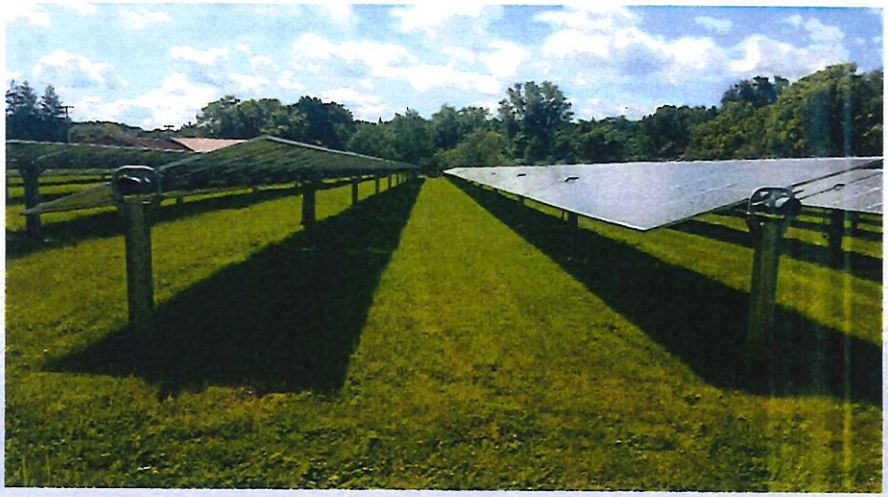
Racking: 2 types

Fixed

- Rows run eat to west
- Panels tiled to south
- Costs less

Tracking

- Row run north to south
- Panels rotate east-to-west during day
- Produces more energy



Inverters

- Convert Direct Current (solar) to Alternating Current (transmission system)
- Increase voltage to 34.5 kV
- About the size of a Chevy Suburban
- 1 inverter per 2-3 MW of generating capacity
- Mounted on concrete pads, gravel pads or metal skids

Collection Lines

- Buried cables that carry electricity from solar panels to inverters and inverters to substation
- Typically 3 feet below grade
- Trench typically cut and collection lines installed in one step

Substation

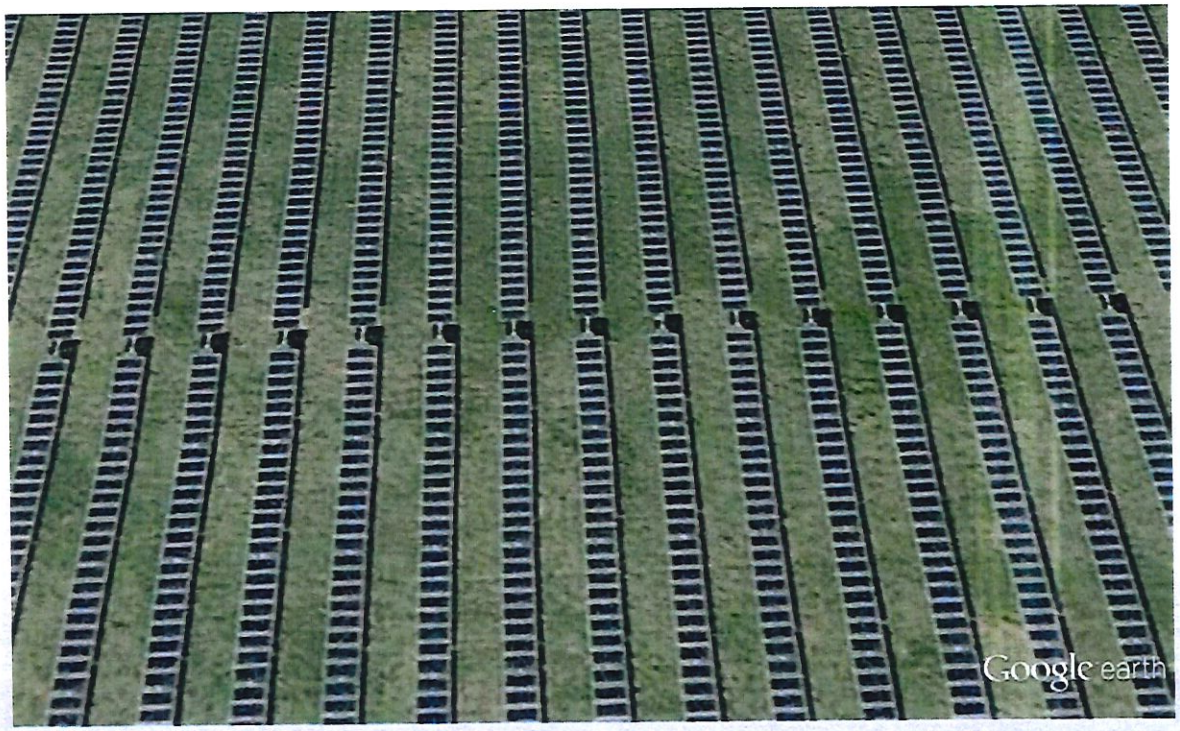
- Collects power and delivers it to transmission system
- Increases voltage to that of existing transmission line
- Can include 1 or 2 depending on whether there is already 1 on transmission line
- Looks like any typical electric substation

Impacts

- No odor
- No dust
- No discernable moving parts
- Insignificant noise
- Virtually no light
- Does not operate at night
- No office
- Insignificant traffic

Land Use

- Project will have minimal grading
- Topsoil will remain to grow turf grass
- Roads are aggregate; no pavement
- Very few foundations
- Turf grass will be planted throughout, even under panels
- Primarily mowing and weed trimmers to maintain grass
- Mostly rain, but occasionally soap and water will be used to clean panels
- 2/3 of site area is just turf grass



Appearance

- Project has a low and even profile
- Maximum height is 15 feet
- Setbacks from roads and parcel lines
- Existing trees and selective vegetative screening breaks up view

Vegetative Screening

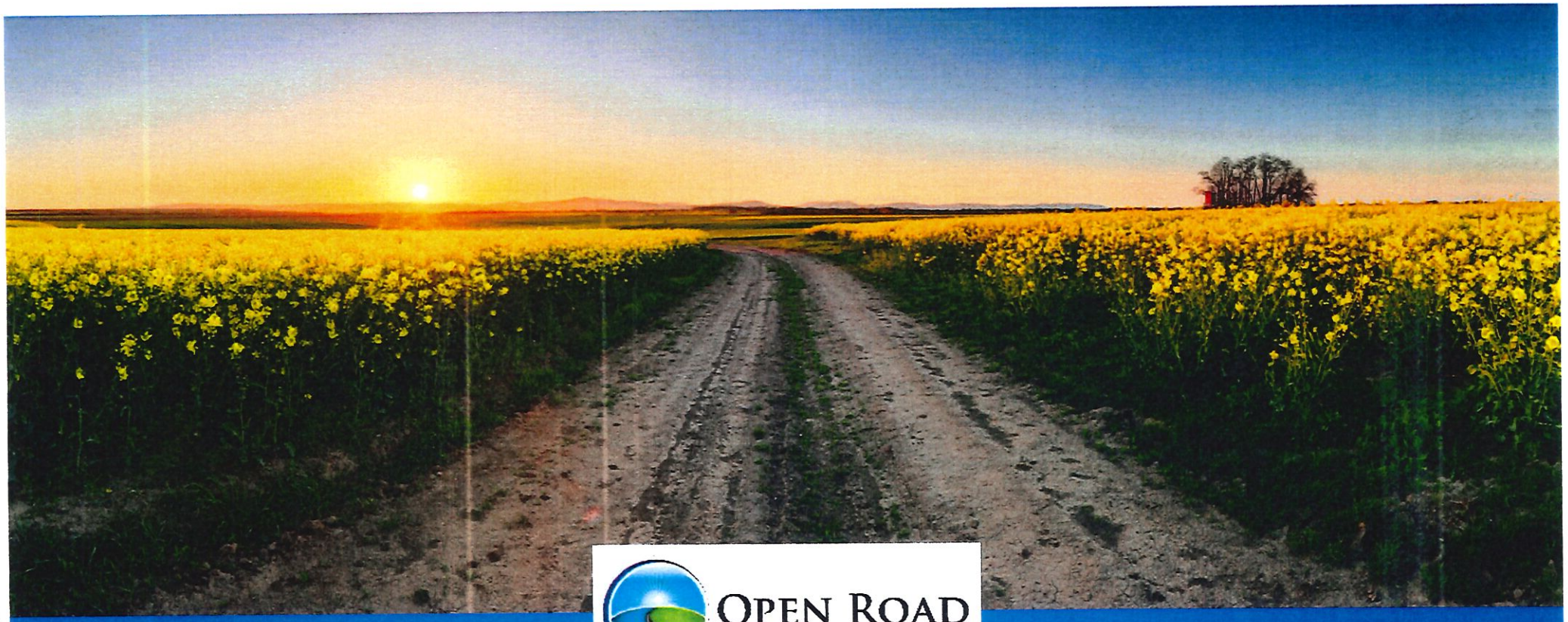
- Screening may be appropriate to minimize the appearance of a solar farm from "sensitive receptors" such as nearby residences or scenic vistas
- Consists of a "row" of hedges, short trees or naturalized, native plantings to create "green wall"
- Cost is not inconsequential, and so usually not applied as blanket approach to entire perimeter

Decommissioning

- Panels have power warranties of 25+ years
- Project will last up to 40 years
- Relatively easy to remove:
  - Most land is unoccupied
  - Very few foundations
  - No pavement
  - Turf grass holds soil in place
- "small but manageable impact on the future agricultural productivity of the land" (NC State)
- Decommissioning plan will be in place prior to construction
- Financial surety provided and periodically updated

"Modern solar facilities may be considered a temporary, albeit long-term, use of the land, in the sense that the systems can be readily removed from the site at the end of their productive life."

N.C. Clean Energy Technology Center, N.C. State University "Balancing Agricultural Productivity with Ground-Based Solar Photovoltaic (PV) Development" (August 2017), p. 4.



OPEN ROAD
RENEWABLES