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July 26, 2024

Yavapai County Development Services
1120 Commerce Drive
Prescott, AZ 86305

RE: August 8th Planning and Zoning Meeting: Solar Facilities Zoning Ordinance Amendment – Sections 501 & 608

Supervisors, Commissioners, and Staff,

AriSEIA previously submitted a letter and redlines on the first draft of the ordinance on June 10th, we submitted a second letter on July 11th, and this letter includes redlines on the second draft as **Attachment A**. We only had four business days between receiving the second draft of the ordinance and the deadline for comments on the final draft. We encourage you to take more time with this ordinance and not vote to send it on to the Board on August 8th.

**Our two largest concerns continue to be the acreage caps and the setback requirements found in Section 608(F).** The acreage caps are arbitrary. 3,000 acres per project is too low. We recommend 5,000 acres per project, if you feel you need a cap at all. *There should be no cumulative cap on acreage development in the County.* The 8,000 acre cap is in conflict with the County's Comprehensive Plan, which was adopted in 2023. The Energy Element of the Comprehensive Plan "promotes the use of clean energy sources, such as solar, wind, geothermal, and biofuels."[1] The Plan is intended to "identify policies and practices that increase the use of renewable energy sources."[2] It goes on to say that "[t]hrough the Energy Element, the County can encourage the efficient use of energy and promote clean, renewable energy production."[3] Finally, the Plan also says the County will "[a]dvocate for the development of renewable energy sources that are not water intensive."[4] Solar uses very little water. We have included some data on lifecycle water uses of various electric generating resources in Figures 1 and 2 below.

The acreage cap will limit solar development in Yavapai County. Our member companies have confirmed that they will *not* apply for a waiver in a jurisdiction with a cap, if they do not already own land, because it is simply too risky. This limits the economic development opportunities of the County, as well as the electric reliability of our grid. As the economic impact assessment we

[1] Comprehensive Plan Update 2023, Yavapai County Government, Section 8.0, P.101, *available here* https://www.yavapaiaz.gov/files/sharedassets/public/v/1/development-and-permits/development-services/documents/yavapai_cty_comp_plan.pdf (emphasis added).
[2] *Id* (emphasis added).
[3] *Id* (emphasis added).
[4] *Id.* at 108 (emphasis added).

provided reflects, even a smaller (200 MW) project would bring more than $200M in economic activity to the County over the life of the project, as well as hundreds of jobs during construction.

A cap could also result in a race to build projects and not result in the best projects being built. We encourage you to remove the cap entirely and review these projects qualitatively on a case-by-case basis. If a project is not a good fit for the County you can deny it, regardless of how many acres are or are not being utilized for solar within the County.

The setbacks continue to be a concern, as well. They are simply too large. We recommended specific parameters for buffer zones in our July 11th letter and in our redlines in Attachment A. Section 8.5.1 of the Comprehensive Plan recognizes the need to mitigate some of the environmental impacts of large scale energy projects, such as solar. The Plan says that "the County finds it preferable for utility-scale projects to be sited as close as practical to existing transmission lines and power substations."[5] The numerous restrictions, including onerous setbacks reduce the plausibility of this stated preference.

Finally, given the tight turnaround time in between rounds of comments, we were not able to research and answer Commissioners' questions regarding vehicle to grid storage, off grid systems, or wildfire shutoffs. However, we have included information as to the waste generated by solar panels. I have also included a fact sheet on Solar Panel Recycling and Disposal as **Attachment B**. Columbia Law School's Rebutting 33 False Claims About Solar, Wind, and Electric Vehicles, False Claim #3 is also included as **Attachment C**.[6] While solar produces a small amount of waste, relative to other waste streams (see Figures 3 and 4 below), considerable effort is being spent to reduce its waste. The national Solar Energy Industries Association (SEIA) has a PV recycling program[7] and the Department of Energy (DOE) is also working on innovative ways to reduce waste.[8] AriSEIA has member companies that work on refurbishment and recycling of solar panels, as well as second life utilization of lithium-ion batteries.

At the August 8th meeting we encourage you to slow the pace of the ordinance so that the Staff has time to incorporate the feedback received in the next version. We still recommend a joint stakeholder working session to discuss any outstanding redlines. **When the ordinance is ready for a vote, we strongly recommend that it not include a countywide acreage cap.**

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[5] *Id.* at 105.
[6] Columbia Law School, Rebutting 33 False Claims About Solar, Wind, and Electric Vehicles, False Claim #3 Solar Panels Generate Too Much Waste and Will Overwhelm Our Landfills, P.4, *available here*
[7] SEIA National PV Recycling Program, *available here* https://www.seia.org/initiatives/seia-national-pv-recycling-program.
[8] DOE, Beyond Recycling: Reducing waste from Solar Modules Before They're Even Made, March 5, 2024, *available here* https://www.energy.gov/eere/solar/articles/beyond-recycling-reducing-waste-solar-modules-theyre-even-made.

Respectfully,


/s/ Autumn T. Johnson
*Executive Director*
**AriSEIA**
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autumn@ariseia.org


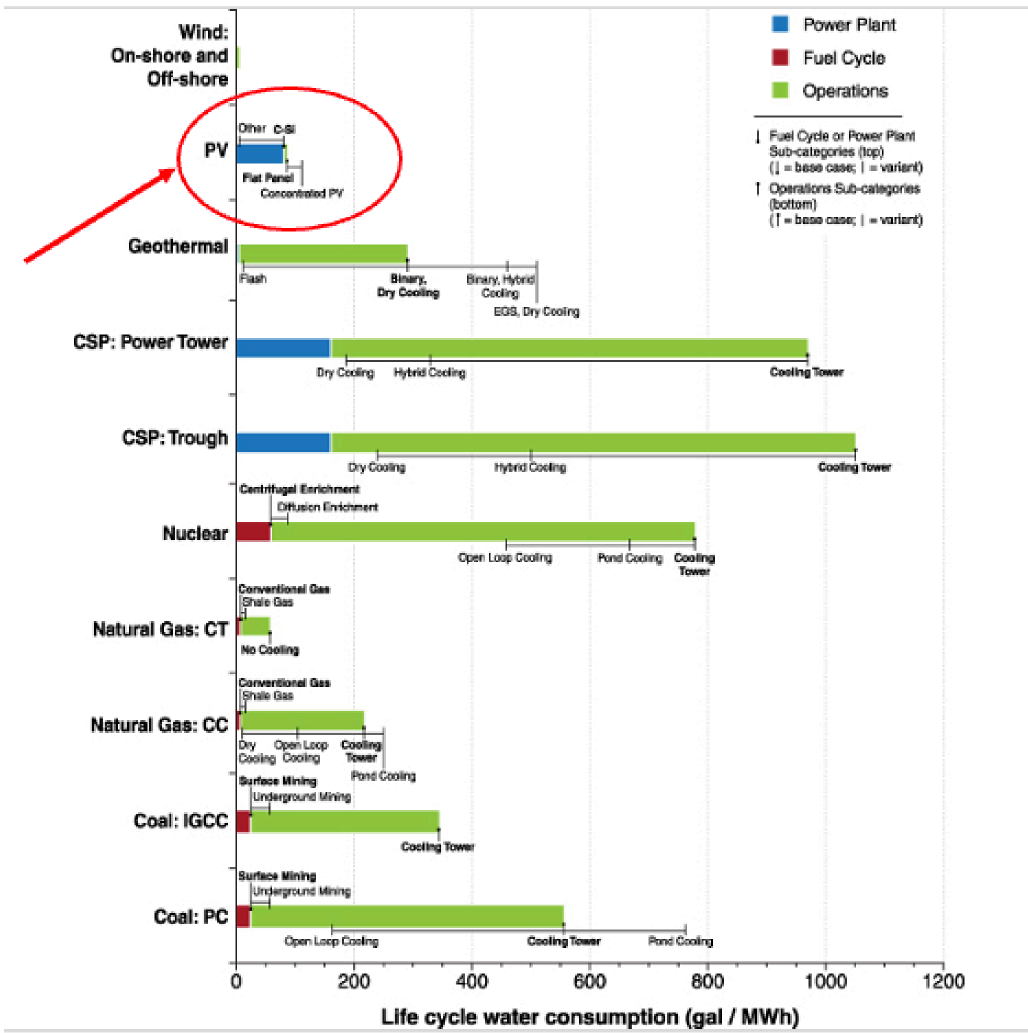


Figure 1. Lifecycle water consumption of electricity generation technologies (J Meldrum et al 2013 Environ. Res. Lett. 8 015031)

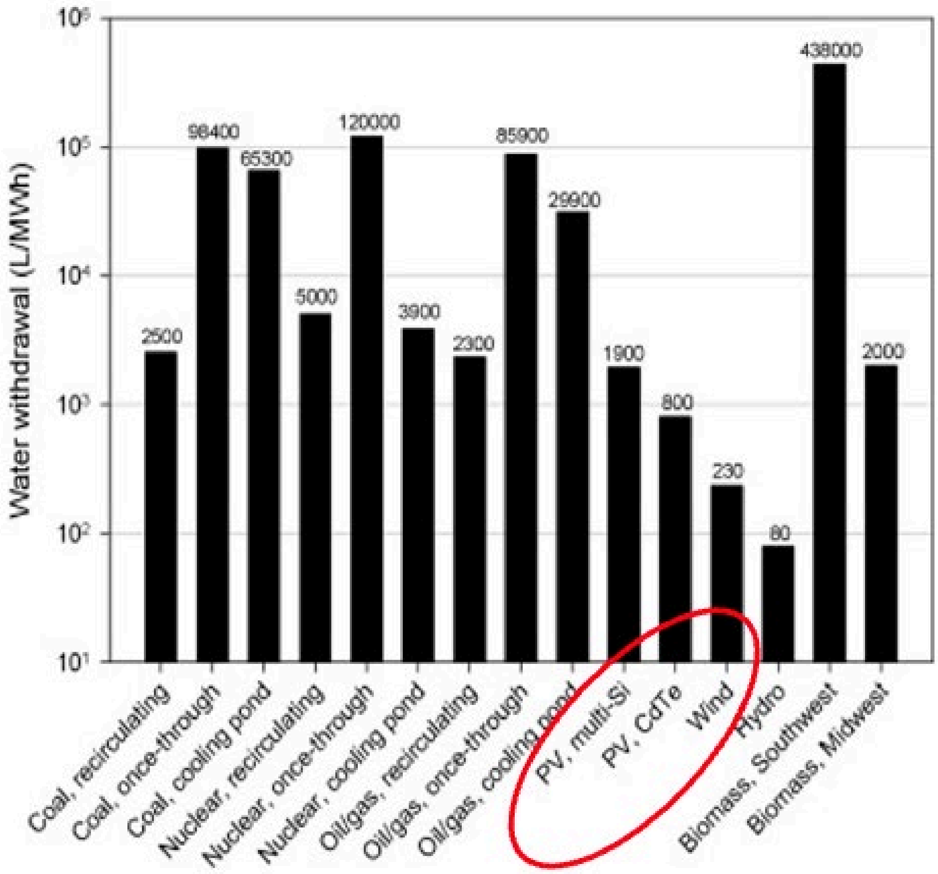


Figure 2: Comparison of water withdrawal across fuel cycles for various power generation plants (Vasilis Fthenakis, Hyung Chul Kim, 2010)

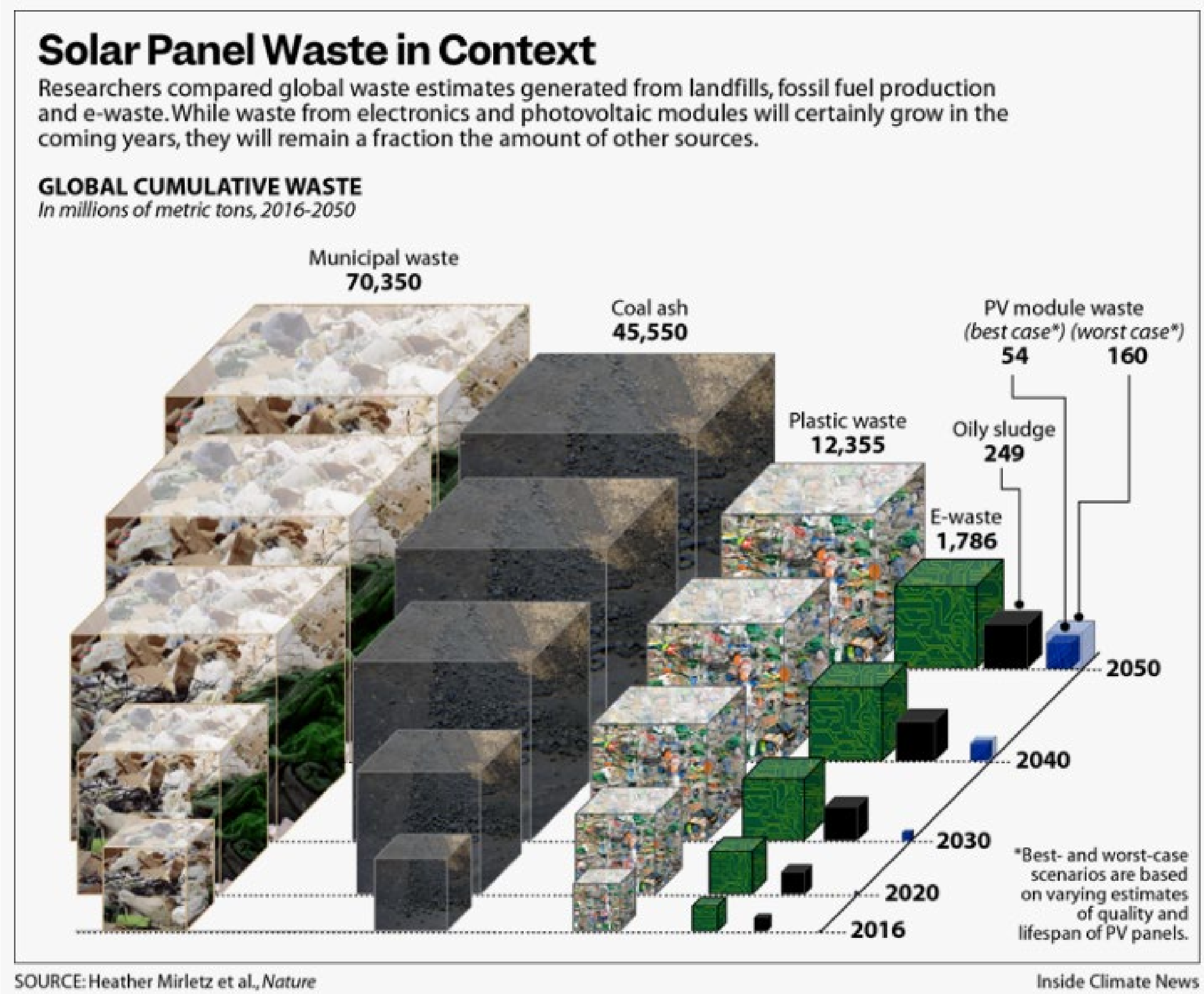


Figure 3: A comparison of waste streams between solar and other types of waste.[9]

[9] Inside Climate News, A Reality Check About Solar Panel Waste and the Effects on Human Health, October 12, 2023, *available here* https://insideclimatenews.org/news/12102023/inside-clean-energy-reality-check-solar-panel-waste/.

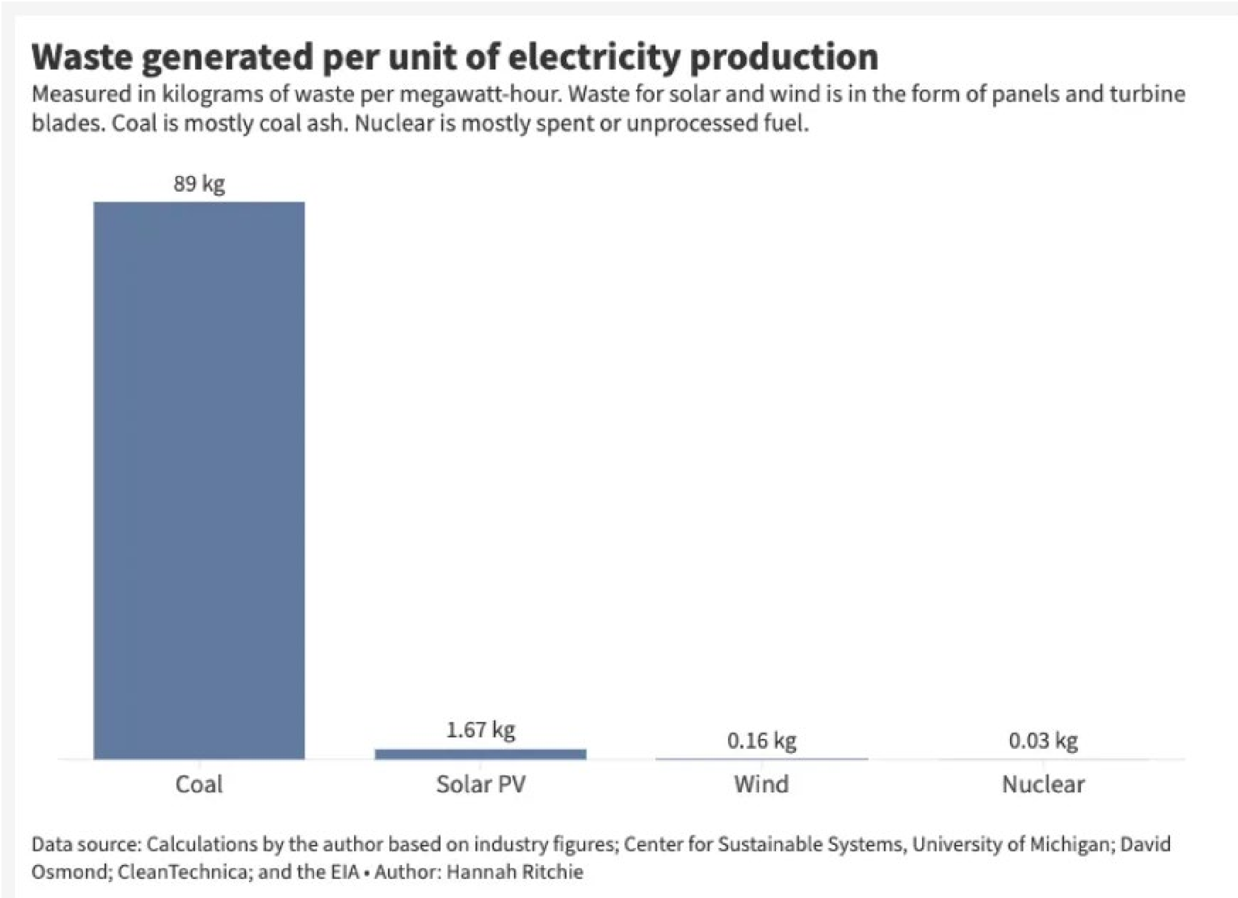


Figure 4: Waste based on electricity generating type.[10]

[10] Sustainability by the Numbers, How Much Waste do Solar Panels and Wind Turbines Produce, *available here* https://www.sustainabilitybynumbers.com/p/renewables-waste.

# ATTACHMENT A

PLA24-000042 Solar Facilities Zoning Ordinance Amendment (revised JULY 15, 2024).

The following modifications and additions will be made to the Yavapai County Planning and Zoning Ordinance.

Modification to SECTION 410 R1L DISTRICT (additions in **bold type/underlining** and deletions shown with a ~~single strike through~~):

410.G.10. Behind the meter ~~S~~solar installations and wind turbines ~~for on-site use only (including NET METERING as adopted by the Arizona Corporation Commission)~~ except that wind turbines ~~and ground mount solar panels~~ must meet district building height limitations above natural grade and principal setback requirements. **Small-Scale Solar Use requirements are set forth in Section 501.E Accessory Uses and Structures.**

Changes from the FIRST Review Draft are shown with additions in **bold type/underlining** and deletions with a ~~single strike through~~.

**SECTION 501 ACCESSORY USES AND STRUCTURES**

E. SMALL-SCALE SOLAR USE of solar energy electricity generating equipment, as defined in Section 608, will be permitted ~~for the purpose of reducing onsite consumption of utility power~~, provided that the following performance standards are met: 1. Roof-mounted p**P**hotovoltaic **(PV)** panels will not extend ~~above the peak of the roof plane where it is mounted and no portion of any such photovoltaic~~ panel will extend more than twenty-four (24”) inches **above the surface of the roof** as measured perpendicularly to the roof at the point where it is mounted**., and PV panels must meet district building height limitations above natural grade.**

3**2**. Ground-mounted photovoltaic**PV** panels will not exceed ~~ten (10’)~~**fifteen (15’)** feet in total height and must follow principal setbacks of the ~~zoning/density~~district.

**3. Support structures such as canopies and carports that incorporate PV panels will be subject to building permits and zoning requirements for the structure type and are not subject to the restrictions noted in E(2) above.**

4. ~~All~~ When practical, utility service lines serving ground-mounted ~~photovoltaic~~**PV** panels must be located underground.

**Commented [AriSEIA1]:** Can this be clarified further?

**Commented [AriSEIA2R1]:** You could also say “distributed” or your could say “primarily used for on-site generation, even if excess power is exported back to the grid,” etc.

**Commented [AriSEIA3]:** Too restrictive. Why is it only permitted to reduce onsite consumption of utility power? Would this limit the use of batteries at substations or other locations? Would it limit microgrids at multiple building campuses? If the state allowed community solar, would this be possible with this ordinance?

**Commented [AriSEIA4]:** This is a problem for flat roofs. Prefer this removed or modified for flat roofs.

**Commented [AriSEIA5]:** What if the array location is adjacent to the overhead service entrance? This should not apply to all situations. It could add cost or unnecessary complications to some projects.

5. All components servicing ~~photovoltaic~~**PV** panels must be concealed **or screened to blend in with the surroundings,** including mechanical piping, electrical conduits, and the like.
6. Battery energy storage associated with ~~s~~**S**mall-~~s~~**S**cale ~~s~~**S**olar ~~u~~**U**se **for one family and two-family dwelling units** will be limited to ~~fifty (50 kW)~~ ~~kilowatts~~**eighty (80 kWh)** **kilowatt-hours aggregate, and must comply with the County's most current adopted building code and the requirements of the fire jurisdiction having authority**.
7. **Battery energy storage exceeding eighty (80 kWh) kilowatt-hours aggregate for Small-Scale Solar Use will be subject to Section 1206 of the 2018 International Fire Code and its subsequent editions.**

**Commented [AriSEIA6]:** There needs to be exceptions to this. For example, what if the array is not in public view? What is the concealment could impair safety or the warranty of the equipment installed? Also, please see ARS 33-1816. It is for HOAs, but the intent is noteworthy.

**Commented [AriSEIA7]:** Is this AC or DC?

**Commented [AriSEIA8]:** Is this redundant to what is included in Section R327-Energy Storage Systems of you residential code?

Changes from the FIRST Review Draft are shown with additions in **bold type/underlining** and deletions with a ~~single strike through~~.

**SECTION 608 SOLAR FACILITIES**

A. PURPOSE: This Section establishes processes, requirements and performance standards for the placing, design, construction, operation, monitoring, modification, and removal of ~~u~~**U**tility-~~s~~**S**cale ~~s~~**S**olar ~~f~~**F**acilities. This Section:

1. Gives County residents, leaders, staff, and developers clear direction on the appropriate siting of ~~s~~**S**olar ~~f~~**F**acilities while considering unique permitting conditions for each site;
2. Provides standards for the placement, design, construction, monitoring, modification, and removal of ~~u~~**U**tility-~~s~~**S**cale ~~s~~**S**olar ~~f~~**F**acilities;
3. Protects and promotes public safety and welfare;
4. Promotes reliable, clean energy sources by providing clear standards to encourage ~~u~~**U**tility-~~s~~**S**cale ~~s~~**S**olar ~~f~~**F**acilities that:
   a. Minimize and mitigate impacts on natural, cultural, and recreational resources;
   b. Maintain and protect wildlife populations and corridors, viewsheds, vegetative communities, dark skies, air quality, and natural quiet;
   c. Protect property values;
   d. Offer private landholders options for economic diversity and stability; and e. Provide adequate financial assurance for decommissioning of facilities. 5. Supports projects that provide clear benefits to the County, such as revenue generation, job creation, and economic and environmental benefits.

Small-Scale Solar Use standards are addressed in Section 410.G.10 and Section 501.E and are excluded from this Section.

B. DEFINITIONS: Throughout this Ordinance, the following terms, phrases, words, and their derivations shall have the meaning given on the following pages. When not inconsistent with the context, words used in the present tense include the plural number. The word "shall" is always mandatory and not merely directory. The word "person" includes individuals, partnerships, corporations, clubs, and associations. The following words or terms when applied to this Ordinance shall carry full force when used interchangeably: lot, plot, parcel, or premises; used, arranged, occupied, or maintained; sold, or dispensed; construct, reconstruct, erect, place, or alter (structurally or otherwise).

**Agrivoltaics:** Agricultural production, such as crop or livestock production or pollinator habitats, underneath or adjacent to PV panels (also known as agrisolar or dual-use solar). This practice may help to prevent water evaporation and produce a localized cooling effect.

**Battery Energy Storage System (BESS):** A physical container providing secondary containment to battery cells that is equipped with cooling, ventilation, fire suppression, and a ~~b~~**B**attery ~~m~~**M**anagement ~~s~~**S**ystem (BMS).

**Battery Energy Storage System (BESS) Facility: A commercial facility containing a group of batteries used to store and dispatch electric energy along with its component parts including associated containers, ventilation, fire safety equipment, associated fencing, landscaping, parking lots, and support structures and buildings. A BESS Facility may also include electrical substations, transformers, ~~transmission lines~~, inverters, metering,** and **communications equipment,~~ and transmission poles~~. BESS Facilities may be part of a Solar Facility Use Permit where permitted by these regulations.**

**Battery Management System (BMS):** An electronic regulator that manages a ~~b~~**B**attery ~~e~~**E**nergy ~~s~~**S**torage ~~s~~**S**ystem (BESS) by monitoring individual battery module voltages and temperatures, container temperature and humidity, off-gassing of combustible gas, fire, ground fault and direct current (DC) surge, and door access, and is also capable of shutting down the system before operating outside of safe parameters.

**Brownfield:** A former industrial or commercial site for which the expansion, redevelopment, or reuse of the site may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant.

**Concentrating Solar Thermal Devices/Towers (CSV):** A device using mirrors to reflect and concentrate sunlight onto a receiver. The use of such devices will not be permitted.

**Critical Habitat:** As defined in the Endangered Species Act, specific geographic areas that contain features essential to the conservation of an endangered or threatened species and that may require special management and protection. These areas are delineated by the U.S. Fish and Wildlife Service.

**Desktop Study:** A preliminary review of readily available and accessible information about a project site to help determine existing characteristics and conditions of the Project Area and vicinity, and whether additional data may be needed. **These studies will include a literature review of current scientific research related to wildlife, vegetation, water resources, and cultural, archaeological, and historic features that may be present.** Desktop ~~s~~**S**tudies will be used to make early decisions regarding appropriate site locations, buffering requirements, design, and construction alternatives, which will help to improve time and cost estimates for the applicant by avoiding unforeseen obstacles.

**Development Area**: The portion of the Project Area where ground disturbance occurs and project infrastructure is installed, including features beyond the project security fence such as transmission or collector lines and driveways. The Development Area does not include buffers, wildlife corridors, or other areas which remain unfenced and undisturbed.

**Hillside: The slope of a landform that rises above or descends below the surrounding terrain and has a distinct summit. For the purposes of this Section, the term Hillside may be applied to the rising or descending side of land features in the terrain that may be referred to as a hill, hillock, knoll, bluff, dune, talus, eminence, mound, prominence, promontory, cliff, valley flank, declination, dip, drop, pitch, ditch, depression, crater, etc.**

**Important Bird Area:** Areas identified, monitored, and protected by the Audubon Society as being vital to the continued existence of a large variety of bird species.

**Integrated Photovoltaic (Integrated PV):** Photovoltaics incorporated into building materials, such as shingles.

**Photovoltaic (PV):** A material or device, such as a ~~p~~**P**hotovoltaic panel, that absorbs sunlight and converts it directly into electricity.

**Photovoltaic Array Block (PV Array Block):** A grouping of ~~p~~**P**hotovoltaic panels.

**Rated Capacity:** The maximum capacity of a ~~s~~**S**olar ~~f~~**F**acility based on the sum of each p**P**hotovoltaic system's nameplate capacity reported as Watts Direct Current (Wdc) or Watts Alternating Current (Wac).

**Small-Scale Solar Use:** The use of solar energy electricity generation equipment intended for onsite usage only. ~~s~~**S**mall-~~s~~**S**cale ~~s~~**S**olar ~~u~~**U**se standards are addressed in Section 410.G.10 and Section 501.E and are excluded from this Section.

**Solar Facility:** A commercial facility that converts sunlight into electricity using p**P**hotovoltaics or other conversion technology, along with all necessary equipment for generating electricity, which may include charge regulators, inverters, associated fencing, landscaping, parking lots, and PV support structures and buildings. A s**S**olar f**F**acility may also include electrical substations or transformers, transmission lines, and ~~b~~Battery ~~e~~Energy ~~s~~Storage ~~s~~Systems (BESS) where permitted by these regulations.

**Solar Facility Decommissioning Plan:** A plan to disconnect, remove, and properly dispose of equipment, facilities, or devices associated with a ~~s~~Solar ~~f~~Facility and to return the site to its original state.

**Solar Facility Project Area (Project Area):** The total area of land (calculated in acres) encompassed by a ~~s~~Solar ~~f~~Facility including all buffer zones.

**Solar Photovoltaics Panel Coverage:** The total acres covered by groupings of ~~p~~Photovoltaic panels (PV Array Blocks) including spaces between panels but excluding driveways, wildlife corridors, required setbacks, wetlands, and the like.

**Special Status Species:** Federally threatened or endangered species, other federally protected species, Arizona Species of Greatest Conservation Need 1A and 1B, and U.S. Forest Service or Bureau of Land Management (BLM) sensitive species, as appropriate.

**Visual Resource:** A physical feature that defines the visual and aesthetic character of an area, and can include natural features, scenic vistas and viewsheds, or human-made structures on or in a landscape. Resource designations such as a Scenic Byway, Scenic Corridor, Scenic Road, Historic Road, National All-American Road, gateway community, ~~N~~national Scenic, historic, or other trails, National or County parks and monuments, ridgelines, and the Granite Dells are examples of ~~v~~Visual ~~r~~Resources, or as identified during the application process.

**Wildlife Linkage:** An area of land used by wildlife to move between or within habitat blocks in order to complete activities necessary for survival, ~~and~~ reproduction**, and population persistence**. Such areas **are identified by the Arizona Game and Fish Department (AZGFD) and consist of interconnecting wildlife corridors and undisturbed lands that provide contiguous connection between habitat blocks**~~include wildlife corridors~~.

C. GENERAL PROVISIONS:

1. The operation of a ~~s~~Solar ~~f~~Facility will require a Solar Facility Use Permit approved by the Board of Supervisors. The Solar Facility Use Permit will be applied for in the same manner as a rezoning (zoning district change) as described in Section 208 of this Ordinance, with the application requirements described for a Solar Facility Use Permit in subsection D of this Section.
2. The Project Area designated within the Solar Facility Use Permit application may include multiple parcels and portions of parcels, which may be wholly owned or leased areas of parcels.
   a. All land within the Project Area may or may not form one solid area (e.g., when separated by roads) and may form a collection of non-contiguous areas. b. The entire Project Area covered by a Solar Facility Use Permit will be considered a single

**Commented [AriSEIA9]:** We think this is too broad and should tie to or be limited to a formal definition, such as a Scenic Byway. “Trails,” “ridgelines,” and “natural features” are vague and open projects up to arbitrary rejection.

~~s~~**S**olar ~~f~~**F**acility. However, no portion of the Project Area

5

may be separated by a distance greater than one-half (1/2) mile from the next closest portion of the Project Area. Any such portion separated by more than one-half (1/2) mile will require a separate Solar Facility Use Permit application.

3. The project boundary will include all the collected Project Areas and will also run along streets abutting the Project Area.
4. A buffer zone within the Project Area will be established and mapped in the Development Plan for the purpose of mitigating the effects of the ~~s~~**S**olar ~~f~~**F**acility upon surrounding properties**, wildlife,** and resources located both within and outside of the Project Area and the community at large.
   a. The buffer zone will be an area reserved for open space, wildlife corridors, natural vegetation, and landscaping.
   b. The buffer zone will begin at the project boundary and ~~may encompass~~ shall include required setbacks**, as defined in subsection F.2, and wildlife corridors that will be defined in consultation with the Arizona Game and Fish Department**.

D. SOLAR FACILITY USE PERMITS: A Solar Facility Use Permit may be approved for a period of thirty (30) years. The project operator may apply for a single ten (10) year extension so long as the project remains in compliance with all terms of the original Solar Facility Use Permit, including the approved site plan~~, and~~**. The Solar Facility must** meet~~s~~ **current** operational standards **and must address public safety and welfare, habitat, and wildlife impact considerations that are** acceptable to the Board of Supervisors at **the** time of the renewal application.

1. Pre-Application Requirements:
   a. In accordance with the requirements of Section 582 Use Permits, a Preliminary Planning Meeting with Development Services must occur prior to submission of the **Solar Facility** Use Permit application.
   b. Following the Preliminary Planning Meeting, the applicant must engage in the Citizen Participation process pursuant to Section 209 of this Ordinance prior to submission of the **Solar Facility** Use Permit application. The notification range for Citizen Participation will be a minimum of two thousand six hundred forty (2,640') feet (i.e., half mile) from the project boundary. The notification range will be extended to five (5) miles from the project boundary for **city and** town councils, homeowner associations, resident organizations, and other stakeholders identified during the Preliminary Planning Meeting. Development Services staff will also determine the appropriate number of community meetings the applicant will be required to hold.
   c. Concept Plan and Preliminary Site Investigations: A review of the Concept Plan and Preliminary Site Investigations must be completed prior to submission of the **Solar Facility** Use Permit application. This review may take place as part of the Preliminary Planning Meeting or as a separate meeting following initial discussion during the Preliminary Planning Meeting. The Concept Plan is

**Commented [AriSEIA10]:** The ordinance's heavy and open-ended reliance on a pre-application process misaligns the levels of investigation and time/capital investment that should be done by the applicant, mostly front-loading milestones as a condition of submitting a completed application, such as public meetings/feedback and the levels of investigation necessary to properly inform the public that are normally part of a completed application's permitting process.

**Commented [AriSEIA11]:** Note, the code already sets out a process and details for notice of major projects. It is confusing to require compliance with Section 209 but then to put forward additional specifics that seem to already be permitted under Section 209. This creates confusion that can be resolved by just relying on Section 209. In addition, it is not appropriate to require the public process to be complete before the application itself is made as the application may end up being revised as a result of the feedback from staff during the review process. This is why Section 209 requires the public process to be complete before the public hearing, not before the application is made.

**Commented [AriSEIA12]:** Concept design is likely to change due to engineering changes and input from these community meetings/opposition to the project. Developers can accommodate a basic site plan visual summary as long as it is understood and clearly communicated that the design is likely to change.

anticipated to change over the course of the application process.

(1) The Concept Plan of the Project Area will provide a visual summary of the project and will consist of:

6

(a) Aerial imagery of the Project Area superimposed with the project boundary;

(b) General location and arrangement of buffer zones, tree preservation, sensitive habitats, wildlife corridors, floodplain, fencing, screening, structures (with elevations), PV array blocks, driveways. and entrances;

(c) Locations of any proposed BESS ~~f~~**F**acility and/or substations; and

(d) Locations of electric lines and overhead utility lines, including the proposed route of private electric power transmission lines from the ~~s~~**S**olar ~~f~~**F**acility to the points of connection to the grid.

(2) Preliminary Site Investigations: Preliminary site investigations, inventories and mapping of the following resources will be of appropriate scope to effectively evaluate and mitigate potential adverse issues. **The applicant must also furnish the County with copies of any National Environmental Policy Act (NEPA) reports if they are required by other entities.** This information will be used to guide the project applicant and the County in determining the appropriate siting and design of an installation. The applicant will complete the following ~~d~~**D**esktop ~~s~~**S**tudies of the Project Area and the surrounding area within at least five (5) miles of the project boundary for review**, and all studies will be conducted by qualified professionals.**:

(a) Preliminary habitat and wildlife study which identifies potential wildlife issues by determining whether Special Status Species or their habitats may be present. **All state and federal wildlife management agencies with jurisdiction over the Project Area must be consulted for this study.** This study will also address any site-specific wildlife concerns, including the identification of**about** existing and suitable habitat**, Important Bird Areas,** and wildlife corridors to be established and protected from disturbance within the Project Area. **Wildlife corridors will be determined in consultation with the Arizona Game and Fish Department using the best available information at the time of this study. Any issues raised by**Appropriate state and federal wildlife management agencies must beconsulted for this ~~study~~ **addressed in the Wildlife Protection Plan (subsection D.2.c) for consideration by the Board of Supervisors**.

(b) Preliminary study of recreational ~~and~~ on public lands, which will include identification of these resources as well as an



**Commented [AriSEIA13]:** Performing a qualified professional study of environmental and wildlife impacts to "at least 5 miles" surrounding the project is significant. Are any other development types in the zoning code required to perform the same level of analysis? If not, this is may be discriminatory.

**Commented [AriSEIA14]:** If there isn't a clear process within both federal and state wildlife management agencies for reviewing project studies, a firm timeline for response, and how these consultations will be used by BoS in the ordinance, this is problematic. In other states, we have experienced months long project delays due to lack of staff impacting project consultation review.

evaluation of any potential negative impacts to them.

Commented [AriSEIA15]: This should be limited to recreational impacts on public lands.

7

(c) Preliminary study (Class I and Class II **cultural resource** surveys) of archaeological, cultural, and historic sites, which will include identification of these resources as well as an evaluation of any potential negative impacts to them. This study must be conducted by a qualified professional and include an on-site survey of the site. In addition, a summary of communication and collaboration efforts, such as a pre cultural on-site survey with any potentially affected Native American tribes to evaluate cultural and historic resources or sites, heritage areas, or cultural landscapes must be submitted with the application. ~~Depending on the results of the~~**If any areas or objects of archeological, paleontological, or historic significance are discovered on the site during the course of the** Class I and Class II surveys**, or during the construction of an approved Solar Facility,** ~~the Development Services Director may require~~ **the applicant will be required to have a qualified professional**~~to~~ conduct a Class III survey **encompassing the discovery area, and any other locations within the Project Area as recommended by the survey professionals, the State Historic Preservation Office (SHPO), or by any qualified third party professionals retained by the County**.

(d) Preliminary study of known water resources and watercourses, streams, creeks, washes, etc., both onsite and adjacent to the site, which will include identification of these resources as well as an evaluation of any potential impacts to them. A statement as to potential negative impacts or use of those resources for the project must also be provided.

(e) Preliminary study of ~~v~~**V**isual ~~r~~**R**esources (viewshed analysis) and residentially zoned property located within **five**~~ten~~ **(5**~~10~~**) and** five (5) miles from the project boundary, or a distance determined by the Development Services Director, must be identified on a map showing the resource's distance from and relationship to the facility. This preliminary information will be used by the County and the applicant to select suitable site locations and the number of viewpoints from which the Visual Impact Analysis will be prepared.

Commented [AriSEIA16]: 10 miles is excessive.

2. Application Requirements: Each application for a Solar Facility Use Permit must be in compliance with this Section including all required site investigations, reports and plans and with Section 582 (Use Permits) of this Ordinance. The following

information must be included with the application:

a. Solar Facility Report: A report providing a detailed description of the project and containing a narrative overview of the ~~s~~Solar ~~f~~Facility, including:

(1) Applicant, owner, and the operator of the proposed ~~s~~Solar ~~f~~Facility;

8

(2) Current uses and physical characteristics of the Project Area and also the surrounding area;

(3) Intended energy provider to interconnect to the ~~s~~Solar ~~f~~Facility and location of proposed interconnection;

(4) Approximate ~~r~~Rated ~~c~~Capacity of the ~~s~~Solar ~~f~~Facility project; (5) Type and location of interconnection to electrical grid and details of coordination with the local energy provider;

~~(6) Status of interconnection agreement with the local energy provider or a written explanation outlining why an interconnection agreement is not necessary;~~

(7) Approximate number of panels and representative types; (8) The Project Area and ~~s~~Solar ~~p~~Photovoltaic ~~p~~Panel ~~c~~Coverage expressed in acres;

(9) An inventory with description of all proposed structures and uses including BESS ~~f~~Facilities, inverters, and substations;

(10) An inventory of all ~~s~~Solar ~~f~~Facilities within two (2) miles of the project boundary;

(11) An explanation of why the proposed site has been chosen based on the preferred **sites**/restricted ~~site~~**locations** criteria (subsection F.1.~~e~~**d** and ~~f~~**e**);

(12) An explanation of how the facility provides clear economic and environmental benefits to the County;

(13) An explanation of how the facility's design and operational procedures apply current best practices and technologies;

(14) A detailed description of how the project meets each of the required Performance Standards in subsection F; **and**

(15) Results of the Preliminary Site Investigations required in subsection D.1.c(2). ~~For the preliminary archaeological, cultural, and historic site study (D.1.c(2)(c)), t~~The narrative will document how the site was **evaluated and** inspected, ~~for culturally and historically significant resources and~~ include the name and details of the professional(s) conducting ~~the~~**each** study, and any additional information requested at the Pre-Application review**.**~~; and~~

~~(16) A Construction Management Plan which will include an estimated construction schedule and hours of operation.~~

b. Development Plan: In addition to the requirements in subsection D.2.a, the Development Plan must also include:

(1) The Project Area and ~~s~~Solar ~~p~~Photovoltaic ~~p~~Panel ~~c~~Coverage expressed in acres;

Commented [AriSEIA17]: This could be problematic due to queue reform (depending on the utility). Some utilities will require that you demonstrate site control (which includes permits) before gaining access to the queue, creating a chicken/egg problem.

(2) The project boundary, property lines, leased area lines, official street line, and all easements within the Project Area, including but not limited to right-of-way and utility easements;

(3) **Approximate** ~~L~~location of driveways, parking, and entrances onto streets;



(4) **Approximate** ~~L~~locations and dimensions of all existing and proposed structures, including PV panels, charge regulators, inverters, substations, BESS ~~f~~**F**acilities, connections to the grid, fencing **within the Project Area**, including the location of all dwellings and associated structures within two thousand six hundred forty (2,640') feet (i.e., half mile) of the project boundary;

(5) E**xample e**levations **and graphic imagery** of structures depicting the typical style, size, and exterior construction materials in sufficient detail to exhibit the relative compatibility of the proposed development with the character of the neighborhood; and

(6) A conceptual grading plan indicating existing and proposed contours at no greater than two (2')-foot contours

c. Wildlife Protection Plan: This plan will be based on the results of the Preliminary Site ~~Evaluations~~**Investigations**. The Wildlife Protection Plan must detail the following information:

(1) an inventory of all Special Status Species that may be present on or utilize the site;

(2) identification of existing and proposed wildlife ~~c~~**C**ritical ~~h~~**H**abitat **and Important Bird Areas**;

**Commented [AriSEIA18]:** Is this defined somewhere? If not, it should be defined here or removed.

(3) location and dimensions of wildlife corridors and **design** details regarding fencing, if any, ~~that accommodates~~**including a description of potential impacts to wildlife and wildlife movement**;

(4) direct and cumulative impacts to wildlife and ~~w~~**W**ildlife ~~l~~**L**inkages and explanation of how these impacts will be avoided through project design, habitat enhancement, stewardship activities, evaluation, continued monitoring, or other mitigation strategies; and

(5) notations summarizing conditional requirements related to wildlife, such as timing restrictions to reduce or prohibit activities in specified areas during sensitive life cycle events (e.g., active nest**ing** period**s and migration movements**) and wildlife survey requirements.

**(6) Post-construction Wildlife Corridor Monitoring: The owner or operator and their successors will work with the Arizona Game and Fish Department and the County to determine an appropriate post construction monitoring plan to validate the effectiveness of implemented wildlife corridors in maintaining habitat connectivity. This may include telemetry and camera studies or other effective options at the time of completion.**

d. Cultural Resources Management Plan: This plan will be based on the preliminary study of archaeological, cultural, and historic resources and must be prepared by a qualified professional to protect and mitigate impacts to any known or discovered archaeological, historical, or cultural~~, or historic~~ sites or artifacts found in the Project Area. Instructions notifying operators how to proceed in the event such cultural resources are encountered during construction or grading must be included on construction documents.

Commented [AriSEIA19]: How will each of these sites be defined?

10

e. Stormwater Management Plan: The proposed Stormwater Management Plan must be in accordance with all applicable County standards/regulations and in conformance with the Flood Control District Stormwater Management Requirements in effect at the time of application and must be approved by the Flood Control District prior to issuance of construction permits. The stormwater management plan will include, but not be limited to, the following sections:

(1) Preliminary and post-development hydrologic analysis of water quantity and proposed usage;

(2) Proposed stream buffer/setback analyses;

(3) Erosion and sediment control regulations for land disturbing activities;

(4) Post-Construction Stormwater Quality Treatment Regulation requirements; and

(5) County and the Federal Emergency Management Agency (FEMA) floodplain regulations/requirements.

f. Visual Impact Analysis: A visual impact analysis demonstrating project siting and, if necessary, proposed mitigation and screening to reduce impacts on the visual character of the surrounding area.

(1) The applicant will provide accurate, to scale, photographic simulations showing the relationship of the ~~s~~Solar ~~f~~Facility to its surroundings.

(2) Photographic simulations will show views of ~~s~~Solar ~~f~~Facility structures and uses from prominent locations, adjacent roads, nearby highways, existing dwellings (from closest adjacent property line), and other residential, scenic, cultural, and recreational areas in order to assess the visual impact of the sSolar fFacility.

(3) The total number of simulations and the perspectives from which they are prepared will be established by the Development Services Director after the pre-application meeting and will be chosen with the intent of establishing the visual impacts upon sensitive areas potentially receiving the greatest impacts from such a proposal.

g. Landscaping Plan: The Landscaping Plan must have sufficient detail to demonstrate compliance with ground cover and vegetation preservation requirements and screening requirements of this Section (subsections F.5 and F.6). The Landscaping Plan will include:

(1) Specifications of proposed ground cover (including seed mixes), screening materials (including identification of appropriate plant species

and spacing), and proposed herbicides used if any;

(2) Design and specifications of proposed additional vegetative screening as needed for certain dwellings and other improvements, in compliance with subsections F.6 of this Section;



(3) Installation and maintenance practices to include the establishment of ground cover and woody plant materials, and the application of herbicides if any;

(4) Locations and descriptions of plant communities and densities in areas that have not been previously plowed or graded;

(5) Proposed clearing or grading of natural vegetation or woody plants including stands of trees, shrubs, and woodlands, which may be a separate plan;

(6) Description of invasive weed populations and densities currently existing on the site and provisions for controlling and preventing the spread of noxious weeds during construction, throughout project operation, and post operation restoration; and

(7) Proposed restoration procedures for roadway shoulders and other areas disturbed by construction.

h. Public Safety, Fire Protection, and Emergency Management Plan: The proposed Public Safety, Fire Protection and Emergency Management Plan for construction and post construction operation of the facility, including plans for ongoing management of forest and fire fuels. Additional mitigation may be required if requested by the local or nearest fire district to support response capabilities. This plan must be finalized and approved by the Development Services Director prior to issuance of construction permits.

i. Traffic Plan: The applicant will submit a preliminary traffic plan describing estimated travel routes and trip volumes during the construction and decommissioning processes. Public road improvement, repair and maintenance is further addressed within subsection H of this Section. This plan must be finalized and approved by the Development Services Director and Yavapai County Public Works prior to issuance of construction permits.

j. Airport Studies: For the purpose of determining impacts on area airports, a Glare Impact Study and/or an Airspace Study in accordance with, and if required by, Federal Aviation Administration (FAA) requirements will be submitted by the applicant.

k. Land Use Impacts and Mitigation: In addition to typical Citizen Participation notification requirements (see Section 209), the applicant must contact all relevant land use entities in the vicinity of the proposed sSolar fFacility (i.e., U.S. Forest Service, Bureau of Land Management, etc.) to discuss, and memorialize in written form, the potential impacts of the project and the recommended mitigation strategies and measures. Such dialogue will be submitted to the Development Services Director for review and reference.

l. Decommissioning Plan: The applicant will submit a Preliminary Decommissioning Plan to be approved by the Board of Supervisors as part of the application. This Plan will specify the procedure by which the owner or operator, or their successors, will remove the improvements associated with the ~~s~~**S**olar ~~f~~**F**acility and any BESS ~~f~~**F**acility after the end of their usefulness and to restore**reclaim** the property for immediate non-solar related uses,

12

including adequately restored**restoring the Project Area to natural conditions where reasonably achievable**. Prior to issuance of construction permits, the applicant will submit a Detailed Decommissioning Plan, which must demonstrate substantial conformance with the Preliminary Decommissioning Plan, to be approved by the Development Services Director. The Development Services Director may choose to defer approval of this plan as a separate hearing item through the Board of Supervisors if substantial changes have been made. The Detailed Decommissioning Plan must be prepared by a professional engineer licensed in the state of Arizona who has expertise in the removal of ~~s~~**S**olar ~~f~~**F**acilities through educational knowledge or practical experience. The Plan will be prepared in sufficient detail to determine compliance with subsection M, and will include the following:

(1) Anticipated life span of the project;

(2) Implementation and manner in which the project will be decommissioned and reclaimed, including:

(a) plans for stabilizing the soils;

(b) regrading,**ripping the soil to loosen the compaction areas prior to native** reseeding, and replanting; and

(c) disposal and recycling of ~~s~~**S**olar ~~f~~**F**acility materials including but not limit to PV panels, inverters, and batteries;

(3) Decommissioning and reclamation cost estimate prepared by an independent third-party Arizona licensed professional engineer mutually agreed upon by the Applicant and the Development Services Director.

(a) The estimate will quantify the gross estimated cost for decommissioning and reclamation of the s**S**olar f**F**acility and any BESS ~~f~~**F**acility in accordance with the Decommissioning Plan and these conditions.

(b) The estimate will explicitly detail the cost and manner in which the estimate was determined.

(c) The estimate will establish the full amount of the decommissioning and reclamation cost ~~without regard to the possibility of~~ less salvage value ~~unless the Board of Supervisors accepts the value of the salvage as part of~~as determined by a third

**Commented [AriSEIA20]:** We'd definitely prefer the cost to be less the salvage value, as posts and trackers do have a significant salvage value that is generally incorporated into decommissioning plans in other places.

party engineer's analysis, as updated every five (5) years with the rest of the cost estimate to ensure reasonable and accurate estimates; and

(d) The estimate will reflect the costs of decommissioning and restoration of the Project Area in accordance with subsection M of this Section.

~~3. Special Land Use Considerations: As part of the review and consideration of the solar facility Use Permit application, off-site impacts including but not limited to those of private electrical power transmission lines (PEPTLs), and appurtenant equipment and~~

~~13~~

~~structures, connected to the solar facility may be reviewed for land use compatibility issues. These issues may include aesthetic and environmental impacts, detrimental impacts to the public health, safety, and general welfare and also to neighboring landowners. Review of PEPTLs may also include, but will not be limited to, consideration of proposed routes from the solar facility to a substation or other connection site and distances of the PEPTLs from right-of-way easements. Upon review of an off-site impact, the Board of Supervisors may adopt conditions or restrictions deemed necessary and advisable for the protection of the public interest, environmental, cultural, and visual considerations, or to mitigate detrimental impacts to neighboring landowners.~~

~~4~~**3**. Site Plan Approval: The applicant must submit and receive ~~Board of Supervisor~~administrative approval of the Site Plan for the entire project prior to obtaining any construction or other permits related to the ~~s~~**S**olar ~~f~~**F**acility.

~~5~~**4**. Waiver Request: In certain instances where the applicant desires a ~~limited~~ deviation from the requirements of this Section, the waiver request to deviate from a specified requirement may be considered for approval if:

a. compliance with the specified requirement would be impractical; b. the deviation would not result in adverse impacts compared to what would otherwise be permitted under this Ordinance; **and**

c. the deviation would not conflict with planned uses and resources in the area. d. The applicant must submit written information with the application indicating the circumstances which are believed to necessitate the need for a deviation from the specific requirement, as well as any proposed alternatives. e. The written information will clearly outline the positive and negative impacts of the proposed changes and what protective measures will be taken by the applicant to adequately reduce, avoid, and mitigate such impacts, along with explanation of how the proposed changes will not adversely affect public safety and welfare**, or wildlife and wildlife movement**.

f. If the proposal is deemed reasonable by the Development Services Director after all internal and external agency reviews are completed, the waiver request will be submitted for consideration as part of the final application to the Board of Supervisors.

~~6~~**5**. Application Review Time: Application review time for **Solar Facility** Use Permits ~~for~~ US Solar Facilities will be ninety (90) days. The application review time may be increased



**Commented [AriSEIA21]:** These should be administrative and not through the BoS. Also, they should be able to pursue site plan approval in conjunction with other permits, not solely beforehand.

**Commented [AriSEIA22]:** Members tell us that they will not apply for a waiver in a jurisdiction with a cap unless they already have land holdings. It simply has too much risk.

**Commented [AriSEIA23]:** We don't know what "limited" means.

with a determination made by the Development Services Director in writing based upon the size and complexity of the application as determined by factors including but not limited to the number of third-party reviews to be coordinated and completed and the Project Area of the ~~s~~**S**olar ~~f~~**F**acility.

~~7~~**6**. A minimum of one (1) year prior to the end of the **Solar Facility** Use Permit term, the ~~s~~**S**olar ~~f~~**F**acility owner or operator must notify the Development Services Director in writing of future plans for the ~~s~~**S**olar ~~f~~**F**acility, which may include decommissioning and reclamation or a request for **Solar Facility** Use Permit renewal.

~~8~~**7**. Although the ~~s~~**S**olar ~~f~~**F**acility allowed by this Section may potentially be located upon multiple parcels of land, the underlying Solar Facility Use Permit comprises and



approves only one (1) unified Solar Facility Use Permit. The use of any parcel, or portion thereof, that results in a conflict with the associated Development Plan (subsection D.2.b) or failure to properly maintain the ~~p~~**P**roject ~~a~~**A**rea according to the Site Maintenance Agreement (subsection G) may cause the Solar Facility Use Permit to terminate. The Development Agreement (subsection E) may also contain provisions that may result in termination of the Solar Facility Use Permit.

~~9~~**8**. Prior to terminating a Solar Facility Use Permit pursuant to subsection D.~~8~~**7** or subsection E, and prior to initiating a partial or complete decommissioning and reclamation of any project, the Board of Supervisors must provide the owner and operator, or their successors**,** with official notice of the County's intent to terminate and/or decommission via certified mail. The notice will identify each specific reason for the commencement of the termination or decommissioning and reclamation process and will provide thirty (30) calendar days to remedy the issue identified in the notice. If the remedy requires more than thirty (30) calendar days to complete, the owner or operator or their successors must respond in writing within the thirty (30) calendar day period and inform the County. The request for a reasonable and specific timeframe to remedy the identified issue(s) will be considered by the Development Services Director. In the event that thirty (30) calendar days pass and the issues have not been completely resolved nor has the County received any written correspondence from the owner or operator or their successors, the Development Services Director may place the item on the Board of Supervisor's Agenda to allow public comment and input from the owner or operator or their successors prior to considering a termination of the **Solar Facility** Use Permit, commencing decommissioning of the ~~s~~**S**olar ~~f~~**F**acility, or providing additional time to remedy the issue(s), which will be determined by the Board of Supervisors.

**9. The Solar Facility Use Permit conditions of approval and Section 608 requirements will be binding on the applicant, owners, and operators, or their successors, assignees and transferees, and any affiliates, agents, or lessees of the applicant who have a contractual relationship with the applicant concerning the construction, operation, maintenance, or reclamation of the project. The applicant will provide to the County any** redacted **agreement(s) or lease(s) pertaining to the project which note that the contracting parties and/or lessees will be responsible for compliance with the conditions and requirements set forth in the Solar Facility Use Permit approval and**

**Section 608. The applicant's responsibilities with respect to compliance with such conditions and requirements will not cease or be abated by reason of the fact that the applicant is not in control of or responsible for operation and maintenance of the project facilities.**

Commented [AriSEIA24]: Projects should be able to provide redacted versions. These cannot become public records without redaction.

Commented [AriSEIA25R24]: Or could just require an attestation of these documents.

E. DEVELOPMENT AGREEMENT: A Development Agreement between the ~~s~~Solar ~~f~~Facility owner or operator and the County, which is satisfactory to and approved by the County, will be required to provide that the sSolar fFacility is developed, maintained, decommissioned, and reclaimed in accordance with the requirements of these regulations and does not create an undue burden on County services. The Development Agreement must be approved by the



Board of Supervisors and all associated financial assurances must be posted prior to issuance of construction permits.

1. The Development Agreement will include the following items, subject to any approved waivers:
   a. Annual compliance monitoring report prepared by the project operator and submitted to the Development Services Director;
   b. Posting of financial assurances for installation and maintenance of the sSolar fFacility as described in subsections G, H, I, J, and K (failure to develop or maintain the sSolar fFacility in the manner required may result in loss of the associated financial assurance funds, ~~or in~~ termination of the **Solar Facility** Use Permit**,** and decommissioning of the ~~s~~Solar ~~f~~Facility);
   c. Provision by the project operator of specialized fire safety equipment or other protections deemed necessary by County emergency services staff as described in subsection L; and
   d. Decommissioning of the ~~s~~Solar ~~f~~Facility and reclamation of the Project Area (subsection M), including:
      (1) posting and collection of associated financial assurance funds; (2) review and recalculation of decommissioning and reclamation costs; (3) the various required deadlines associated with decommissioning and reclamation; and
      (4) adherence to the finalized Detailed Decommissioning Plan.
2. The Development Agreement includes financial assurance, as described in subsection M.1.g, which must be received prior to the approval of any construction permits and must remain in full force for the duration of the life span of the ~~s~~Solar ~~f~~Facility and until all decommissioning and reclamation is completed to the satisfaction of the County. If the County receives notice or reasonably believes that any form of assurance has been revoked, or the County receives notice that any assurance may be revoked, the County may, after providing notice and a reasonable opportunity to post a replacement security, terminate the **Solar Facility** Use Permit and will be entitled to take all actions necessary to obtain the rights to the securitized funds.
3. Liability Insurance: The owner or operator of the sSolar fFacility will maintain a current **general** liability insurance policy **with minimum limits of $1 million per occurrence with a $2 million aggregate**~~which will~~ **to** include the County as an additional insured,

with the designation of primary and noncontributory. ~~The County may require higher limits.~~ The owner or operator must immediately provide the County, in writing, with notice of cancellation or other changes to this liability insurance policy.

**4. Compliance with Other Agencies:**

**a. The owner or operator of the Solar Facility must comply with the Arizona Game and Fish Department (AZGFD) guidelines for handling Special Status Species, should any be encountered during construction and operation of the project, and must consult with AZGFD or the U.S. Fish and Wildlife Service, as appropriate, on all other issues concerning wildlife.**



**b. The owner or operator of the Solar Facility must consult the State Historic Preservation Office (SHPO) with respect to cultural resources. If objects of cultural significance or any archeological, paleontological, or historic sites are discovered during the construction or operation of the project, the owner or operator will promptly report the discovery to the Director of the Arizona State Museum (ASM) and, in consultation with the Director, will immediately take all responsible steps to secure and maintain the preservation of the discovery as required by ARS §41-844. If human remains and/or funerary objects are encountered during the course of any ground-disturbing activities related to the construction or maintenance of the project, the owner or operator will cease work on the affected area of the project and notify the Director of the ASM as required by ARS §41-865 for private land, or as required by ARS §41-844 for state, county, or municipal lands.**

~~4~~5. Use of Third Parties: The County may obtain reviews, inspections or other work completed by a third party for the purpose of review or monitoring of the ~~s~~Solar ~~f~~Facility, the costs of which will be required to be reimbursed by the ~~s~~Solar ~~f~~Facility owner or operator. Examples of such work include but are not limited to reviews and associated inspections of the Wildlife Protection Plan, stormwater quantity and quality plans, the Decommissioning Plan, and compliance reports.

~~5~~6. Change of Owner or Operator: The ~~s~~Solar ~~f~~Facility owner or operator must give the County ninety (90) days written notice prior to any proposed change of the ~~s~~Solar ~~f~~Facility operator or ownership, with the additional requirement that the new owner or operator must enter into all required written agreements and provide the required financial assurances prior to the release of the then current owner or operator.

F. DEVELOPMENT AND PERFORMANCE STANDARDS: The following standards are intended to mitigate and avoid adverse impacts on adjacent property owners, the surrounding area, viewshed, and natural, cultural, archaeological, and recreational resources, as well as future development within the County.



**Commented [AriSEIA26]:** Based on what? How is this not arbitrary or possibly discriminatory?

**Commented [AriSEIA27R26]:** This could be reviewed like decommissioning costs if necessary.

1. Location and Dimensions: Solar ~~f~~Facilities are required to be located in the RCU (Residential; Rural) zoning district. The County will utilize the following criteria to identify appropriate locations within this required zoning district. A waiver request, as described in subsection D.5 of this Section, will be required for consideration to locate a ~~s~~Solar ~~f~~Facility in any other zoning district. The Board of Supervisors may also utilize and require these criteria for the siting of ~~s~~Solar ~~f~~Facilities in other zoning districts when considering whether to approve the waiver request:

a. The maximum Development Area will not exceed three thousand (5~~3~~,000) acres.

~~b. The cumulative acreage maximum for all sSolar fFacilities located within Yavapai County is eight thousand (8,000) acres.~~



c. Solar ~~f~~Facilities must be located greater than one (1/4) mile from any municipal limits. This requirement will not apply to non-contiguous areas of a town or city (“islands”) that are less than twenty-five (25) acres in size.

~~d. Solar facilities must be located greater than one (1) mile from the boundary of any airports and related properties.~~

~~e~~d. Preferred Sites: **The following site characteristics are considered preferred.** Projects that are able to demonstrate compliance with at least three of the following criteria, as determined during the pre-application phase, will be considered as preferred sites. No combination of preferred characteristics will create an entitlement to a Solar Facility Use Permit**, but the Board of Supervisors will consider those characteristics to determine whether a location is appropriate. The determination of whether a proposed Solar Facility’s location is appropriate is a legislative decision by the Board of Supervisors**. Preferred sites will be located on:

(1) a previously utilized site exhibiting challenging characteristics for reuse (e.g., existing ~~b~~Brownfield, aggregate extraction, or mining site);

(2) project sites exhibiting highly disturbed and degraded ecological features;

(3) project sites having low environmental, recreational, and cultural or archaeological resource values as identified in the required preliminary site investigations;

(4) project sites that may retain traditional uses and allow for multiple uses such as Agrivoltaics;

(5) project sites that have minimal **negative** visual impact **on significant landforms and scenic viewsheds of widely recognized aesthetic or recreational value,** or **which** are more than ~~ten (10)~~**five (5)** miles from ~~v~~Visual ~~r~~Resourcessuch as natural landforms, vegetation, water features, and human modifications that give the landscape its visual aesthetic quality;

(6) project sites located near major highway interchanges, existing or planned industrial areas, or other ~~s~~Solar ~~f~~Facilities; and



**Commented [AriSEIA28]:** We have also raised this several times. This appears arbitrary and is very small. We suggest 5000 acres.

**Commented [AriSEIA29]:** This is a significant problem, is much too small, and seems to be arbitrary. This is .15% of the county. There is no need for a cap. Projects are already reviewed on a case by case basis. If you have to have a cap it should be reasonable relative to the size of the county and the size of these projects. This will curtail solar development in the county, which is in conflict with the general plan (see page 101). Eloy was 16%.

**Commented [AriSEIA30R29]:** If the County insists on a cap we encourage you to increase it as much as possible and include an annual increase unless the ordinance is further modified (suggest it based on percentage of land in county or large enough for several more projects per year, but not less than one).

**Commented [AriSEIA31]:** This should be ¼ or ½ mile from an incorporated city or town limits.

(7) project sites that use or are near an existing or planned substation, or transmission line or other satisfactory inter-tie location.

fe. Restricted sites**Locations**: The following factors will not be used to determine ~~preference for siting, but are~~locations within the Project Area ~~that~~ must remain in an undisturbed condition **unless a waiver is granted as described in subsection D.4**:

(1) ~~sites or~~ locations that would fragment, degrade, or irreparably harm important resources of local, County or state significance;

(2) sites or locations that conflict with or have potential significant negative impacts on Special Status Species and their habitats, other special wildlife designations such as Critical Habitat and Important Bird Areas, identified wildlife corridors (e.g., pronghorn antelope,



predators, and other wide-ranging wildlife), and significant stands of unique vegetative communities (e.g., saguaro cactus);

(3) scenic sites, areas, and viewsheds **of recognized aesthetic or recreational value**;

(4) unique topographic features such as ridges;

(5) steep **Hillside** slopes averaging greater than ~~ten percent (10%)~~**five percent (5%)** over two hundred (200') feet or more of horizontal run,

or averaging greater than fifteen percent (15%)**ten percent (10%)** over fifty (50') feet or more of horizontal run;

(6) sites or locations that conflict with or have potential negative impacts on archaeological, cultural, and historic resources or sites, heritage areas, or cultural landscapes as formally identified by a designated tribal entity or government;

(7) ~~sites or~~ locations that require significant ground disturbance and grading due to their unique topographical features or environmental constraints;

(8) forested or heavily vegetated sites or locations comprising 25% canopy density of woody or **tall** cactus species (i.e., trees, shrubs, succulents**, saguaros**) as averaged across the vegetated area; and

(9) floodplains, riparian areas, wetlands, or seeps **as may be determined by the Federal Emergency Management Agency (FEMA), Yavapai County Flood Control District, or other federal, state, and local public entities charged with environmental water quality and protection**.

2. Setbacks: The following standards will apply to the Development Area of the s**S**olar ~~f~~**F**acility, unless otherwise expressly stated in this Section, including fencing and PV panels, but not including landscaping.

a. Five hundred (500') feet from any dwellings (existing or under permit) or any parcels zoned R1L, RMM, R1, RCU, R2, RS, C1, C2, C3, PAD, RCD, or OS. b. Five



**Commented [AriSEIA32]:** This needs a definition. This could be anything.

**Commented [AriSEIA33]:** We typically only see revegetation requirements, not restrictions on developing in areas with a certain perennial coverage. Restrictions are typically reserved for areas with sensitive plants or riparian vegetative communities. We propose replacing this restriction with a requirement for a restoration plan or stipulations (mitigation) to restore back to 25% cover instead.

**Commented [AriSEIA34]:** Tall is vague, suggest just listing saguaros.

**Commented [AriSEIA35]:** We have raised this issue in each of our prior comments, with specific distance suggestions in our July 11th letter.

**Commented [AriSEIA36R35]:** · The setback requirements around FEMA flood plains, wetlands, and slopes greater than 5% are also of significant concern. Setbacks for bodies of water, water flows, FEMA floodplains, etc. are typically set at 50-100 feet. The 500-foot requirement in the draft ordinance is sharply out of that range. Additionally, the further narrowing of the restrictions for hillside slopes (now >5% over a 200' horizontal area, previously 10%, and >10% over a 50' horizontal area, previously 15%) will continue to undercut development in the county. A ~5% grade is common in the industry and is not considered steep . Steep grades are more frequently considered as 15% or larger. We would prefer the 5% grade setback to be cut, or at least the requirements returned to the original levels in first the first version of the guidance at 10% and 15%, respectively.
· The setback requirement for federally protected land is not workable for projects that are proposed on federal land.
· Regarding the setback for significant scenic, historic, cultural, or archeological sites, AriSEIA should continue to suggest that the county defer to SHPO policies on the appropriate buffer, which will be resource-specific.
· Setbacks for substations are also a critical item in the draft. The restrictions limit design flexibility and will likely lead to inefficient electrical design e.g., longer gen-ties and more impacted land. The location of the substation is highly project-specific and depends on the project's design and point of interconnection. We recommend the county allows flexibility to waive the requirements upon demonstrating that the proposed substation location significantly limits the amount of land impacted for the site design.

hundred (500') feet from any parcel zoned PM, M1, or M2. c. Five hundred (500') feet from any lake, creek, perennial or intermittent stream, river, major tributaries, riparian areas, wetlands, or seeps, as measured from the top edge of the bank, or from **the outer edge of** any delineated Federal Emergency Management Agency (FEMA) Floodplains. Minor tributaries may warrant a reduced buffer setback to be no less than one hundred fifty (150') feet as determined by the ~~Development Services~~ Director**Board of Supervisors**.

d. One thousand (1,000') feet from ~~F~~**f**ederally protected lands (e.g., National Park, National Monument, Conservation Lands), and five hundred (500') feet from other federally managed lands.

e. One thousand (1,000') feet from County open space, parks, and other recreational facilities.

f. Five hundred (500') feet from forested or heavily vegetated areas comprising forty-five (45%) percent or greater canopy density of woody or cactus species



(i.e., trees, shrubs, succulents) as averaged across the vegetated area, or from transitional habitat areas.

g. Five hundred (500') feet from ravines, canyons, or other significant and well defined drainage features, as measured from the peak of the outer edges of these features.

h. One hundred fifty (150') feet from any ~~h~~**H**illsides with slopes of ~~fifteen~~ percent (15%)**ten percent (10%)** or greater or with a total elevation gain of fifty (50') feet or more. The setback will be measured from the high and low points where the average slope percentage calculation begins and ends.

i. Five hundred (500') feet from significant ~~scenic, historic, cultural, or~~ archeological**, palentological, or historic** sites as identified in the Cultural Resources Management Plan**, or sites already formally recognized by the State Historic Preservation Office (SHPO). Identified cultural ruins of documented and recognized significance may require an additional setback up to one thousand (1,000') feet** as determined by the Board of Supervisors.

**j. Six hundred fifty (650') feet from each parcel corner on land parcels with checkerboard ownership arrangements (i.e., public land/private land) to allow connectivity to be maintained for wildlife corridors identified in the Wildlife Protection Plan (subsection D.2.c). Parcels with adjacent corners that also provide an equivalent buffer would be able to complete a combined wildlife corridor of one thousand three hundred (1,300') feet.**

~~j~~**k**. Three hundred (300') feet from the official street Right-of-Way line of any State or Interstate highway.

~~k~~**l**. In all other cases where the above setbacks do not apply, the front, rear, interior side, and exterior side setbacks will be a minimum of one hundred (100') feet.

3. Height:

a. The maximum height of the highest edge of PV panels when fully tilted will be ~~fifteen (15')~~**twenty (20') feet**, as measured from the average finished grade



Commented [AriSEIA37]: This needs a definition.

of the row.

b. The maximum height of all other structures associated with the ~~s~~**S**olar ~~f~~**F**acility will be thirty-five (35') feet as measured from the finished grade at the base of the structure to its highest point, including appurtenances. This does not apply to poles and other equipment associated with onsite substation uses.

4. Wildlife Corridors: The applicant for a proposed ~~s~~**S**olar ~~f~~**F**acility is required to conduct a preliminary habitat and wildlife study as part of the required preliminary site investigations. The study will identify existing corridors, potential impacts, and proposed mitigation measures to avoid or substantially reduce potential impacts to wide-ranging wildlife that may be present on or utilize the Project Area (e.g., **deer,** pronghorn antelope, elk, bears, mountain lions, etc.). Existing wildlife corridors and those identified in the Wildlife Protection Plan (subsection D.2.c) will be provided a minimum width of ~~one thousand (1,000')~~**one thousand three hundred (1,300')** feet through the entire length of the course. **If the length of the corridor through the**



**Project Area exceeds two (2) miles, a minimum width up to two thousand (2,000') feet may be required as determined by the Board of Supervisors and consultation with the Arizona Game and Fish Department (AZGFD).** The applicant must consult with **the** Arizona Game and Fish **AZGFD** and other relevant agencies **in identifying wildlife corridors** to provide adequate access for wildlife to safely navigate through and around the Project Area. Wildlife ~~l~~**L**inkages and access strategies must be shown in the Concept Plan and Development Plan submitted to the County. The use of wildlife permeable fencing with holes large enough to allow for small and medium sized animals (e.g., racoons, rabbits, squirrels, etc.) to fit through is required. All fencing must be permeable to small animals by leaving a six (6") inch gap between the bottom of the fence and the ground, exclusive of substation and BESS ~~f~~**F**acilities. Interior passageways which are unfenced and rarely used non-impervious driveways within the Project Area may also be considered as part of a wildlife corridor **if deemed appropriate upon consultation with the AZGFD**. These meaningful accommodations will be provided to support habitat connectivity and facilitate the safe movement of mobile wildlife species.

**Commented [AriSEIA38]:** Does this give AZ GFD de facto authority over siting?

5. Ground Cover and Vegetation Preservation: Preliminary erosion control, site maintenance, noxious weed control and management, and native plant preservations and revegetation plans will be submitted as part of the Landscaping Plan. The project must be planned and developed in a way that maintains the local ecosystem by minimizing grading and site disturbance and to maximize retention of native vegetation, topsoil, and landforms. Areas cleared during construction that are not needed for site operations must be revegetated with native vegetative cover.

a. For the purpose of preventing erosion and managing runoff, any disturbed land, including land under and around the PV panels **following construction or decommissioning**, must be seeded with a **certified weed free native** revegetation seed mix based on plants predominantly native to the site and Yavapai County, as approved by the Development Services Director. Such ground cover will be continually maintained on the site for the duration of the

**Solar Facility** Use Permit.

b. Solar ~~f~~**F**acilities will be designed and developed to minimize grading and to protect and preserve prominent landscape features (i.e., rock outcroppings, large boulders, etc.), unique plant communities, riparian zones, steep slopes, and other natural features, prime grassland, woodland, and Sonoran Desert habitat. No more than a ten percent (10%) average change from natural grade will be allowed except for roads, equipment pads, substation, BESS, and other structures that require a leveled surface to meet engineering or safety codes.

6. Screening: The required project boundary setbacks and buffer zone must provide adequate screening to reduce visual impacts associated with the ~~s~~**S**olar ~~f~~**F**acility. **Screening should be placed strategically with consideration of wildlife benefit and must not impede identified wildlife corridors.** In areas where it is determined that setbacks and buffer zones do not appropriately screen the project from sensitive



locations (e.g., dwellings, designated viewsheds, scenic highways, etc.), the following screening measures will apply:

a. The applicant may use any combination of methods listed in this subsection, or other comparable methods deemed equivalent by the Board of Supervisors, to satisfy the screening requirements. The methods proposed by the applicant must provide adequate relief from ground level views and activity. While full view obstruction is not required, the intent is to minimize and soften views from being dominated by the project by providing strategic natural landscaping. Such screening will be located within the buffer zone and outside of security fencing. Screening may also be required in other locations for specific uses or structures, such as substations and BESS Facilities. The Board of Supervisors may approve a plan to allow phased screening based on special or unique conditions of the use or site. The screening required by this section must be shown on the required Development Plan.

(1) Existing vegetation, topography, buildings, open space, or other elements located on or adjacent to the site may be considered as part of the required screening if deemed adequate by the Board of Supervisors.

(2) Vegetative landscaping intended for screening may include a combination of evergreen and deciduous trees, shrubs, and/or cacti or succulents where appropriate, that are native to Yavapai County and four (4') to six (6') feet in height (excluding cacti and succulents) at time of planting. The combination of plant species to be installed and spacing will be detailed in the Landscaping Plan (subsection D.2.g).

(3) Berms must generally be constructed with a three-to-one (3:1) horizontal-to-vertical ratio, four (4') feet to six (6') feet above the adjacent grade, with a top that is three (3') feet in width (the wide top is necessary to have a flat area for plantings). The outside edges of the berm must be sculpted such that there are vertical and horizontal undulations to give variations in appearance. When completed, the

berm must have a naturalistic appearance and may not be uniform like a dike. All land berms will be seeded with a revegetation seed mix based on shrubs, cacti and succulents, grasses and herbaceous forbs, and wildflowers native to Yavapai County as approved by the Development Services Director.

(4) Fencing: Proposed fencing will be designed to minimize visual impacts and be complementary with scenic corridors and adjacent properties. Fencing will also be designed to minimize impacts to wildlife **and must not impede identified** wildlife corridors.

**(a) Exclusionary fencing will be aligned to avoid dead ends where wildlife could become trapped. If fencing is required within a wildlife corridor due to**

22

**industry regulatory standards, it must consist of a wildlife friendly design provided by the Arizona Game and Fish Department (e.g., fencing with a maximum height of forty-two (42") inches and a smooth bottom wire that is eighteen to twenty (18-20") inches above the ground to allow pronghorn and deer fawns to pass under).**

**(b)** Fencing intended for screening must be at least seventy-five (75**%**) percent visually solid as viewed on any line perpendicular to the fence from adjacent property or a public street.

**(c)** Fencing may be used in combination with other screening methods but will not be the primary method. Forthe purposes of this subsection, fencing will not be used to screen more than thirty (30%) percent of the views required to be screened.

**(d)** Depending on the location, such as where fencing abuts residential uses, ornamental features may be required on the fence.

**(e)** Fencing material used for screening will not include chain link fencing with slats.

**(f)** When feasible, fencing will be designed around groups or clusters of equipment, as opposed to fencing the entire site.

**(g)** New fencing must not impede existing easements to private or public lands.

(5) The perimeter of BESS ~~f~~Facilities, substations, and other structures must be enclosed with security or game fencing prior to the commencement of operations of the ~~s~~Solar ~~f~~Facility as required by local, state, and federal regulations and national safety codes.

Perimeter fencing around PV arrays must be composed of low visibility game or similar fencing. Arizona Game and Fish and other applicable agencies will be consulted on the design of perimeter fencing and associated wildlife openings. Fencing will be maintained in an upright and functional condition pursuant to the executed Site Maintenance Agreement.

(6) Dwellings located one thousand (1,000') feet or less from the project boundary which are existing or under permit at the time of Board of Supervisors approval of the ~~s~~Solar ~~f~~Facility may require additional vegetative screening from views of the ~~s~~Solar ~~f~~Facility structures as determined appropriate by the Development Services Director. Such vegetative screening will be located within the buffer zone in an area extending at least seventy-five (75') feet from either side of the dwelling.

23

(7) Additional screening where appropriate may be required as determined by the Development Services Director.

7. Outdoor Storage: Material storage areas will be located in low-visibility areas of the project site whenever possible. The locations of any storage areas and an inventory of anticipated materials to be stored must be included in the Development Plan. Screening requirements for outside storage areas will be determined by the Development Services Director upon review.

~~8. Lines and Connections: Projects will be designed to minimize visual impact by: a. Placing all collection lines within the installation underground to the greatest extent practical, including any connections to a substation. Exceptions may be approved by the Board of Supervisors when co-locating with existing above-ground collection lines or if the applicant demonstrates a significant or substantive need for above ground connections.~~

~~b. Mitigating visual impacts from transmission lines connecting substations to the utility grid to the greatest extent practical, including by co-locating with existing lines or other linear infrastructure.~~

~~c. Any overhead electrical lines must be designed in compliance with Avian Power Line Interaction Committee (APLIC) standards.~~

~~9~~**8**. Outdoor Lighting: Any outdoor exterior lighting associated with the ~~s~~Solar ~~f~~Facility or BESS ~~f~~Facility will be limited to levels required for safety and security **and avoid crossing into identified wildlife corridors**. All outdoor lighting must comply with Section 603 Light Pollution Control, and lamps must not exceed a correlated color temperature (CCT) in excess of three thousand (3,000K) kelvins. Light poles associated with the ~~s~~Solar ~~f~~Facility will not exceed a height of eighteen (18') feet. All lighting must be shown on the Development Plan. ~~Additional lighting after approval of the **Solar Facility** Use Permit may require an amendment to the **Solar Facility** Use Permit as determined by the Development Services Director.~~

Commented [AriSEIA39]: Lighting plans are preliminary. It is atypical to provide this level of detail (especially if binding) at this stage of permitting.

~~10~~**9**. Glare Impact: All structures and PV panels associated with the ~~s~~Solar ~~f~~Facility will be arranged to direct reflected sunlight and artificial light away from adjacent parcels**, identified wildlife corridors,** and public streets~~,~~ and will be installed in such a manner as to prevent glare that could interference with any road or air traffic. As indicated in subsection D.2.j of this Section, the Federal Aviation Administration (FAA) may require a glare impact study and/or an airspace study to determine impacts on area airports.

1110. Noise: Operational noise impacts at the project boundary will not exceed fifty (50 dBA) decibels where abutting residential or Planned Area Development use districts, **identified wildlife corridors,** or where abutting parcels with dwellings existing at the time of Board of Supervisors approval of the sSolar fFacility. This must be demonstrated by a noise analysis prepared by a qualified expert **or by submission of manufacturer documentation showing noise level compliance with the fifty (50 dBA) decibels standard as determined satisfactory by the Development Services Director**.

Commented [AriSEIA40]: Noise levels continue to be too low to allow storage development in the county. Battery HVAC units usually emit 85dB 3' away and can be in the ~60/65 dB range at the boundary of the project.



1211. Signs: Any signs associated with the sSolar fFacility will be designed to comply with Section 601 Sign Code and a sign permit must be obtained for all proposed signs. Only signs related to sSolar fFacility use and safety will be permitted.

1312. General Compliance: The sSolar fFacility or BESS fFacility will be designed, constructed, tested, and operated to fully comply with all applicable County, ~~S~~state, and ~~F~~federal laws, regulations, codes, and requirements. **The Solar Facility will also comply with the most current standards set forth by industry regulating bodies, including the Western Electricity Coordinating Council (WECC) and North American Electric Reliability Corporation (NERC) planning standards, as approved by the Federal Energy Regulatory Commission (FERC), the National Electric Safety Code (NES) standards, and Federal Aviation Administration (FAA) regulations.**

G. INSTALLATION AND MAINTENANCE: The sSolar fFacility must be developed in accordance with the approved Development Plan and will be continually maintained and kept in good repair including, but not limited to, fencing, ground cover, screening, lighting, driveways, entrances, PV panels, and structures.

1. A Site Maintenance Agreement will be mutually executed between the owner or operator and Yavapai County (as a condition of approval).
2. The sSolar fFacility operator will be responsible for the cost of developing and maintaining the ~~s~~Solar ~~f~~Facility.
3. **The Solar Facility operator will be responsible for arranging the training of all project field personnel regarding proper ingress/egress routes and on-site protocols for working in environmentally, culturally, or archeologically sensitive areas. Contractors employing such field personnel must maintain records documenting that the personnel have received this training.**
4. **A Construction Management Plan that includes an estimated construction schedule and hours of operation must be provided to the County prior to the start of construction.**

~~3~~5. Unless allowed by a phasing plan approved by the Board of Supervisors, all grading, groundcover, berms, fencing, trees, and other forms of landscaping will be installed in accordance with the Development Plan within one (1) year of the commencement of construction.

~~4~~**6**. Berms and fencing will be continuously maintained and repaired or replaced if damaged.

~~5~~**7**. Solar panels must be repaired or replaced or removed when they are either nonfunctional or in visible disrepair.

~~6~~**8**. All undeveloped portions of the subject property will be maintained in a natural, undisturbed, and debris-free condition. The project operator will monitor noxious weed density and provide mitigation to eradicate or prevent the spread of such weeds based on the Landscaping Plan (subsection D.2.g).

~~7~~**9**. After the construction of the solar arrays, native low-growing vegetation will be used to stabilize and restore disturbed areas of the site for the duration of the facility's use.



~~8~~**10**. Weed and vegetation control or mowing will be performed routinely and a performance bond reflecting the costs of such maintenance for a period of six (6) months must be posted and maintained by the owner or operator.

~~9~~**11**. Groundcover and landscaping will be continuously maintained and replaced if dead.

~~10~~**12**. While the use of herbicides is not encouraged, any herbicides must be applied in a manner that does not cause "drift", which occurs when applied pesticides move through the air to abutting properties or aquatic habitat. Only Environmental Protection Agency (EPA) designated minimum risk herbicides may be used for vegetative and weed control. Herbicide applicators must possess an Arizona Certified Pesticide Applicator license.

~~11~~**13**. The ~~s~~**S**olar ~~f~~**F**acility operator will be responsible for noxious weed management in accordance with state laws within the Project Area.

~~12~~**14**. Persistent failure to maintain the site or its improvements over a continuous period of ~~six (6)~~**twelve (12)** months may result in termination of the **Solar Facility** Use Permit and initiate the facility's decommissioning by the Board of Supervisors (subsection **D.7 and** D.8 ~~and D.9~~)**. However, following the first six (6) months of such failure to maintain the site, the County will have the option to hire appropriate professionals to perform needed maintenance using the surety funds designated by the Development Agreement (subsection E.1.b).**

H. PUBLIC ROAD IMPROVEMENT, REPAIR, MAINTENANCE, AND DEDICATION (including bridges, drainage structures, guard rails and all other roadway related infrastructure): The ~~s~~**S**olar ~~f~~**F**acility owner or operator will be responsible for any damage to public roads caused by the installation or decommissioning of a ~~s~~**S**olar ~~f~~**F**acility. In addition to the Traffic Plan (subsection D.2.i) which provides general travel routes and trip volumes to assist in the general review of the **Solar Facility** Use Permit, a public road mitigation plan may be required by Yavapai County Public Works to address the following:

1. Improvement, repair, and maintenance of public roads, including during installation and decommissioning of the ~~s~~**S**olar ~~f~~**F**acility.
    a. Yavapai County Public Works may require more than one Mitigation Plan to document road conditions, first during installation, and again during

decommissioning and reclamation.

b. The Mitigation Plan will identify all public roads within unincorporated Yavapai County proposed as haul routes to transport equipment, parts and material for construction, operation, maintenance, and decommissioning of any ~~s~~Solar ~~f~~Facility, including estimated daily vehicle counts as required by Yavapai County Public Works.

2. Yavapai County Public Works may request studies and reports prepared by qualified professionals to determine the likely and expected impact to the haul routes designated by the applicant.

a. All associated costs for baseline road condition studies of the haul routes will be paid for by the applicant.

b. Yavapai County Public Works will inspect the haul routes periodically to determine the road conditions and any damages caused by the sSolar



fFacility. The sSolar fFacility will be responsible for the costs of such inspections, repairs, and restoration of the haul road, or any other road damaged by activities associated with the sSolar fFacility.

3. Existing roads will be used to provide access to the site. If new roads are constructed, the amount of land disturbance must be minimized. Roads constructed to provide vehicle access for site will be designed and constructed to standards approved by Yavapai County Public Works and the nearest Fire District, in coordination with any required public safety, fire protection, and emergency management plans.

a. Grading and road construction permits are required under certain circumstances as described in the current version of the Yavapai County Engineering Design and Construction Manual.

b. Measures to control and mitigate dust on roads will be outlined in a dust control and mitigation plan.

4. If prior to or during initial installation of the ~~s~~Solar ~~f~~Facility Yavapai County Public Works determines the haul routes designated by the applicant appear inadequate for use as haul routes because of the weight of the loads, the number of trips, drainage issues, or because of safety concerns, then the sSolar fFacility owner or operator may be required to improve and maintain the roads to accommodate the anticipated traffic load. The costs and details for required improvements will be included in the project's Development Agreement and subsequent amendments as needed.

5. Yavapai County Public Works may require financial assurance to address any reasonably foreseeable costs and expenses related to the repair and maintenance of the haul roads designated by the applicant. Such financial assurance requirement may be a separate agreement or may be included as part of the sSolar fFacility Development Agreement required by subsection E.2 of this Section.

6. The property owner/developer must dedicate the full right-of-way for all minor and major arterial roads (see Yavapai County Interactive Map) or as identified by the Yavapai County Public Works Director prior to obtaining a building permit.

7. The property owner/developer will coordinate with the appropriate Fire Department or Fire District on the required roadway cross section to provide adequate weight

**Commented [AriSEIA41]:** During installation there would be too much development risk. If it was misrepresented prior to installation then that can be addressed; otherwise, it is open for too much subjectivity.

capacity and internal circulation from the project vehicular access points to key internal project components (i.e., inverters, batteries, etc.) for fire and emergency response apparatus.

I. STORMWATER MANAGEMENT PERFORMANCE BOND: The ~~s~~Solar ~~f~~Facility owner or operator will be responsible for all stormwater facilities. The project must be planned with low impact development stormwater management techniques, as outlined in the current version of the Yavapai County Engineering Design and Construction Manual, to capture and infiltrate stormwater and rainwater. A performance bond or other surety acceptable to the Board of Supervisors may be required as deemed necessary to ensure compliance with the County's stormwater regulations and to correct nonfunctioning or inadequate stormwater controls or necessary maintenance and may be a separate agreement or may be included as part of the ~~s~~Solar ~~f~~Facility Development Agreement required by subsection E.2 of this Section. The bond or other surety, if any, may be required to remain in effect during the entire term of the **Solar Facility** Use Permit.



J. BATTERY STORAGE: In addition to the above general provisions, application requirements, and development and performance standards, the following additional requirements must be met for the approval of a ~~b~~Battery ~~e~~Energy ~~s~~Storage ~~s~~System (BESS) facility**, for both stand alone facilities and those approved in conjunction with a Solar Facility Use Permit**: 1. Location: Due to their potentially combustible nature and possible large footprint, the siting of BESS ~~f~~Facilities must meet the following criteria:

a. BESS ~~f~~Facilities will be located in nonresidential areas **unless approved as part of the Solar Facility Use Permit or substation**.

b. BESS ~~f~~Facilities may not be located in areas used by the public (e.g., parkland) **or within identified wildlife corridors**.

**Commented [AriSEIA42]:** This needs a definition.

c. Buffer the BESS ~~f~~Facility from the surrounding areas by siting toward the interior of the parcel and through the use of greater parcel sizes and setbacks. BESS ~~f~~Facilities may also be co-located with the project substation as described in subsection K.

d. Take advantage of existing topography, structures, and vegetation to provide extra screening.

e. Design the BESS ~~f~~Facility so that it mitigates the potential detrimental impacts to the general health, safety, and welfare of the community**, and to wildlife**. f. Design and configure the BESS ~~f~~Facility in a way that minimizes other adverse impacts on the community (e.g., views, noise, and vibration).

2. Configuration:

a. All battery cells will be contained within a BESS equipped with cooling, ventilation, built-in 24/7 automated fire detection and extinguishing technology (following all manufacturer recommendations), and a ~~b~~Battery ~~m~~Management ~~s~~System (BMS).

b. The BMS will monitor individual battery module voltages and temperatures, container temperature and humidity, combustible off-gassing, fire, ground fault and direct current (DC) surge, and door access.

c. The BMS must be capable of shutting down the system before it begins to operate outside of safe parameters (before thermal runaway takes place).

3. Construction, Maintenance and Operation: BESS fFacilities will be constructed, maintained, and operated in accordance with applicable codes and standards including, but not limited to:

a. All applicable fire, electrical and building codes adopted by the County. b. National Fire Protection Association (NFPA) 855, Standard for the Installation of Stationary Energy Storage Systems, 2023 Edition and subsequent additions.

c. Underwriters Laboratories (UL) 9540A, Standard for Test Method for Evaluating Thermal Runaway Fire Propagation in Battery Energy Storage Systems and subsequent editions; and, unless otherwise required by such regulations and codes:

(1) Access to all batteries and electrical switchgear will be from the exterior for normal operation and maintenance.

28

(2) Access **will not be permitted** to theany containers**s that have an** interior **walkway** will not be permitted while the system is in operation, except for safety personnel and first responders; and

(3) Signage must include the following information:

(a) Type of technology associated with the BESS;

(b) Any associated special hazards;

(c) Type of suppression system installed in the area of the BESS;

(d) 24-hour emergency contact information, including reach back phone number.

(4) Disconnect and other emergency shutoff information must be clearly displayed on a light reflective surface.

K. SUBSTATIONS: In addition to the above general provisions, application requirements, and development and performance standards, the following additional requirements must be met for the approval of a substation**, for both stand-alone facilities and those approved in conjunction with a Solar Facility Use Permit**:

1. Location:

a. Substations may not be located within two thousand six hundred forty (2,640') feet (a half mile) of adjacent residential districts, existing or approved residences, subdivisions, public lands and uses, or parkland. An exception to this requirement will be made when co-locating within five hundred (500') feet of an existing utility substation**, however, a substation may not be located within an identified wildlife corridor**.

b. Buffer the substation from the surrounding areas by siting toward the interior of the parcel and through the use of greater parcel sizes and setbacks.

c. Take advantage of existing topography, structures, and vegetation to provide extra screening.

d. Design the substation so that it mitigates the potential detrimental impacts to the



**Commented [AriSEIA43]:** We would amend "except for safety personnel at the direction of the operator" as generally speaking you don't want safety personnel entering the containers under most circumstances even/especially during thermal runaway .

**Commented [AriSEIA44]:** Substations should be permitted 100' from any residences. A more onerous requirement will inevitably make the gen-ties longer, which will be more onerous visually and have greater land use impacts.

**Commented [AriSEIA45]:** Severely limits flexibility in design and where substations can be sited, which may result in inefficient electrical design e.g., longer gen-ties and more impacted land. The location of the substation is highly project-specific and depends on the project's design and POI. This requirement should be removed.

general health, safety, and welfare of the community, and to wildlife. e. Design and configure the substation in a way that minimizes other adverse impacts on the community (e.g., views, noise, and vibration).

2. Term: Substations includedapproved as part of the sSolar fFacility Use Permit will have the same Use Permit term as the sSolar fFacility, however, substations and transmission lines may have a life expectancy longer than that of the remainder of the sSolar fFacility. Therefore, upon decommissioning of the sSolar fFacility, the private owner of a substation ~~owner~~ may apply for a new Use Permit or other zoning approval to allow the continued use of the substation. Public utility service providers are exempt from this requirement.

Commented [AriSEIA46]: This needs to clarify that the initial use permit will provide approval for substation and solar facility. There are not two SUPs required at the outset.

L. EMERGENCY PREPAREDNESS/SAFETY INSPECTIONS:

1. The sSolar fFacility owner or operator will allow County employees and designated third-party inspectors access to the sSolar fFacility premises with forty-eight (48) hour notice for inspection purposes as set forth in their application.

29

2. The sSolar fFacility operator will coordinate with County emergency services staff (e.g., Fire District, Sheriff's DepartmentOffice, and Emergency Management staff) to provide materials and continuing education to these departments serving the Project Area with emergency services.
   a. These materials will inform staff on how to safely respond to onsite emergencies, including emergencies associated with any BESS Facilities.
   b. The sSolar fFacility operator will arrange a pre-operational training session with emergency services staff to familiarize personnel with issues unique to the sSolar fFacility prior to the initiation of solar operations.
3. The sSolar fFacility owner or operator will provide a fire safety plan, a fire evacuation plan, and all other submittals relating to emergency planning and preparedness as required by applicable fire, electrical and building codes adopted by the County or referenced in this Section.
4. In addition to the annual life and fire safety inspections required by the fire code and performed by County staff, the sSolar fFacility operator will conduct semi-annual on site self-inspections of the battery units and submit a written report to the Development Services Director on their condition.
5. The sSolar fFacility Development Agreement, required by subsection E.1.d of this Section, must address provision of specialized BESS fFacility fire safety equipment or other protections, if necessary for support of the BESS fFacility use.
   a. The cost of this specialized equipment, or a portion thereof, may be required to be reimbursed by the sSolar fFacility owner or operator.

M. DECOMMISSIONING AND RECLAMATION: The Solar Facility Use Permit will include the submission of a Detailed Decommissioning Plan as described in subsection D.l. Prior to the issuance of construction permits, the cost estimate for the complete removal of non operational above and below ground improvements must be submitted and financial assurance must be posted.

1. Decommissioning Plan: The Decommissioning Plan will address the following items: a. All physical improvements, materials, and equipment related to solar energy generation, transmission, and storage must be removed from the surface and the subsurface to a minimum depth of ~~forty-eight~~thirty-six (36~~48~~”) inches. The pre existing soil grade will also be restored following disturbance caused in the removal process. These will include, but are not limited to, structures, buildings, equipment, cabling and wiring, solar electric systems, electrical components, security barriers, foundations, pilings, berms, storm water improvements, and any other associated facilities.

**Commented [AriSEIA47]:** 36” is standard.

**Commented [AriSEIA48]:** Typically any improvements will be left up to the discretion of the landowner.

b. All fencing will be removed and recycled or reused unless the Development Services Director grants approval for any existing perimeter fencing to remain in place**, in which case, the Arizona Game and Fish Department will be consulted to ensure that the remaining fence will not negatively impact wildlife**.

c. All access roads located within the Project Area will be removed unless the Development Services Director approves a written request from the current



or purchasing landowner to allow a portion of the access roads and associated culverts or related materials to remain.

d. For any part of the ~~s~~**S**olar ~~f~~**F**acility on leased property, the Decommissioning Plan may propose to incorporate agreements with landowners regarding the retainment of driveways, roads, landscaping, berms, fences, gates or repurposed buildings or other structures with approval by the Board of Supervisors. However, any proposed use of remaining buildings or other structures must be in conformance with the regulationsfor the zoning district in effect at the time of Board of Supervisors approval.

e. Ground cover and screening established as part of the ~~s~~**S**olar ~~f~~**F**acility Development Plan and other existing vegetation may remain as part of the Decommissioning Plan. Land disturbed as part of the decommissioning process must be reseeded and re-vegetated with **certified weed free** native seed mixes (such as those described in subsection F.5 or other plant species suitable to the area. A list of such appropriate plant materials will be provided by the Development Services Director. Such planting and associated grading or other land disturbance must be completed within one (2~~1~~) years of removal of ~~s~~**S**olar ~~f~~**F**acility structures and equipment, in accordance with the Decommissioning Plan approved and adopted by the Board of Supervisors.

**Commented [AriSEIA49]:** Projects typically need more than 12 months for decommissioning (typically takes as long to decommission as to construct). 24 months is more reasonable or the ordinance should provide flexibility based on project size.

f. Disposal and recycling of all ~~s~~**S**olar ~~f~~**F**acility materials and equipment, including but not limited to PV panels, inverters, and batteries must fully comply with all applicable County, state and federal laws, regulations, and code requirements, which includes a County-approved demolition permit for work to be performed by a licensed contractor and an approved location for disposal of such materials and equipment.

g. Guaranteed Funds: Financial assurance for the estimated cost of decommissioning and reclamation, which may include the possibility of salvage value if allowed by the Board of Supervisors, prepared as required in subsection E.2, must be guaranteed by the owner or operator of the ~~s~~**S**olar ~~f~~**F**acility prior to issuance of construction permits to ensure that decommissioning and reclamation can successfully occur. Should another authority having jurisdiction (e.g., Arizona State Land Department, Bureau of Land Management, etc.) also require financial assurance for decommissioning and reclamation, the Board of Supervisors may consider accepting the same or portions of the same financial assurance to satisfy both requirements, so long as the assurance meets the specifications of both Yavapai County and the separate authority, as part of a waiver request pursuant to subsection D.5. Upon issuance of the financial assurance, the applicant will name the County as a party to the financial assurance. The applicant may choose one of the following options (either the full cost option or the tiered securitization option) to provide financial assurance:

(1) Full Decommissioning Cost: The full cost of decommissioning and reclamation will be guaranteed by a combination of the following:

31

(a) Trust Fund: The owner or operator of the ~~s~~**S**olar ~~f~~**F**acility will establish a trust fund into which money specifically earmarked for decommissioning and reclamation is deposited. The ~~s~~**S**olar ~~f~~**F**acility Development Agreement will prohibit the release of these funds without the written consent of the County. The County will consent to the release of the funds upon compliance with the Decommissioning Plan approved by the Board of Supervisors.

(b) Payment Surety Bond: The owner or operator of the ~~s~~**S**olar ~~f~~**F**acility will obtain a surety bond satisfactory to and approved by the County in an amount equal to the estimated cost of decommissioning and reclamation. A standby trust fund must be established into which the surety company will make payments if the ~~owner/operate~~**owner or operator** fails to comply with their financial responsibilities. This money deposited into the standby trust fund will be used to pay a third party to perform the work described in the Decommissioning Plan approved by the Board of Supervisors.

(c) Letter of Credit: A letter of credit issued by a financial institution that has a credit rating of at least BBB+ or higher by Standard and Poor's or Baa1 or higher by Moody's; and financial ratios and capitalization requirements that are acceptable to the County, in the full amount of the decommissioning and reclamation estimate.

(2) Tiered Securitization: An amount equal to, or more than, ten (10%)

percent of the approved decommissioning and reclamation cost estimate will be either: deposited into a cash escrow account at a financial institution acceptable to the County; or an amount equal to, or more than, ten (10%) percent of the decommissioning and reclamation cost estimate in the form of a payment surety bond or a letter of credit issued by a financial institution that has a credit rating of at least A- from Standard & Poor's or A3 from Moody's and assets (50%) and capital surplus (50%) totaling at least $10,000,000,000, or an A.M. Best financial strength rating of at least A- (Excellent) or other credit rating and capitalization reasonably acceptable to the County will be obtained. The amount deposited in the cash escrow account, or the amount of the surety bond or letter of credit, will increase by an additional ten (10%) percent each year on the anniversary of the commencement of operation of the ~~s~~Solar ~~f~~Facility for nine (9) additional years until 100% of the full cost estimate of decommissioning and reclamation is achieved.

h. Cost Estimate Update: The estimated decommissioning and reclamation costs must be recalculated at an interval no sooner than every year but not later than every five years by an independent third-party Arizona licensed

32

professional engineer, following the requirements for the original cost estimate as required in subsection M.1.g of this Section~~, and using the most current industry standards.~~ The cost of preparing this update must be paid by the owner or operator.

(1) If the recalculated estimated cost of decommissioning and reclamation exceeds the original estimated cost by two percent (2%) or greater, then the ~~s~~Solar ~~f~~Facility owner or operator will deposit additional funds into the trust fund or cash escrow account or make an update to the payment surety bond or letter of credit to meet the new cost estimate.

(2) If the recalculated estimated cost of decommissioning and reclamation is less than ninety-eight percent (98%) of the original estimated cost, then the County may consider approval of a written request by the owner or operator to reduce the required deposits or, payment surety bond, or letter of credit to the recalculated estimate of decommissioning and reclamation cost.

(3) Any increase or decrease in the decommissioning and reclamation securitization will be funded by the applicant or refunded to the applicant (if permissible by the form of security) within ninety (90) calendar days and will be similarly readjusted for every subsequent five (5)-year decommissioning cost estimate update.

2. Amendment to Decommissioning Plan: Any amendment must be approved by the Board of Supervisors prior to beginning decommissioning and reclamation. Applications for an



**Commented [AriSEIA50]:** Recalculating to entirely new standards versus what was originally in the decommissioning plan at the time could make the requirement unworkable. Additionally, projects typically need more than 12 months for decommissioning and more often require closer to 24 months. To address the above issues, the county should provide flexibility based on project size.

amendment will require a public hearing under the same procedures as required for the **Solar Facility** Use Permit. Required timeframes for completion of decommissioning and reclamation will not be extended due to the amendment application process.

3. Partial Decommissioning: If decommissioning is triggered for a portion, but not the entire ~~s~~**S**olar ~~f~~**F**acility, then the owner or operator will complete decommissioning and reclamation in accordance with the Decommissioning Plan for the applicable portion of the sSolar fFacility. The remaining portion of the sSolar fFacility will continue to be subject to the Decommissioning Plan.
4. Date of Decommissioning: If the ~~s~~**S**olar ~~f~~**F**acility is to be decommissioned and reclaimed, the sSolar fFacility owner or operator must notify the Development Services Director in writing of the proposed date of discontinued operations and plans for removal.
5. Abandonment of Solar Facility: Unless otherwise approved by the Development Services Director (e.g., to allow time to repair damage from severe weather or to update equipment), ~~s~~**S**olar ~~f~~**F**acilities that have not been in active and continuous service for a period of twelve~~six~~ (12~~6~~) months will be decommissioned and reclaimed at the sSolar fFacility owner or operator's expense.
6. The owner or operator or their successors, within six (6) months after the complete cessation of use of the ~~s~~**S**olar ~~f~~**F**acility and at their sole expense, will initiate and

33

provide continuous decommissioning of the sSolar fFacility in accordance with the approved Decommissioning Plan.

   a. Following the completion of decommissioning of the entire sSolar fFacility and payment for any such costs arising out of a default by the owner or operator or their successors, any remaining securitized funds held by the County will be distributed to the project owner(s) in the same percentage of the securitized funds matched with the percentage of the project owner's acreage ownership of the sSolar fFacility.

7. Default Decommissioning and Reclamation by the County: If the owner or operator, or their successors, fail to decommission the ~~s~~**S**olar ~~f~~**F**acility pursuant to the approved Decommissioning Plan, and the County has not approved a repowering of the ~~s~~**S**olar ~~f~~**F**acility, the County will have the right, but not the obligation, to commence decommissioning and reclamation activities and will have access to the property, and will have the right to draw on securitized funds up to the amount of the actual decommissioning costs, and the rights to the solar generation equipment and BESS equipment and materials remaining on the property. If applicable, any excess decommissioning and reclamation securitized funds will be returned to the current owner(s) of the property after the County has completed the decommissioning and reclamation activities and paid all outstanding invoices, divided according to the percentage of the property owner's acreage ownership of the ~~s~~**S**olar ~~f~~**F**acility. Nothing herein will limit other rights or remedies that may be available to the County to enforce the obligations of the owner or operator or their successors, including under the County's zoning powers.



**Commented [AriSEIA51]:** I thought Staff already agreed to 12 months. We have previously submitted comments on this. 6 months is too short for normal operation/development and is not typical in other ordinances we have seen.

# ATTACHMENT B

# Solar Panel Recycling and Disposal

Solar energy plays a vital role in growing the United States' domestic clean energy resources. Rapid technology improvements have enabled utility-scale solar energy to grow exponentially; there is enough solar capacity in the U.S. to power more than 12.8 million homes. According to the U.S. Department of Energy, the U.S. can meet 40% of its electricity needs by 2035 with solar power.[1]

## Solar Photovoltaics & Public Safety

Solar panels are designed to provide safe, reliable, and affordable energy for 35 years. Most of a solar panel's weight (75%) is glass; other materials include aluminum, copper, and semiconductor materials. The primary component in solar cells is silicon, which is the second-most common element on earth and used in a variety of consumer electronics, from cell phones to computer chips.[2,3] Modern commercial solar panels do not contain sufficient hazardous materials to pose a danger to the environment and human health, and generally may be disposed of in an ordinary landfill.

After a panel's useful life, it may continue to operate, albeit at reduced efficiency. A study from the National Renewable Energy Laboratory calculated panels lose approximately 0.5% efficiency per year, meaning by Year 20 the facility can operate at 90% of its original output.[4] Should the owner of a solar facility decide to restore the site to another land use – known as decommissioning - there are many options for the used panels.

## Reuse

Panels can continue to be operational after surpassing their warrantied lifetime. Through maintenance and repair aimed at reducing waste from early or unexpected decommissioning, many solar panels can be refurbished and reused. The lower resale price makes these panels attractive to buyers that have fewer financial resources.[5] There is a small but growing market for secondhand solar panels, enabling residential customers to install solar panels at a significantly reduced cost. Resale or donation of PV panels presents an opportunity for communities to reduce exposure to air pollution emissions through renewable energy deployment, while advancing low-cost electricity access.[6]

## Recycle

The bulk of a solar panel's weight is glass and aluminum: materials commonly recycled in the U.S. With current technology, up to 95% of semiconductor material and 90% of glass used in panels can be recycled.[7] While the solar panel recycling industry is relatively small at present, it is likely to grow as more solar facilities reach the end of their operational life in the next decade and beyond. It is estimated that by 2030, the cumulative value of recoverable materials from decommissioned solar panels will be approximately $450 million. The U.S. Environmental Protection Agency notes that many solar panels may contain materials deemed critical to national security such as tin and aluminum.[8] Presently, it is estimated that about one in ten solar panels are recycled,[9] though it is anticipated that as more panels reach the end of their useful life, the price of recycling will fall, and the rate of recovery will increase.

The solar industry, research organizations, government agencies, and other stakeholder groups are also taking steps to increase solar panel recycling and apply technological advances for alternative uses for the decommissioned panels and materials. For example, takeback programs run by major panel manufacturers collect and recycle their panels at the end of their lifetime, creating a closed-loop system. One manufacturer has reported capacity to successfully recycle over 90% of collected materials for both reuse in new panels and diversion into other products like rubber mats and shoe soles[10]

## Landfill

Solar PV panels are primarily made up of non-hazardous materials (refer to Solar Panels and Your Community Factsheet), thus most modern panels can be safely disposed of in municipal landfills. For more information on the contents of solar panels, please review "Solar Panels and Your Community. "

Solar panels currently make up a small percentage (0.006%) of total waste;[11] and according to the U.S. Department of Energy, in the absence of new recycling initiatives, by 2050 decommissioned solar PV panels may account for just .1% of total solid waste.[12] As waste diversion efforts increase in the U.S., solar recycling will likely become more common, but in the meantime, landfills can be a safe means of disposal for most solar panels.

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1 Department of Energy. 2022. "Solar Futures Study." Accessed at: https://www.energy.gov/eere/solar/solar-futures-study

2 Department of Energy. 2022. "Solar Photovoltaic Cell Basics." Accessed at: https://www.energy.gov/eere/solar/solar-photovoltaic-cell-basics

3 U.S. Geological Survey. 2016. "A World of Minerals in Your Mobile Device." Accessed at: https://pubs.usgs.gov/gip/0167/gip167.pdf

4 Lifetime of PV Panels. National Renewable Energy Laboratory. 2018. Available: https://www.nrel.gov/state-local-tribal/blog/posts/stat-faqs-part2-lifetime-of-pv-panels.html

5 International Renewable Energy Agency (IRENA). 2016. "End of Life Management of Solar Photovoltaics." Accessed at: https://www.irena.org/publications/2016/Jun/End-of-life-management-Solar-Photovoltaic-Panels

6 Heath, Garvin; Ravikumar, Dwarakanath; Ovaitt, Silvana; Walston, Leroy; Curtis, Taylor; Millstein, Dev; Mirletz, Heather; Hartmann, Heidi; and McCall, James. "Environmental and Circular Economy Implications of Solar Energy in a Decarbonized US Grid." NREL. Accessed at: https://www.nrel.gov/docs/fy22osti/80818.pdf

7 IRENA, 2016.

8 EPA. 2022. "Solar Panel Recycling." Accessed at: https://www.epa.gov/hw/solar-panel-recycling

9 Crownhart, Casey. 2021. "Solar panels are a pain to recycle. These companies are trying to fix that." MIT Technology Review. Accessed at: https://www.technologyreview.com/2021/08/19/1032215/solar-panels-recycling/

10 IRENA, 2016.

11 IRENA, 2016.

12 Department of Energy. 2022. "Solar Energy Technologies Office Photovoltaics End-of-Life Action Plan." Accessed at: https://www.energy.gov/sites/default/files/2022-03/Solar-Energy-Technologies-Office-PV-End-of-Life-Action-Plan.pdf


Source: Nextracker

# ATTACHMENT C

4-2024

# Rebutting 33 False Claims About Solar, Wind, and Electric Vehicles

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Available at: https://scholarship.law.columbia.edu/sabin_climate_change/217

Columbia Law School | Columbia Climate School

Sabin Center for Climate Change Law

# REBUTTING 33 FALSE CLAIMS ABOUT SOLAR, WIND, AND ELECTRIC VEHICLES

APRIL 2024

*(Updated June 2024)*

# TABLE OF CONTENTS

One peer-reviewed study in the *Journal of Natural Resources and Development* found it unlikely for lead or cadmium to leach into the soil from functional solar panels.[49] Measuring heavy metal concentrations in the soil at various distances, researchers found no significant differences in lead or cadmium concentrations directly underneath solar panels, compared to soil 45 or 100 feet away.[50] The study further found that "lead and cadmium were not elevated in soils near PV systems and were far below levels considered to be an imminent or future danger to environmental health."[51]

Although the study did find higher levels of selenium in soil directly underneath solar panels, the study noted that the presence of selenium was possibly a "result of the cement used in construction," rather than leaching from the panels themselves.[52] In addition, the study noted that even the highest selenium concentrations observed were below the EPA's risk threshold for mammals.[53] Finally, the study noted that fly ash, a product of coal combustion "commonly disposed of in landfills and as a soil amendment in agriculture," contains significantly higher concentrations of lead (40x), cadmium (1.1x) and selenium (4x) than the soil samples taken directly underneath the solar panels in the study area.[54]

## False Claim #3: Solar panels generate too much waste and will overwhelm our landfills.

> *"Solar panels pose a huge risk for overfilling the landfills."*[55]

The amount of waste that solar panels are expected to generate over the next few decades is trivial compared to the amount of waste that will be generated by fossil fuels. A study published in Nature Physics in October 2023 found that "35 years of cumulative PV module waste (2016-2050) is dwarfed by the waste generated by fossil fuel energy and other common waste streams." Specifically, the study found that "if we do not decarbonize and transition to renewable energy sources, coal ash and oily sludge waste generated by fossil fuel energy would be 300-800 times and 2-5 times larger [in mass], respectively, than PV module waste."[56]

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[49] Seth A. Robinson et al., *Potential for leaching of heavy metals and metalloids from crystalline silicon photovoltaic systems*," 9 J. NAT. RES. AND DEV. 19, 21 (2019), https://doi.org/10.5027/jnrd.v9i0.02.
[50] *Id.* at 21-22.
[51] *Id.*; U.S. Environmental Protection Agency, *Ecological Soil Screening Level* (2018), https://www.epa.gov/chemical-research/ecological-soil-screening-level (last updated May 3, 2023).
[52] Robinson et al., *supra* note 49, at 21-22.
[53] *Id.*
[54] *Id.*
[55] NO TO SOLAR, *supra* note 7.
[56] Heather Mirletz et al., *Unfounded concerns about photovoltaic module toxicity and waste are slowing decarbonization*, NATURE PHYSICS, October 2023, https://www.nature.com/articles/s41567-023-02230-0.

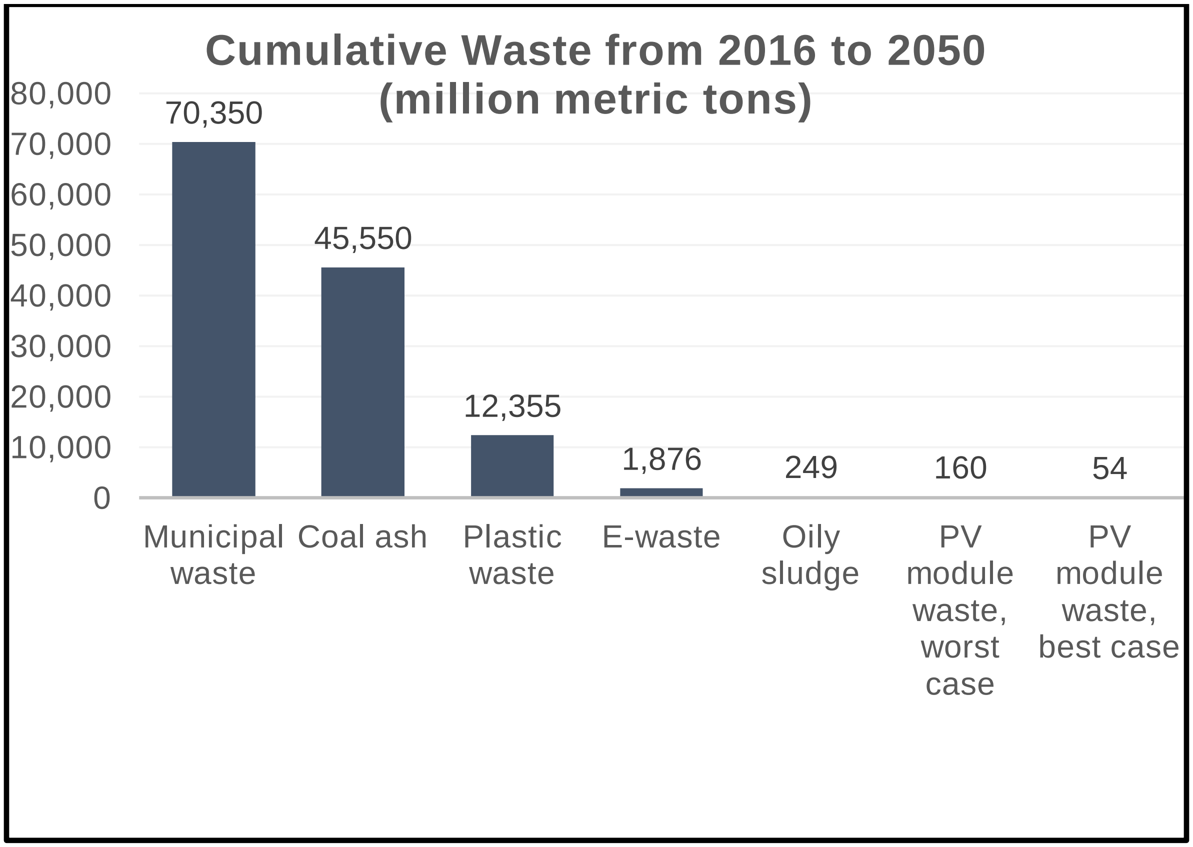


*Figure 1: PV module waste from 2016-2050 compared to other sources of waste.*
***Source: The Sabin Center for Climate Change Law (visualizing data from Heather Mirletz et al.).***[57]

In addition, although only about 10% to 15% of solar panels are recycled in the United States,[58] the U.S. Department of Energy has awarded funding under the Infrastructure Investment and Jobs Act for additional research and development for solar technology recycling.[59] A 2024 study on solar PV recycling concluded that "PV recycling will reduce waste, and CO2 emissions, while contributing to a sustainable environment," and that "[i]t is expected that the research for efficient PV recycling strategies will accelerate as the PV industry grows and as many more organizations and government work towards a sustainable future."[60]

[57] *Id.*
[58] Allyson Chu, *Scientists found a solution to recycle solar panels in your kitchen*, WASH. POST (Jul. 5, 2023), https://www.washingtonpost.com/climate-solutions/2023/07/05/solar-panel-recycling-microwave-technology/#.
[59] *Solar Recycling Research & Development*, OFFICE OF ENERGY EFFICIENCY & RENEWABLE ENERGY, DEP'T OF ENERGY, https://www.energy.gov/eere/solar-recycling-research-development (last visited March 26, 2024).
[60] Zita Ngagoum Ndalloka et al., *Solar photovoltaic recycling strategies*, 270 Solar Energy 112379 (March 2024), at 9-10, https://www.sciencedirect.com/science/article/pii/S0038092X24000732.

Already, some companies have been able to recover 90% of solar panels' mass in their recycling processes.[61] One commercial recycling plant in France can recycle more than 95% of a solar module.[62] Bulk materials such as glass, steel, and aluminum are recoverable through existing recycling lines,[63] while certain semiconductor materials (tellurium and cadmium) can also be recovered at very high rates of 95% to 97%.[64] Valuable materials in the panels, including silver, copper, and crystalline silicon, are actively sought for the development of other products, including the next generation of solar panels.[65] In addition, new companies are emerging with innovative technologies to recycle solar panels.[66]

## False Claim #4: Clearing trees for solar panels negates any climate change benefits.

> *"It isn't 'green' to cut down thousands of acres of trees to build large solar plants. Trees remove carbon from the atmosphere and slow global warming. Deforestation contributes to climate change."*[67]

Forests have immense ecological benefits, recreational benefits, and intrinsic value. However, when looking at the narrow but important issue of carbon accounting, it is usually not true that removing trees to build a solar farm negates any emissions reductions from solar generation. In fact, an acre of solar panels in the United States usually offsets significantly more carbon dioxide emissions than an acre of planted trees can sequester.

In the United States, the emissions intensity of electricity produced by natural gas-fired power plants is roughly 1,071 pounds of carbon dioxide per megawatt-hour (MWh).[68] The emissions intensity of solar PV, meanwhile, is about 95 pounds per MWh, a difference of 976 pounds per MWh compared to natural gas.[69] According to a 2022 *Journal of Photovoltaics* study, utility-scale solar power produces between 394 and 447 MWh per acre per year.[70] When displacing electricity from natural gas, an acre of solar panels, producing zero-emissions electricity would therefore save between 385,000 to 436,000 pounds, or 175 to 198 metric tons, of carbon dioxide per year.

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[61] M.M. Aman, et al., *A review of Safety, Health and Environmental (SHE) issues of solar energy system*, 41 RENEWABLE AND SUSTAINABLE ENERGY REVIEWS 1190 (2015), https://doi.org/10.1016/j.rser.2014.08.086.

[62] Rong Deng et al., *Recent progress in silicon photovoltaic module recycling processes*, 187 RESOURCES, CONSERVATION AND RECYCLING 106612 (2022), at 10, https://www.sciencedirect.com/science/article/pii/S0921344922004463.

[63] Garvin A. Heath, *Research and Development Priorities for Silicon Photovoltaic Module Recycling to Support a Circular Economy*, 5 NATURE ENERGY 502, 503 (2020), https://doi.org/10.1038/s41560-020-0645-2; U.S. DEP'T OF ENERGY, OFFICE OF ENERGY EFFICIENCY & RENEWABLE ENERGY, SOLAR ENERGY TECHNOLOGIES OFFICE, PHOTOVOLTAICS END-OF-LIFE ACTION PLAN 11 (2022), https://www.energy.gov/sites/default/files/2023-10/SETO-PV-End-of-Life-Action-Plan-1.pdf.

[64] Md. Shahariar Chowdhury et al., *An overview of solar photovoltaic panels' end-of-life material recycling*, 27 ENERGY STRAT. REVIEWS 100431, 100437 (2020), https://doi.org/10.1016/j.esr.2019.100431.

[65] Jon Hurdle, *As Millions of Solar Panels Age Out, Recyclers Hope to Cash In*, YALE ENV'T. 360 (Feb. 28, 2023), https://e360.yale.edu/features/solar-energy-panels-recycling.

[66] *Id.*

[67] *5 Things You Need to Know About Solar*, CITIZENS FOR RESPONSIBLE SOLAR, https://perma.cc/VE5H-U33V (last visited March 25, 2024).

[68] Nat'l Renewable Energy Laboratory, *Life Cycle Greenhouse Gas Emissions from Electricity Generation: Update* (Sept. 2021) (Table 1), https://www.nrel.gov/docs/fy21osti/80580.pdf. NREL calculates emissions intensity using grams of carbon dioxide equivalent per kilowatt-hour.

[69] *Id.*

[70] Mark Bolinger and Greta Bolinger, *Land Requirements for Utility-Scale PV: An Empirical Update on Power and Energy Density*, 12 IEEE J. VOLTAICS 589, 593 (2022), https://www.doi.org/10.1109/JPHOTOV.2021.3136805.