PRINCE EDWARD COUNTY
PLANNING COMMISSION
August 20, 2019

AGENDA

7:00 p.m.	**1.**	The Chairman will call the August 2019 meeting to order
	2.	Approval of Minutes
	3.	Review of Board of Supervisors Actions
	4.	Discuss amendment to zoning ordinance to add a section on Solar Facilities
	5.	Public Hearing – Holocene Solar
	6.	Old Business
	7.	New Business
	8.	Informational

Next Meeting September 17, 2019 at 7:00 p.m.

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County of Prince Edward
Planning Commission
Agenda Summary

Meeting Date: August 20, 2019

Item No.: 2

Department: Planning and Community Development

Staff Contact: Wade Bartlett

Issue: Approval of Meeting Minutes

Summary:

Approval of Meeting Minutes - June 18, 2019

Attachments:
Meeting Minutes

Recommendations:
Approval

Motion _____	Paige _____	Hunt _____	Jones _____
Second _____	Sandlin _____	Gilliam _____	Watson _____
Prengaman _____	Jenkins _____	Leatherwood_____	Peery _____

Prince Edward County Planning Commission
Meeting Minutes
June 18, 2019
7:00 pm

Members Present:	John Prengaman, Chair	John "Jack" W. Peery, Jr., Vice Chairman
	Donald Gilliam	Preston L. Hunt
	Mark Jenkins	Robert "Bobby" Jones
	Clifford Jack Leatherwood	Whitfield M. Paige
	Cannon Watson	
Absent:	Teresa Sandlin	
Staff Present:	Wade Bartlett, County Administrator	

Chairman Prengaman called the June 18, 2019 meeting to order at 7:00 p.m.

Approval of Minutes: April 30, 2019

Commissioner Peery made a motion, seconded by Commissioner Leatherwood, to approve the meeting minutes from April 18, 2019 as presented; the motion carried:

Aye:	Donald Gilliam	Nay:	(None)
	Preston Hunt		
	Mark Jenkins		
	Robert M. Jones		
	Clifford Jack Leatherwood		
	Whitfield M. Paige		
	John "Jack" W. Peery, Jr.		
	John Prengaman		
	Cannon Watson		
Absent:	Teresa Sandlin		

In Re: Review of Board of Supervisors Actions

Mr. Bartlett reported the Board of Supervisors approved the Dominion Microwave Tower special use permit request. He said no one spoke during the public hearing held by the Board of Supervisors.

In Re: Special Use Permit – Joe Byler, Firewood Processing Operation

Chairman Prengaman announced this was the date and time scheduled for a Public Hearing on a Special Use Permit application to permit the operation of a Firewood Processing operation located at 419 Singleton Road, on Tax Map

Parcel 74-A-2, owned by Joe S. Byler. This is an A1, Agricultural Conservation District. Notice of this hearing was advertised according to law in the Wednesday, June 5, 2019 and Wednesday, June 12, 2019 editions of THE FARMVILLE HERALD, a newspaper published in the County of Prince Edward.

Chairman Prengaman reviewed the public hearing process. He then said the County has received a Special Use Permit application to permit the operation of a Firewood Processing operation located at 419 Singleton Road, on Tax Map Parcel 74-A-2, owned by Joe S. Byler.

The proposed facility will process and dry firewood to be wholesaled to a third-party operation for sale. The proposed operation will be a family-run operation that will include Mr. Byler and his three sons and operate from 7:00 a.m. to 6:00 p.m., Monday through Friday, and Saturday 6:00 a.m. to 12:00 noon.

The proposed operation will be located within a 40' x 104' building and utilize a diesel operated machine and associated equipment and generate three tractor trailer loads a week.

County staff went out to the property on May 15, 2019 at 10:00 a.m. and measured the sound levels of the equipment from various locations and offer the following information:

- Front of the property at the driveway: 36.7 db.
- Darlington Heights Fire Department (BBQ Pitt): 42.7 db. (Only could hear the lawnmower across the road)
- Approximately 300' across the road, grass was being cut and registered 58.4 db.
- Prince Edward County Convenience Center entrance located on Singleton Road: 35.6 db.
- Forty feet off of Singleton Road on the Hall property located across from the location: 35.2 db.
- Approximately 40 feet from equipment: 60.1 db.
- Two feet from the equipment: 84.5 db.

For comparison, normal conversation is 60 db., while a lawnmower is approximately 90 db. During the inspection, staff did not observe any loud sound from the equipment from the adjacent properties.

Chairman Prengaman opened the public hearing.

Gary Hall, Buffalo District, expressed his concerns regarding the proposed hours of the operation and questioned what is included in "other associated equipment." He also said he is concerned about the number of 90-ton trucks on Singleton Road and the noise associated with running machinery. Mr. Hall then asked if this business is permitted, would another business follow.

Chairman Prengaman stated this public hearing is just for the wood processing operation and anything else would require a special use permit application and public hearing.

Dallas Tinsley, Buffalo District, expressed his concerns and those of his surrounding neighbors regarding the noise level. He said he lives approximately a half-mile from the proposed operation and he could hear the machinery running on the day they were measuring the decibels. He stated Darlington Heights is a retirement community and people have moved there for the peace and quiet. He said the equipment is similar to a tractor and usually they cannot be heard; he asked if the mill processing equipment was run or just the motor on the day the testing was done. He also said he has concerns regarding the business increasing and needing stronger equipment, and asked what is in place to protect the community [from that happening]. Mr. Tinsley then asked if there is something in place to keep the operation from making too much noise; he said an existing saw mill has added a planer. He then expressed his concerns regarding tractor trailer traffic, and asked what the added revenue would be for the County. He questioned the community benefit for compensation for the noise if there is little to no revenue. He said the citizens in that area wish to keep Darlington Heights a quiet community.

Chairman Prengaman stated any special use permit may set limitations on size, noise levels, hours, or other parameters.

Tina Fox, Buffalo District, said the proposed operation is approximately one-quarter mile across the field from her residence. She said she moved to the area to retire and asked the Planning Commission to not allow this application. She said the noise eight hours a day, six days a week would ruin a lot of people's lifestyles.

Betty Tinsley, Buffalo District, said her family has lived in the area for hundreds of years and they enjoy the peace and quiet there. She said most of her neighbors are all retirees in the community now and they are there because of the quiet.

Wilkie Chaffin, Buffalo District, said he is about two miles from the proposed operation and asked if this is already operational, and if it isn't, how could they get decibel readings.

Chairman Prengaman said Mr. Byler was asked to run the equipment for decibel readings.

Mr. Chaffin stated the road is narrow and rough, he is concerned about the noise, and a church and the fire department are nearby. He said when there is an all-day function at the fire house, it could present a problem. He asked how this would work in the future and stated past projects evolved over the years.

Bob Timmons, Buffalo District, expressed his concerns regarding the hours of operation, stating 7:00 a.m. was too early to start. He said constraints need to be placed on the hours of operation. He then said testing should be done to establish a benchmark which is good to measure against in the future. He said there is a mill currently [near his residence] that hasn't gone through the [special use application] process and there is constant noise.

Joe S. Byler stated the equipment includes a log loader, a 66 HP firewood processor, and a chainsaw bar which uses the same motor; he said he could limit the hours of operation to 45 hours a week. He said setting three loads a week was a high estimate, and mufflers are on and would be kept on.

Commissioner Jones asked if the machinery will run constantly. Mr. Byler stated he expects to process [the wood] as fast as they can and shut the processor down, and wrap the wood in plastic. He said it would likely run most of the day and they would load the trucks out. The rest of the process is indoors.

Commissioner Hunt asked how the wood is dried. Mr. Byler said there will be fans and insulated trailers with a woodstove heating it; he said the wood is heat-treated to kill bugs.

Commissioner Jones asked if the power unit will be in the building. Mr. Bartlett explained the motor was outside when the tests were done, and it was revved up to its operating level at 1800 RPM.

Chairman Prengaman asked if the hours could be reduced. Mr. Byler said he could change from 7:30 a.m. to 5:00 p.m., Monday through Friday and it is not likely they would work on Saturday.

Mr. Bartlett said the tax revenue would not be significant and estimated annual revenue would be approximately $420 in machinery tax and $2,000 in real estate tax.

There being no one further wishing to speak, Chairman Prengaman closed the public hearing.

Chairman Prengaman reviewed the concerns: noise level, hours of operation, equipment being used, number of trucks, and increased traffic.

Commissioner Gilliam said a baseline for the noise needs to be set.

Commissioner Jones said there can be no additional equipment without an additional special use permit.

Chairman Prengaman said the hours can be changed to 7:30 a.m. to 5:00 p.m. and no Saturday and Sunday operation.

Commissioner Jones asked if any type of buffering help. Mr. Bartlett said the operation will be inside [a building] already and a natural buffer would take years to grow; he said insulation in the building would be better.

Commissioner Watson said that when the concrete and asphalt plant was being discussed, there was a room full of contentious people because of disturbing their peace and quiet. He said they were on a divided highway. He said he cannot imagine big trucks on [Singleton] road and questioned the viability of trucking on Singleton Road.

Commissioner Jones said that according to the application, there would be three trucks a week. Discussion followed.

Commissioner Hunt asked who would be responsible for fixing the road if the trucks damage it. Mr. Bartlett said VDOT is responsible for the road; VDOT would require Mr. Byler to put in a commercial entrance.

Commissioner Watson reminded the citizens that if the Planning Commission decides to approve the recommendation to the Board, the Board of Supervisors has the final say to approve or disapprove. He said if the citizens are not satisfied with the outcome, he said they can go to the public hearing that will be held by the Board of Supervisors.

Chairman Prengaman stated the purpose of the Planning Commission is to review any special use permits, zoning changes and everything relative to the entire county and then and make a recommendation for or against to the Board of Supervisors. The Board of Supervisors sometimes turns down a project.

Commissioner Peery asked if there is a staff recommendation on this proposed operation.

Mr. Bartlett said that staff didn't see that there was a great amount of noise, the traffic would only be three trucks a week and there are log trucks that travel the road already. He said decreasing the number of hours, operating inside the building, and limiting the decibels with the readings being held as a baseline would be a benefit. He said atmospheric conditions can change how sound carries and there is not a lot of natural buffer to dissipate the noise. He said from the readings taken, about 45-50 db. is a maximum. Discussion followed.

Chairman Prengaman reviewed the stipulations, to include no additional equipment other than the two pieces, hours of 7:30 a.m. to 5:00 p.m. with no work on Saturday or Sunday, noise level no louder than 45-50 decibels at the property line, three trucks per week, and exhaust directed into the woods.

Commissioner Hunt questioned if the sound would be measured routinely. Mr. Bartlett said the County has a complaint-based system; if a complaint is received, staff will investigate. He said they are currently looking into another mill that has not gone through the proper channels to operate. Discussion followed.

Mr. Byler stated his equipment would include a forklift that would also be used.

Commissioner Jones said all the stipulations must be included; he said the peace and quiet is important, but there is noise associated with making a living. He said the stipulations would relieve some of the issues.

Commissioner Jones made a motion, seconded by Commissioner Hunt, to recommend approval to the Board of Supervisors for the Special Use Permit application from Joe S. Byler to operate a Firewood Processing operation with the following conditions:

- No additional equipment
- Hours of 7:30 a.m. to 5:00 p.m. with no work on Saturday or Sunday
- Noise level no louder than 45-50 decibels at the property line
- Three trucks per week
- Exhaust directed into the woods
- Decibel level would have to be measured outside the building once the building is built with the machine running to get the true noise level
- Add natural buffer of fast-growing trees or shrubs

The motion carried:

Aye:	Donald Gilliam	Nay:	John "Jack" W. Peery, Jr.
	Preston Hunt		Cannon Watson
	Mark Jenkins		
	Robert M. Jones		
	Clifford Jack Leatherwood		
	Whitfield M. Paige		
	John Prengaman		
Absent:	Teresa Sandlin		

In Re: Old Business
(None)

New Business
(None)

On motion of Chairman Prengaman, seconded by Commissioner Jones, and adopted by the following vote:

Aye:	Donald Gilliam	Nay:	(None)
	Preston Hunt		
	Mark Jenkins		
	Robert M. Jones		
	Clifford Jack Leatherwood		
	Whitfield M. Paige		
	John "Jack" W. Peery, Jr.		
	John Prengaman		
	Cannon Watson		
Absent:	Teresa Sandlin		

the meeting was adjourned at 7:49 p.m.

Next Meeting: July 16, 2019

County of Prince Edward
Planning Commission
Agenda Summary

Meeting Date:	August 20, 2019
Item No.:	3
Department:	Planning and Community Development
Staff Contact:	Wade Bartlett
Issue:	Review of Board Actions

Summary:

Informational

Motion _____	Paige _____	Hunt _____	Jones _____
Second _____	Sandlin _____	Gilliam _____	Watson _____
Prengaman _____	Jenkins _____	Leatherwood_____	Peery _____

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County of Prince Edward
Planning Commission
Agenda Summary

Meeting Date:	**August 20, 2019**
Item No.:	4
Department:	**Planning and Community Development**
Staff Contact:	**Wade Bartlett**
Issue:	**Amendment to the County's Zoning Ordinance**

Summary:
The County, in fact the entire nation, has seen an explosion in the applications to build large utility-scale solar generation facilities. The County's Zoning ordinance was adopted before this technology had developed to where it is not cost effective. There is no mention of solar generating facilities in our current zoning ordinance. The closest use mentioned in our zoning ordinance is **Utility Services, Major.** The definition is

Utility Services, Major – *Services of a regional nature which normally entail the construction of new buildings or structures such as generating plants and sources, electrical switching facilities and stations or substations, water towers and tanks, community waste water treatment plants, and similar facilities. Included in this definition are also electric, gas, and other utility transmission lines of a regional nature which are not otherwise reviewed and approved by the Virginia State Corporation Commission.*

Currently this use is allowed in the A1, A2, R1, R2, R3 and C1 zones by a special use permit. Large solar generation facilities are not compactable with the residential and commercial zones. It is allowed in the I1 zone by right. Prince Edward has very limited land zoned industrial. To allow a solar facility to locate in that zone BY RIGHT could easily mean one solar project could occupy a very large percentage of the County's industrial zoned land. This would greatly hinder if not outright stop any future industrial development in the County without the expenditure of millions of dollars of tax payer funds to build or expand industrial parks.

Attachments:

Recommendations:
These projects often utilize hundreds of acres of land and just a few such projects could cover thousands of acres. These projects are long-term, at least 25 years. Left unchecked these projects can have a profound impact on the land use in the County. These utility-scale facilities are rather new on the scene and as with any new technology or land use unknown and unintentional consequences are bound to happen. County staff recommends the Planning Commission direct County staff to research utility-scale solar and wind generation facilities and draft a proposed amendment to the zoning ordinance to minimize the negative impact of such facilities on land use and the citizens of the County.

Motion _____	Paige _____	Hunt _____	Jones _____
Second _____	Sandlin _____	Gilliam _____	Watson _____
Prengaman _____	Jenkins _____	Leatherwood_____	Peery _____

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County of Prince Edward
Planning Commission
Agenda Summary

Meeting Date:	**August 20, 2019**
Item No.:	**5**
Department:	**Planning and Community Development**
Staff Contact:	**Wade Bartlett**
Issue:	**Special Use Permit-Holocene Clean Energy**

Summary:

The County has received a special use permit application to permit the construction and operation of a solar generation facility, on tax map parcels 69-4-B and 69-A-14 owned by Ana Sawyer located in the vicinity of 1827 Piney Grove Road (SR606), attachment (1).

The public hearing notice was advertised in the August 2nd and 9th editions of the Farmville Herald, attachment (2). Attachment (3) from Holocene provides a summary of the project. While it provides a good overview of the project that is accurate – located on 20 acres, surrounded by a security fence, will be buffered and provides a site plan – while doing research on solar farms and solar panels I have found information that contradicts some of the information contained in the materials provided by Holocene. Attachment (4) is the list of adjoining property owners sent a letter notifying them of the request for a special use permit. Attachment (5) is the letter sent to all adjoining property owners. Attachment (7) is the proposed site plan.

First, lithium-ion batteries do contain toxic materials. Lithium-ion batteries contain Cobalt which is toxic. Lithium-ion batteries contain 10%-13% of cobalt by weight. When used in lithium-ion batteries, cobalt provides the risk of thermal runaway, a chemical reaction internal to the battery, regardless of ambient temperature. When a battery containing cobalt degenerates and goes into a state of thermal runaway, it becomes an unmitigated fire that is toxic and cannot be extinguished by water or flame retardants, or contained within its housing. Instead, the fire must be allowed to burn, releasing toxic fumes. Holocene acknowledges the potential of such thermal runaways in their summary and the steps they will take to mitigate such risks.

Second, it appears the panels and the racking system themselves contain hazardous material. Attachments (8-10) are various articles I found on-line that discuss the potential problems with solar panels during installation, operation and disposal. Of particular concern is the statement in attachment (10) "The fact that cadmium can be washed out of solar modules by rainwater…".

Motion _____	Paige _____	Hunt _____	Jones _____
Second _____	Sandlin _____	Gilliam _____	Watson _____
Prengaman _____	Jenkins _____	Leatherwood_____	Peery _____

Third, is the microclimate impacts that solar farms have on areas where they are located. My research found that solar farms create islands of heat that can have detrimental impacts on vegetation, animals and insects. Determining the exact impact of solar farms on the climate was beyond the scope of this letter. Additional research needs to be completed before I can fully understand the research on this topic.

Fourth, section 15.2-2241.2 of the Code of Virginia requires a written agreement to decommission the facility prior to being approved, attachment (11). The County has not received such a plan.

Finally, staff has not had enough time to study the impact solar farms will have on property values, or impacts on long-term land use.

Attachments:

1. Special Use Permit Application
2. Public Hearing Notice
3. Summary of the Project provided by Holocene
4. List of Adjoining property owners notified of Special Use Permit
5. Sample letter sent to adjoining property owners
6. Map of adjoining properties
7. Site map
8. Toxic Chemicals in Solar Panels by David H. Nguyen, Ph.D.
9. Negative Effects of Solar Energy by Didem Tali
10. If Solar Panels are so clean, why do they produce so much toxic waste by Michael Shellenberger
11. Code Section 15.2-2241.2

Recommendations:

Because of the questions raised by staff research concerning the possible long-term environmental impacts, the lack of a decommissioning plan and the lack of a County policy regarding solar farms Staff recommends this request be tabled until additional research can be completed.

Motion _____	Paige _____	Hunt _____	Jones _____
Second _____	Sandlin _____	Gilliam _____	Watson _____
Prengaman _____	Jenkins _____	Leatherwood_____	Peery _____

1827 Piney Grove

COMMENTS: _____

PERMIT/APPLICATION NO _____
ZONING DISTRICT _____
MAGISTERIAL DISTRICT _____
DATE SUBMITTED _____

County of Prince Edward

PLEASE PRINT OR TYPE

PRINCE EDWARD COUNTY APPLICATION FOR SPECIAL USE PERMIT

TO: PRINCE EDWARD COUNTY PLANNING COMMISSION SPECIAL EXCEPTION REQUESTED:
VIA: ZONING ADMINISTRATOR

The undersigned owner of the following described property hereby applies for a Special Use permit as provided in Section 5-124 of Article V, Site Plan requirements are found in Section 4-100 of Article IV Development Standards of the Zoning Ordinance of Prince Edward County, Virginia.

Applicant's Name: HCE Moran Solar I

Applicant's Address: 727 W. Hargett St, Ste 201, Raleigh, NC 27603

Applicant's Telephone Number: ( ) 919-829-9037

Present Land Use: Timber land

Legal Description of Property with Deed Book and Page No. or Instrument No. _____

Tax Map # 69-4-B and 69-A-14 Acreage : 190 parcel acres, 25 to be solar

Narrative statement evaluating effects on adjoining properties (noise, odor, dust, fumes, etc.): (Attach additional sheet if necessary.) The construction process will include land clearing and disturbance and will take place in accordance with VA DEQ and DOT guidlines. Noise and fumes will be created during construction by heavy machinery and post driving equipment. Once operational, the solar facility will produce no discernable noise, odor, fumes or dust.

Statement of general compatibility with adjacent and other properties in the zoning district. (Attach additional sheet if necessary.) Adjacent property is timbered land, with relatively few residences. The solar facility will be a passive use of the land, much like forestry and will be a compatible use in this area of the county.

Height of Principal Building (s): Feet 8 Stories N/A

APPLICANT'S STATEMENT: (if not owner(s) of property):

I hereby certify that I have the authority to make the foregoing application, that the information given is complete and correct to the best of my knowledge, and that development and/or construction will conform with the regulations as set forth in the Prince Edward County Zoning Ordinance as written and also with the description contained in this permit application.

Signature of Applicant (if not property owner) _____ Date 4.18.19

PROPERTY OWNER(S) STATEMENT:

I hereby certify that I/We own the above described property, that the information given is complete and correct to the best of my knowledge, and the above person(s), group, corporation, or agent has the full and complete permission of the undersigned owner(s) to make application for a Conditional Use permit as set forth in the Prince Edward County Zoning Ordinance as written.

Signature of Property Owner(s) _____ Date 4-16-19

Signature of Property Owner(s) _____ Date _____

Signature of Property Owner(s) _____ Date _____

NOTE: THIS PERMIT APPLICATION IS NOT VALID UNLESS ALL PROPERTY OWNER(S) SIGNATURES ARE AFFIXED AND DATED. ATTACH ADDITIONAL SHEETS IF NECESSARY.

Application Fee $300.00 Fee Received by Rob Fowler Date 4/24/19
CK# 2999

The above mentioned application charges are nonrefundable, regardless of whether the permit application is approved or denied once submitted.

All checks for payment should be made payable to: Treasurer, Prince Edward County, Virginia.

Mail to: Department of Planning & Community Development
P. O. Box 382
Farmville, VA 23901
(434) 392-8837

Attachment (1)

NOTICE OF PUBLIC HEARINGS

The Prince Edward County Planning Commission will hold a public hearing on Tuesday, August 20, 2019 at 7:00 p.m. in the Board of Supervisors Room located on the 3rd floor of the Prince Edward County Courthouse, 111 South Street, Farmville, Virginia, to receive citizen input prior to the Planning Commission making recommendations to the Board of Supervisors on the following:

1. Request by Holocene for a Special Use Permit to construct and operate a major utility and allow the construction of a Solar Electrical Generation Facility located on Piney Grove Road (SR606) on properties identified as Tax Map 69-A-14 and 69-4-B. This is an A1 Zoning District.

A complete copy of the Special Use Permit application is available for public review in the office of the Prince Edward County Administrator, 111 South Street, 3rd Floor, Farmville, VA, or on the county website at www.co.prince-edward.va.us. It is the County's intent to comply with the Americans with Disabilities Act. Should you need special accommodations, please contact W. W. Bartlett, County Administrator at 434-392-8837.

Attachment (2)

NARRATIVE STATEMENT

ON BEHALF OF

HCE MORAN SOLAR I

CONDITIONAL USE PERMIT

PREPARED FOR:

PRINCE EDWARD COUNTY, VA

Prepared by:

Holocene Clean Energy

4325 Lake Boone Trail #220

Raleigh, NC 27607

August 8, 2019

Attachment (3)

Table of Contents

Introduction

To inform the county as to the nature of the proposal solar project, Moran Solar I, and its adherence to the established development standards, Holocene Clean Energy wishes to provide this narrative statement to the Planning Commission of Prince Edward County in conjunction with a request for a Conditional Use Permit.

Applicant Information

The parent company of the applicant is Holocene Finance, LLC, a North Carolina based firm doing business as Holocene Clean Energy. Holocene develops, finances, designs, builds, and operates solar generation facilities in numerous including NC, VA, NJ, SC, PA. Holocene specializes in smaller sized 2-5 MW distributed generation solar and battery storage projects that are designed to blend into local communities. We are a relationship driven company and engage directly with local stakeholders throughout the development process. Our experienced team Holocene has completed of 120 MW of solar PV projects in the 10 years since its founding. We are pleased to bring our experience and passion to Prince Edward County.

Project Information

Moran Solar I is a proposed 3MWac, 3.6MWdc photovoltaic solar and battery storage facility located off of Piney Grove road, near Southside Electric Cooperative's Moran substation in Prince Edward County Virginia. The proposed project will be approximately 20 acres in size and built on land owned by Ana Sawyer, Tax Map # 69-4-B and 69-A-14. Holocene achieved site control via long-term lease agreement with landowner. The property is currently timberland land with one residence on it. The majority of that timberland will be unaffected by the project and will continue to be managed by the landowner.

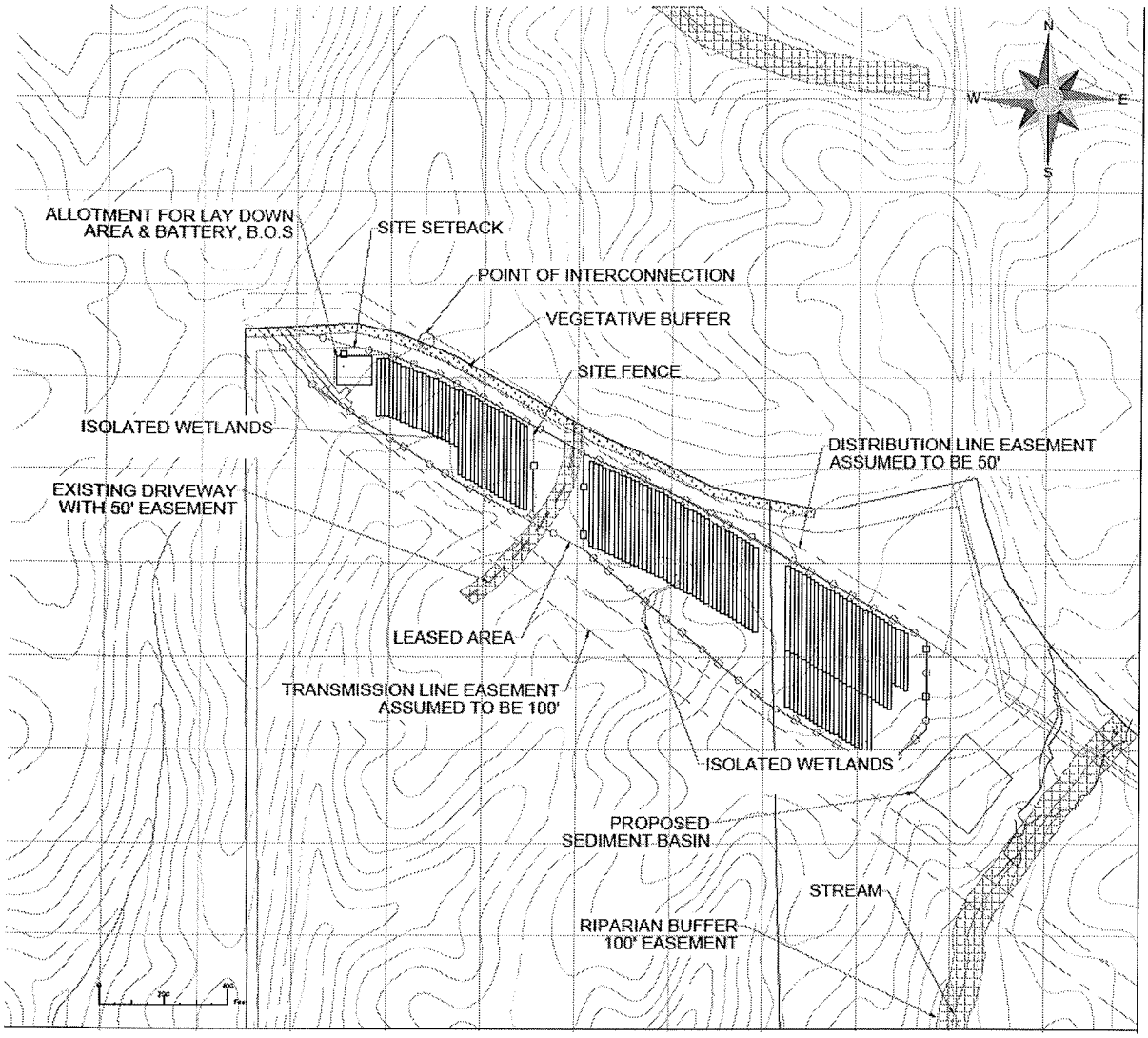
The site selected was identified as highly suitable for solar development given its proximity to the Southside substation. Holocene is working with Southside to site multiple small-scale projects throughout their territory. The energy produced at the Moran substation will be used on the local distribution grid and will provide clean, renewable energy to this community.

Holocene coordinated with the zoning administrator Rob Fowler to establish permitting and design guidance for the proposed facility. Per staff guidance, a solar project may apply for a Special Use Permit as a Major Utility. The design is subject to several specific criteria of the zoning ordinance, specifically the requirements for a vegetative buffer, security fencing, and setbacks. All required design details and application information was provided to the county on April 18, 2019 and deemed complete.

Site Design

The solar facility consists of five main components: solar modules themselves, racking for the modules to sit on, an inverter to change DC current to AC current, a transformer to increase voltage and wiring to carry the energy. The modules are laid out in arrays and connected to the inverters via underground cabling. The inverter feed into transformers which allow power to flow onto the grid. Additionally, a lithium ion battery will be installed on site, to be charged with the excess solar energy. The entire

facility is enclosed in a chain link security fence. A concept plan showing the proposed layout was provided along with the application. An image of that plan can be found below.



The total array area for this facility is estimated at 15 acres. The facility does cross a parcel line, but both properties are owned by the same landowner. The applicant plans to ask the owner to recombine these parcels.

Per the Prince Edward County Zoning ordinance and consultation with the planning staff, the design includes a 75'f, 35's, 70'r setback. In addition, a vegetative buffer no less than 10 feet in width is shown parallel with Piney Grove Road.

Neighborhood Outreach

Holocene values community engagement in our projects. In most jurisdictions, Holocene will hold a neighborhood informational meeting to inform the public of the project and give neighbors an

opportunity to ask questions. For the Moran Solar project, the planning administrator and Holocene agreed to use an informational letter in place of this meeting, given its remote location. The letter was mailed to all adjacent landowners and those one removed (adjacent-to-adjacent). A copy of that letter is attached to this statement.

Of the forty individual property owners mailed, only three reached out the Holocene with questions. One citizen asked about the materials used another wanted to ensure their access to land south of the project would remain open for their use. The last individual we met with to confirm the project location and confirmed it would not impact their viewshed. All individuals were satisfied with the information provided and had no further comments.

Comprehensive Plan

Per section 15.2-2232.H of the Virginia State Code, solar facilities must be deemed to be substantial accord with the County's Comprehensive Plan. Holocene has reviewed the Comprehensive Plan and believes the proposed project is in harmony with the plan. The project diversifies the county economic base by introducing a new land use and provides local energy generation which offsets the need for power to be bought from far off generators. It brings low-impact development and economic sustainability, all without impacts to core services such as education, safety, public and private recreational facilities, or any historical landmarks. The grass planted below the panels will be seeded with native grass which benefits the local ecosystems. Vegetation planted on the road will screen the facility from view and help preserve the rural nature of this section of the county.

Fiscal and Economic Impact

The proposed facility will make a significant fiscal contribution to Prince Edward County, primarily through the increased real estate tax valuation. We anticipate the change of use of the property will trigger a reassessed value close to $10,000 per acre. Using the county real estate tax rate of 0.51 per $100, the local tax revenue is estimated to be $1,020 annually for our 20 acre project. This totals $30,600 over the 30-year projected lifetime of the project. The project is exempt from all property tax, and machinery/ tools tax under VA Code § 58.1-3660, and HB 1297, respectively.

Moran Solar I will make an economic contribution to the county, via jobs through construction and then through operational lifetime. An estimated one-time pulse of economic activity will occur during construction phase up to 3 full time equivalent jobs in Prince Edward County and $20,000 associated labor income, and additional economic output in Prince Edward County. Accounting for per diem, hotel expenditures, and other local spending, projected economic impact in the county is $48,080.

This report only accounts for direct impact and does not include any economic multipliers into the analysis. This leads the applicant to believe that the estimates included in this report are extremely conservative of the true county and regional impact that this facility will have as the Prince Edward I solar facility purchases goods and employs local laborers.

Environmental and Safety Considerations

Decades-long studies show photovoltaic solar generation facilities pose no significant environmental or health risks to their neighbors. On-site components consist of common building materials like glass, aluminum, steel, and copper and are not hazardous to human health or the environment. The PV cell itself is nearly 100% silicon, encapsulated from air and moisture between two layers of plastic and a layer of glass. There are no toxic materials use on site.

Solar farms have a long run beneficial impact to human health and the ecosystem through the generation of renewable electricity. Generating electricity from renewable sources like solar creates zero-emission alternative to traditional fuels like coal, natural gas and nuclear. Carbon-based fuels produce emissions of particulates and chemical compounds that have been shown to have a detrimental effect on human health and the planet.

Site studies have been conducted to evaluate the potential for the project to impact environmental and historical resources. Screening will take place for endangered and threatened species and we will ensure there is no risk of impact. Cultural and historical assessments and consultation with state agencies will ensure any such resources are also protected. Furthermore, the project produces no noise and will not disrupt the quiet enjoyment of the natural environment.

Lithium Ion battery energy storage devices similarly contain no toxic materials and are non-hazardous when operated correctly. However, the batteries can be problematic if they heat beyond the operational capacity. Excessive heat causes thermal runaway and may result in fire. Upwards of 1000 degrees, plastic and lithium burn. The storage devices have safety mechanisms installed to prevent overheating and, in the event of thermal runaway, a fire suppression safety system triggers the ventilation system to pressure out any off gassing from the batteries. The offgas consists of hydrogen fluoride, carbon monoxide and carbon dioxide which are typical byproduct gases from a combustion event.

Ownership, Maintenance and Operation

Most of the life cycle of a solar farm is spent in the operational phase. With such a long-lived asset, Holocene and its partners recognize the importance of good upkeep. Holocene plans to engage a financial partner to help fund the construction of the site and to take an ownership stake in the project. Holocene seeks to maintain a significant interest in the project and will be engaged throughout its operational life, committed to the long-term success of the project.

Maintenance of the facility will include both vegetation maintenance and equipment maintenance. Vegetation maintenance and landscaping will focus on the upkeep of any vegetative buffer to ensure site screening and grass cutting inside the array. A native grass seed mix, determined by consultation with the VA Department of Conservation and Recreation, will be planted inside the array to support local pollinators.

Routine landscaping maintenance of the solar property will typically be accomplished by a team of three workers with two mowing and one trimming and spraying of excessive weed growth, fence lines, and around the inverter/transformer pads as needed. The use of herbicides will be minimized and only targeted towards troublesome growth. Broad spectrum herbicides will be used sparingly. The amount of

mowing will vary during the seasons, with increased frequency in the growing season. Grazing sheep tended by a local farmer may also be allowed to the graze within the fenced area of the project. If this method of vegetation control is used, it will be periodically supplemented by mowing. The area will also be regularly monitored for invasive species of grasses and plants.

Equipment maintenance is closely tied with the monitoring and operational productivity of the site and typically occurs very infrequently. Sites are continually monitored in real time by remote analysists who will dispatch technicians if repairs are needed. Otherwise, maintenance trips are limited to an annual site inspection. Holocene will work with a qualified operations and maintenance provider to ensure the site is well maintained and productivity is optimized.

Decommissioning

Anticipated Life

The primary component of a solar generating facility is the photovoltaic modules, and thus the operational life of a solar farm is typically associated with the operating life of the modules. The project is planned with Tier 1 crystalline solar modules, as defined by Bloomberg New Energy Finance, which have an operational life of 25 years or more. Most module manufacturers advertise even longer operational lives for their products and financing parties have been willing to accept 35 or 40-year project lifetimes. Research from the North Carolina Clean Energy Center and numerous other sources support 30-35 year operational lifetimes. In this plan, we estimate this project's operational life at 30 years, which has been corroborated with Ballentine Associates, PLLC, an independent engineering firm engaged for decommissioning estimates. If the operational life is judged to be greater than 30 years, this decommissioning plan will be updated with additional cost information.

The long-term lease agreement is in effect for 20 years with two, 10-year extension options for a total of 40 years.

Decommissioning Plan

A separate Decommissioning Plan will be provided to the county in accordance with section 15.2-2241.2 of Code of Virginia.

Prince Edward County

Special Use Permit

Applicant: HCE Moran Solar
727 W. Hargett St., Ste 201
Raleigh, NC

Date: April 24, 2019

Schedule B

List of property owners and mailing addresses adjoining the parcel proposed for Special Use.

Parcel ID	Owner	Address	Note
069-A-38	Burley C Anderson & Marie C. Jones	126 Walton Ave Union, NJ 07083	
069-4-2	Dennis P. & Anita L. Fabiszak	1580 Piney Grove Road Rice, VA 23966	
069-3-A	Paul T. & Debra Ann Campbell	PO Box 293 Greenbay, VA 23942	
069-A-13-A	Henry O. Coates, Jr.	PO Box 193 Crewe, VA 23930	
069-A-15	Shirley N. Fowlkes Family LLC	301 Bell Street Burkeville VA 23922	
069-A-34	Shirley N. Fowlkes Family LLC	301 Bell Street Burkeville VA 23922	
069-A-37	Devin Logging Company	PO Box 28 Wylliesburg VA 23976	
069-A-33	Linda Gibbs Staylor ET AL	1395 Quail Crossing Rd Burkeville VA 23922	
070-A-65	Ricky Dale Gibbs, Jr, Lavanna M Gibbs, Irrevocable Trust	1450 Burkes Tavern Rd. Burkeville VA 23922	
070-A-66	Ricky Dale Gibbs	1583 Moran Road Rice VA 23966	
069-A-48	Angela Savage & Robert E. Nunnally, Jr.	2866 Medford Drive Dumfries VA 22026	

Attachment (4)

069-A-49	Lucy Nunnally c/o Charles Nunnally	691 Piney Grove Road Rice VA 23966	
069-12-4	Commonwealth of Virginia Dept of Conservation & Recreation	203 Governor Street Richmond VA 23219	
069-6-9	Tony C & Tamara J Ingram	428 Deerfield Acres Drive Burkeville VA 23922	

COUNTY OF PRINCE EDWARD, VIRGINIA

COUNTY ADMINISTRATOR

W.W. Bartlett

Post Office Box 382
111 N. South Street, 3rd Floor
Farmville, VA 23901

Office: (434) 392-8837
Fax: (434) 392-6683

wbartlett@co.prince-edward.va.us
www.co.prince-edward.va.us

August 14, 2019

RE: Special Use Permit Application at Tax Map 69-4-B and 69-A-14,

Dear Adjoining Landowner:

The Prince Edward County Planning Commission has scheduled a Public Hearing on Tuesday, August 20, 2019 at 7:30 p.m.to consider an application for a Special Use Permit by Holocene Clean Energy. The Public Hearing will be held in the Board Room on the Third Floor of the Prince Edward County Courthouse. A public hearing gives the Planning Commission the opportunity to gather citizen input prior to considering the special use request.

This Special Use Permit application is a request by Holocene Clean Energy to construct a solar generation facility encompassing approximately 20 acres on Tax Map Parcels 69-4-B and 69-A-14 owned by Ana Sawyer. The solar site will run parallel to Piney Grove Road and be located between the transmission line and the Piney Grove Road. The solar facility will consist of solar panels and the racking system to hold the panels, an inverter, a transformer, wiring and a lithium ion battery. The entire site will be enclosed by a chain link security fence.

You are receiving this notice because you own land adjacent to this parcel. The Special Use Permit application is available for review in the Prince Edward County Administrator's Office and on the county webpage at www.co.prince-edward.va.us. If you have any questions about this meeting or the permit application, I encourage you to contact me by calling 434-392-8837 or at wbartlett@co.prince-edward.va.us.

Respectfully,

WWBartlett

W.W. Bartlett
County Administrator

Attachment (5)

NOTES:

General

Property Owner: Sawyer
Prince Edward County
Parcel ID: 69-4-B, 69-A-14
10' Contour Interval

System
3.0 MW AC

Setbacks
Zone: Agricultural Conservation District
75' Front Setback
35' Side Setback
70' Rear Setback

Civil Takeoffs

Parcel Acreage:	154.19
Fence Acreage:	15.3
Leased acreage:	17.4
Acreage to Clear:	3.0
Building Demolition:	0

Storm Water and Erosion & Control will be designed at a later date to meet county and state regulations.

*Locations are approximate, Subject to change based on environmental and electrical studies, permitting, civil work, surveying, county requirements, and final equipment selection.

Holocene
CLEAN ENERGY

HOLOCENE DESIGN BUILD, LLC

727 W HARGETT STREET
SUITE 201
RALEIGH, NC 27603
UNITED STATES

PROJECT ADDRESS

MORAN SOLAR I
1867 PINEY GROVE RD
RICE, VA 23966
UNITED STATES

PRELIMINARY DRAWING

NOT FOR CONSTRUCTION

DATE ISSUED: 4.16.19
DRAWN BY: HJH
DESIGNED BY: HJH

SHEET NAME

SITE PLAN

SHEET NUMBER

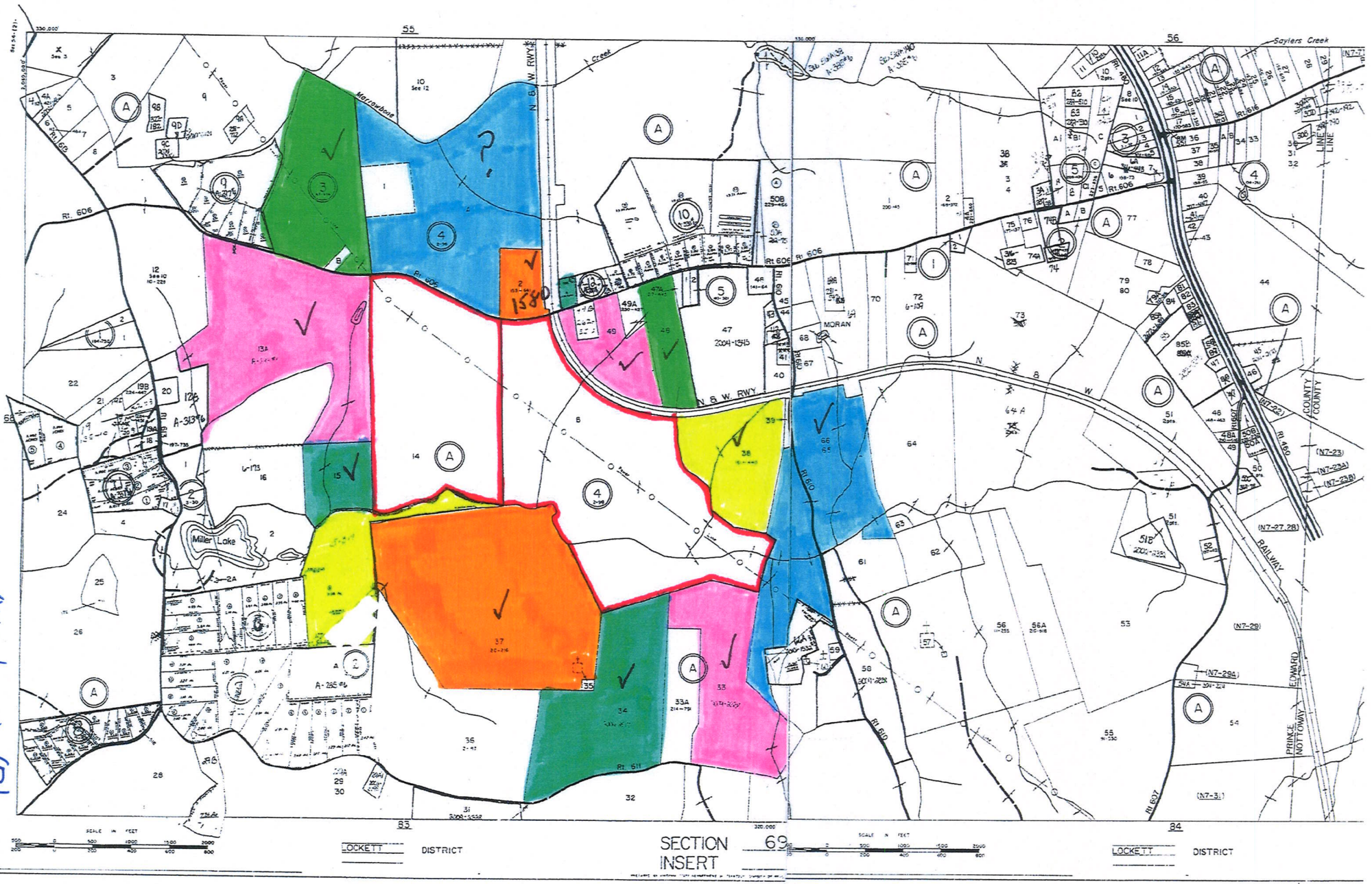
01

MORAN SOLAR I

Attachment (6)

PRINCE EDWARD COUNTY

PRINCE EDWARD COUNTY



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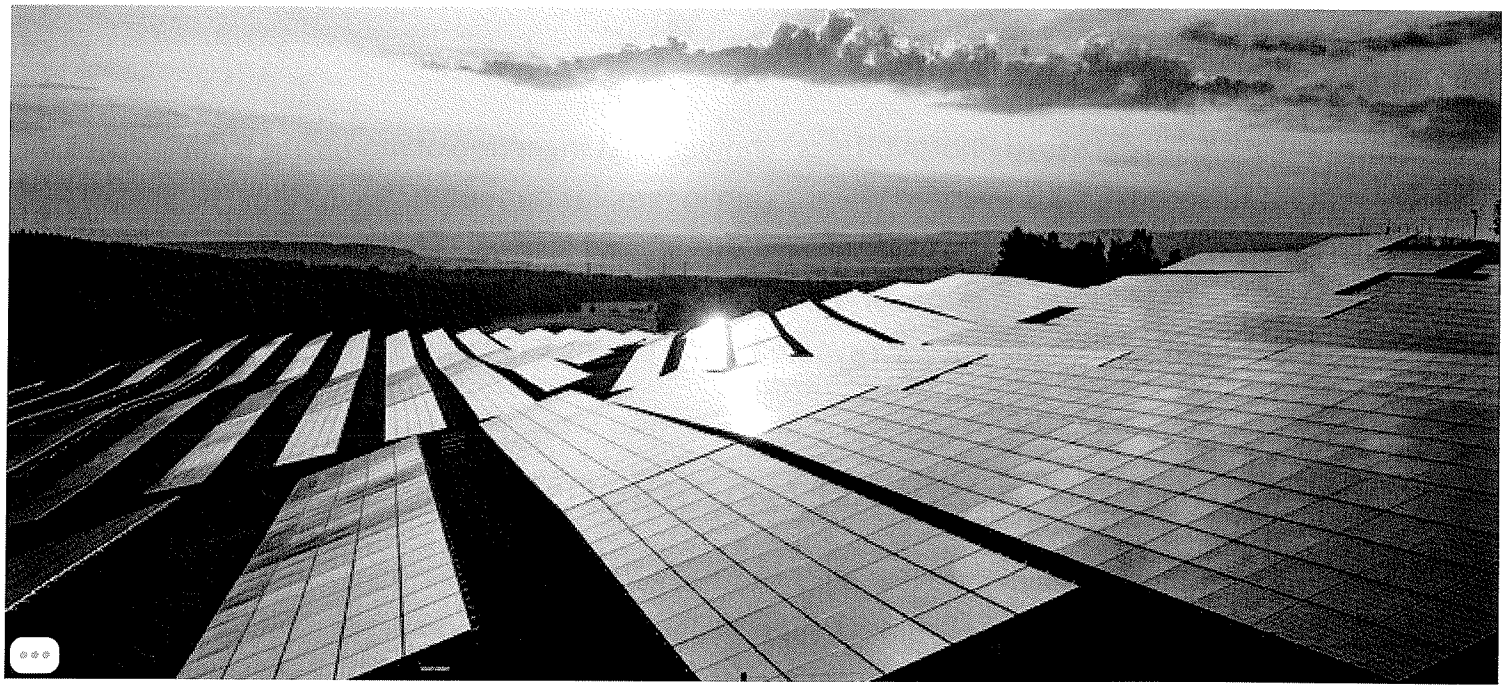
Toxic Chemicals in Solar Panels



Updated April 30, 2018 *By David H. Nguyen, Ph.D.*

Solar panels may be an appealing choice for clean energy, but they harbor their share of toxic chemicals. The toxic chemicals are a problem at the beginning of a solar panel's life -- during its construction -- and at the end of its life when it is disposed of. These two intervals are times when the toxic chemicals can enter into the environment.

The toxic chemicals in solar panels include cadmium telluride, copper indium selenide, cadmium gallium (di)selenide, copper indium gallium (di)selenide, hexafluoroethane, lead, and polyvinyl fluoride. Additionally, silicon tetrachloride, a byproduct of producing crystalline silicon, is highly toxic.

TL;DR (Too Long; Didn't Read)

During manufacture and after the disposal of solar panels, they release hazardous chemicals including cadmium compounds, silicon tetrachloride, hexafluoroethane and lead.

Cadmium Telluride

Cadmium telluride (CT) is a highly toxic chemical that is part of solar panels. In the journal, "Progress in Photovoltaics," it reported that male and female rats that received CT through

Attachment (8)

ingestion did not gain weight as they normally should have. This lack of weight gain occurred at low, moderate and high doses. When inhaled, CT also prevented normal weight gain and caused lung inflammation and lung fibrosis, a hardening of lung tissue. From low to high doses of inhaled CT, the weight of the lungs increased. Moderate to high doses of inhaled CT proved lethal.

Copper Indium Selenide

The study of rats in "Progress in Photovoltaics" showed that ingestion of moderate to high doses of copper indium selenide (CIS) prevented weight gain in females but not males. Moderate to high doses of inhaled CIS increased the weight of a rat's lungs and increased lung fibrosis. Lungs exposed to CIS produced high amounts of fluid. Another study of CIS on rats, reported in "Toxicology and Applied Pharmacology," revealed that inhaling CIS caused rats to develop abnormal growths in their lungs.

Cadmium Indium Gallium (Di)selenide

Cadmium indium gallium (di)selenide (CIGS) is another chemical in solar panels that is toxic to lungs. The "Journal of Occupational Health" reported a study in which rats received doses of CIGS injected into the airway. Rats received CIGS three times a week for one week, and then researchers examined lung tissue until three weeks after that. The scientists used a low, moderate and high dose of CIGS. All doses resulted in lungs that had spots that were inflamed, meaning they were damaged. Lungs also had spots that produced excessive fluid. These spots worsened as time went on after the one week of exposure.

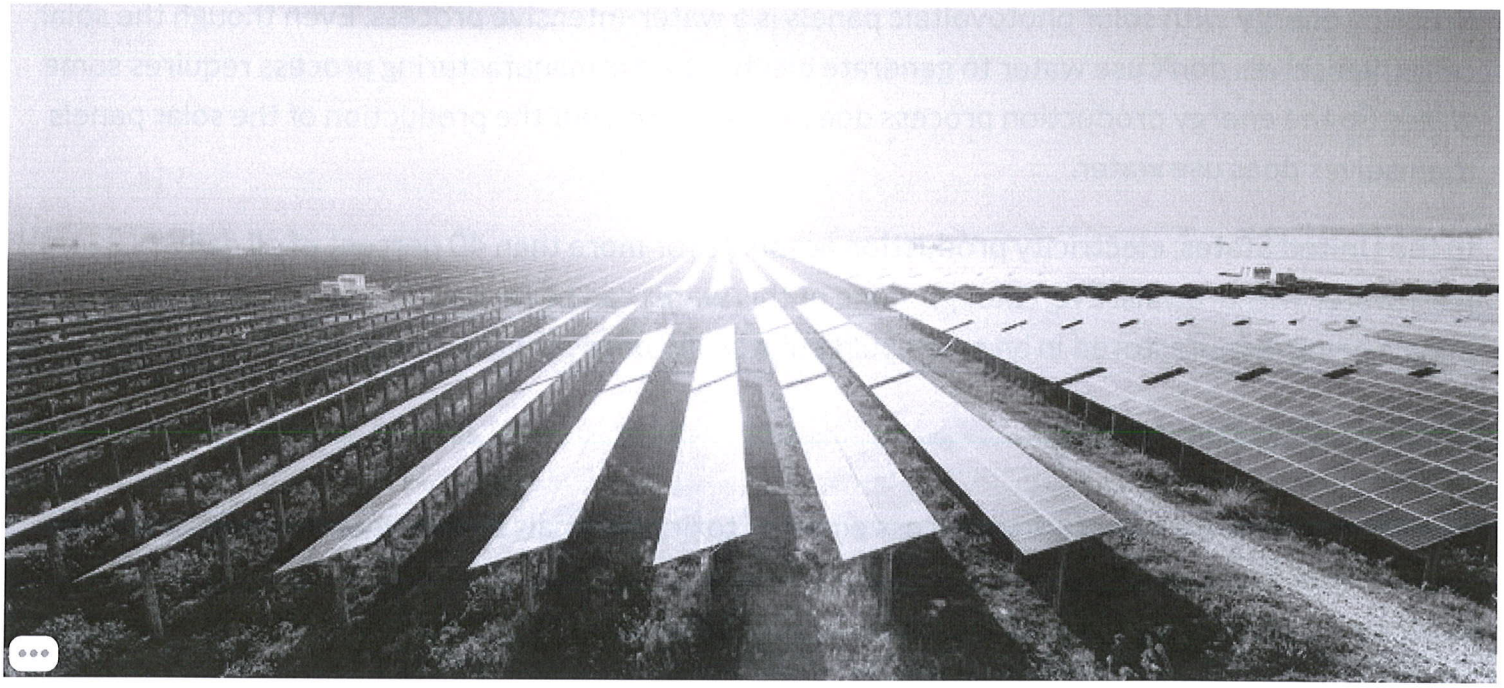
Silicon Tetrachloride

One of the toxic chemicals involved with solar panels is not what's in the panels but is a byproduct of their production. Crystalline silicon is a key component of many solar panels. The production of crystalline silicon involves a byproduct called silicon tetrachloride. Silicon tetrachloride is highly toxic, killing plants and animals. Such environmental pollutants, which harm people, are a major problem for people in China and other countries. Those countries mass-produce "clean energy" solar panels but do not regulate how toxic waste is dumped into the environment. The country's inhabitants often pay the price.

⊕ References

⊕ About the Author

Negative Effects of Solar Energy



Updated July 26, 2019 *By Didem Tali*

Solar energy, which provides clean energy from the sun, is booming in the United States and globally. The cost to install solar energy has dropped by more than 70 percent since 2010. In the last decade, solar has experienced an average annual growth rate of 68 percent. Many households and businesses that switch to solar energy save money and decrease their ecological footprint.

While there is no doubt solar energy can be an important solution for many of the world's energy problems, it's not a magic pill. Some studies show solar energy to have considerable environmental drawbacks.

Land Use

Large utility-scale solar panels take up a lot of space, which can result in environmental degradation and habitat loss. Solar farms that cover a large amount of land are likely to have an impact on the local fauna and flora, particularly on birds. Solar farms can also inhibit local vegetation growth and damage agriculture. Unlike wind energy, solar panels aren't able to share the land they occupy for other uses.

Small-scale solar panels for domestic use don't require much land. However, at an industrial level, the sheer amount of required space for the panels to produce energy is a challenge.

Attachment (9)

Also, many people feel that utility-scale solar panels create an aesthetic disturbance for the communities in the vicinity.

Water Use

Creating energy with solar photovoltaic panels is a water-intensive process. Even though the solar cells themselves don't use water to generate electricity, the manufacturing process requires some water. So the energy production process doesn't use water, but the production of the solar panels themselves does use water.

In the United States, electricity production accounts for more than 40 percent of all daily freshwater withdrawals. Even though some of this water can be reused, an abundance of solar panels being manufactured in an area could put a strain on local water resources.

Toxic Chemicals

The photovoltaic manufacturing process employs toxic chemicals such as hydrochloric acid, sulfuric acid, nitric acid, hydrogen fluoride, 1,1,1-trichloroethane and acetone. If manufacturers don't strictly follow the laws and regulations, these chemicals can introduce significant health risks, particularly to the manufacturing workers.

Furthermore, if the solar panels aren't disposed of properly, these toxic chemicals can be an environmental hazard. Solar panels create 300 times more toxic waste per unit of energy than do nuclear power plants.

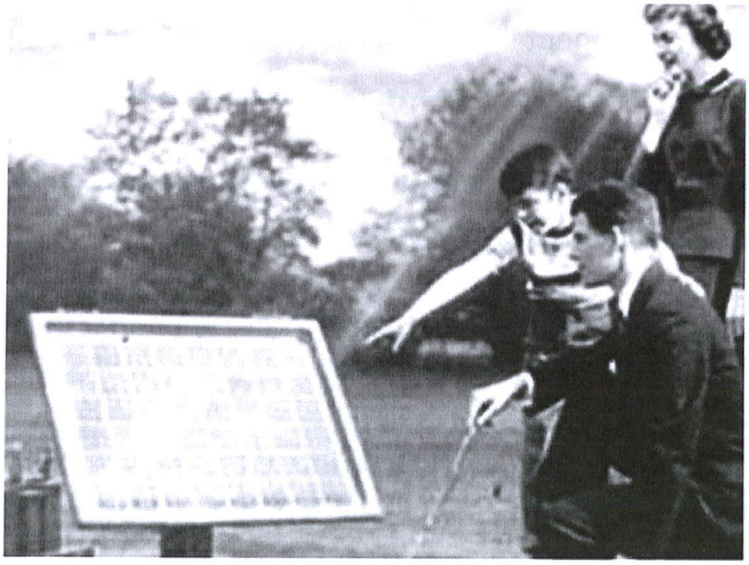
Often, panels end up in e-waste dumps in developing countries such as India, China and Ghana where these toxic chemicals might create devastating health effects for residents of nearby communities.

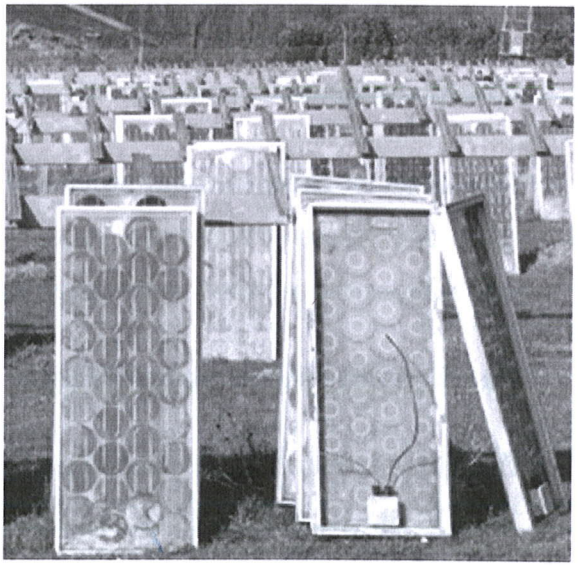
References

About the Author

If Solar Panels Are So Clean, Why Do They Produce So Much Toxic Waste?

Michael Shellenberger Contributor ⓘ
Energy
I write about energy and the environment.





Bell Labs, 1954. Solar Panel Waste, 2014 BELL LABS & PV CYCLE

Para la traducción al español, haga clic aquí

Klik hier voor de Nederlandse versie

The last few years have seen growing concern over what happens to solar panels at the end of their life. Consider the following statements:

- The problem of solar panel disposal "will explode with full force in two or three decades and wreck the environment" because it "is a huge amount of waste and they are not easy to recycle."
- "The reality is that there is a problem now, and it's only going to get larger, expanding as rapidly as the PV industry expanded 10 years ago."

Attachment (10)

- "Contrary to previous assumptions, pollutants such as lead or carcinogenic cadmium can be almost completely washed out of the fragments of solar modules over a period of several months, for example by rainwater."

Were these statements made by the right-wing Heritage Foundation? Koch-funded global warming deniers? The editorial board of the *Wall Street Journal*?

None of the above. Rather, the quotes come from a senior Chinese solar official, a 40-year veteran of the U.S. solar industry, and research scientists with the German Stuttgart Institute for Photovoltaics.

With few environmental journalists willing to report on much of anything other than the good news about renewables, it's been left to environmental scientists and solar industry leaders to raise the alarm.

"I've been working in solar since 1976 and that's part of my guilt," the veteran solar developer told *Solar Power World* last year. "I've been involved with millions of solar panels going into the field, and now they're getting old."

The Trouble With Solar Waste

The International Renewable Energy Agency (IRENA) in 2016 estimated there was about 250,000 metric tonnes of solar panel waste in the world at the end of that year. IRENA projected that this amount could reach 78 *million* metric tonnes by 2050.

Solar panels often contain lead, cadmium, and other toxic chemicals that cannot be removed without breaking apart the entire panel. "Approximately 90% of most PV modules are made up of glass," notes San Jose State environmental studies professor Dustin Mulvaney. "However, this glass often cannot be recycled as float glass due to impurities. Common problematic impurities in glass include plastics, lead, cadmium and antimony."

Researchers with the Electric Power Research Institute (EPRI) undertook a study for U.S. solar-owning utilities to plan for end-of-life and concluded that solar panel "disposal in "regular landfills [is] not recommended in case modules break and toxic materials leach into the soil" and so "disposal is potentially a major issue."

California is in the process of determining how to divert solar panels from landfills, which is where they currently go, at the end of their life.

California's Department of Toxic Substances Control (DTSC), which is implementing the new regulations, held a meeting last August with solar and waste industry representatives to discuss how to deal with the issue of solar waste. At the meeting, the representatives from industry and DTSC all acknowledged how difficult it would be to test to determine whether a solar panel being removed would be classified as hazardous waste or not.

The DTSC described building a database where solar panels and their toxicity could be tracked by their model numbers, but it's not clear DTSC will do this.

"The theory behind the regulations is to make [disposal] less burdensome," explained Rick Brausch of DTSC. "Putting it as universal waste eliminates the testing requirement."

The fact that cadmium can be washed out of solar modules by rainwater is increasingly a concern for local environmentalists like the Concerned Citizens of Fawn Lake in Virginia, where a 6,350 acre solar farm to partly power Microsoft data centers is being proposed.

"We estimate there are 100,000 pounds of cadmium contained in the 1.8 million panels," Sean Fogarty of the group told me. "Leaching from broken panels damaged during natural events — hail storms, tornadoes, hurricanes, earthquakes, etc. — and at decommissioning is a big concern."

There is real-world precedent for this concern. A tornado in 2015 broke 200,000 solar modules at southern California solar farm Desert Sunlight.

"Any modules that were broken into small bits of glass had to be swept from the ground," Mulvaney explained, "so lots of rocks and dirt got mixed in that would not work in recycling plants that are designed to take modules. These were the cadmium-based modules that failed [hazardous] waste tests, so were treated at a [hazardous] waste facility. But about 70 percent of the modules were actually sent to recycling, and the recycled metals are in new panels today."

And when Hurricane Maria hit Puerto Rico last September, the nation's second largest solar farm, responsible for 40 percent of the island's solar energy, lost a majority of its panels.

Destroys Solar Farm in Puerto Rico BOB MEINETZ

Many experts urge mandatory recycling. The main finding promoted by IRENA's in its 2016 report was that, "If fully injected back into the economy, the value of the recovered material [from used solar panels] could exceed USD 15 billion by 2050."

But IRENA's study did not compare the value of recovered material to the cost of new materials and admitted that "Recent studies agree that PV material availability is not a major concern in the near term, but critical materials might impose limitations in the long term."

They might, but today recycling costs more than the economic value of the materials recovered, which is why most solar panels end up in landfills. "The absence of valuable metals/materials produces economic losses," wrote a team of scientists in the *International Journal of Photoenergy* in their study of solar panel recycling last year, and "Results are coherent with the literature."

Chinese and Japanese experts agree. "If a recycling plant carries out every step by the book," a Chinese expert told *The South China Morning Post*, "their products can end up being more expensive than new raw materials."

Toshiba Environmental Solutions told Nikkei Asian Review last year that,

> Low demand for scrap and the high cost of employing workers to disassemble the aluminum frames and other components will make it difficult to create a profitable

business unless recycling companies can charge several times more than the target set by [Japan's environment ministry].

Can Solar Producers Take Responsibility?

In 2012, First Solar stopped putting a share of its revenues into a fund for long-term waste management. "Customers have the option to use our services when the panels get to the end of life stage," a spokesperson told *Solar Power World*. "We'll do the recycling, and they'll pay the price at that time."

Or they won't. "Either it becomes economical or it gets mandated. " said EPRI's Cara Libby. "But I've heard that it will have to be mandated because it won't ever be economical."

Last July, Washington became the first U.S. state to require manufacturers selling solar panels to have a plan to recycle. But the legislature did not require manufacturers to pay a fee for disposal. "Washington-based solar panel manufacturer Itek Energy assisted with the bill's writing," noted Solar Power World.

The problem with putting the responsibility for recycling or long-term storage of solar panels on manufacturers, says the insurance actuary Milliman, is that it increases the risk of more financial failures like the kinds that afflicted the solar industry over the last decade.

[A]ny mechanism that finances the cost of recycling PV modules with current revenues is not sustainable. This method raises the possibility of bankruptcy down the road by shifting today's greater burden of 'caused' costs into the future. When growth levels off then PV producers would face rapidly increasing recycling costs as a percentage of revenues.

Since 2016, Sungevity, Beamreach, Verengo Solar, SunEdison, Yingli Green Energy, Solar World, and Suniva have gone bankrupt.

The result of such bankruptcies is that the cost of managing or recycling PV waste will be born by the public. "In the event of company bankruptcies, PV module producers would no longer contribute to the recycling cost of their products," notes Milliman, "leaving governments to decide how to deal with cleanup."

Governments of poor and developing nations are often not equipped to deal with an influx of toxic solar waste, experts say. German researchers at the Stuttgart Institute for Photovoltaics warned that poor and developing nations are at higher risk of suffering the consequences.

Maharashtra, India, 2014 DIPAK SHEELARE

> Dangers and hazards of toxins in photovoltaic modules appear particularly large in countries where there are no orderly waste management systems... Especially in less developed countries in the so-called global south, which are particularly predestined for the use of photovoltaics because of the high solar radiation, it seems highly problematic to use modules that contain pollutants.

The attitude of some solar recyclers in China appears to feed this concern. "A sales manager of a solar power recycling company," the *South China Morning News* reported, "believes there could be a way to dispose of China's solar junk, nonetheless."

"We can sell them to Middle East... Our customers there make it very clear that they don't want perfect or brand new panels. They just want them cheap... There, there is lots of land to install a large amount of panels to make up for their low performance. Everyone is happy with the result."

In other words, there are firms that may advertise themselves as "solar panel recyclers" but instead sell panels to a secondary markets in nations with less developed waste disposal

systems. In the past, communities living near electronic waste dumps in Ghana, Nigeria, Vietnam, Bangladesh, Pakistan, and India have been primary e-waste destinations.

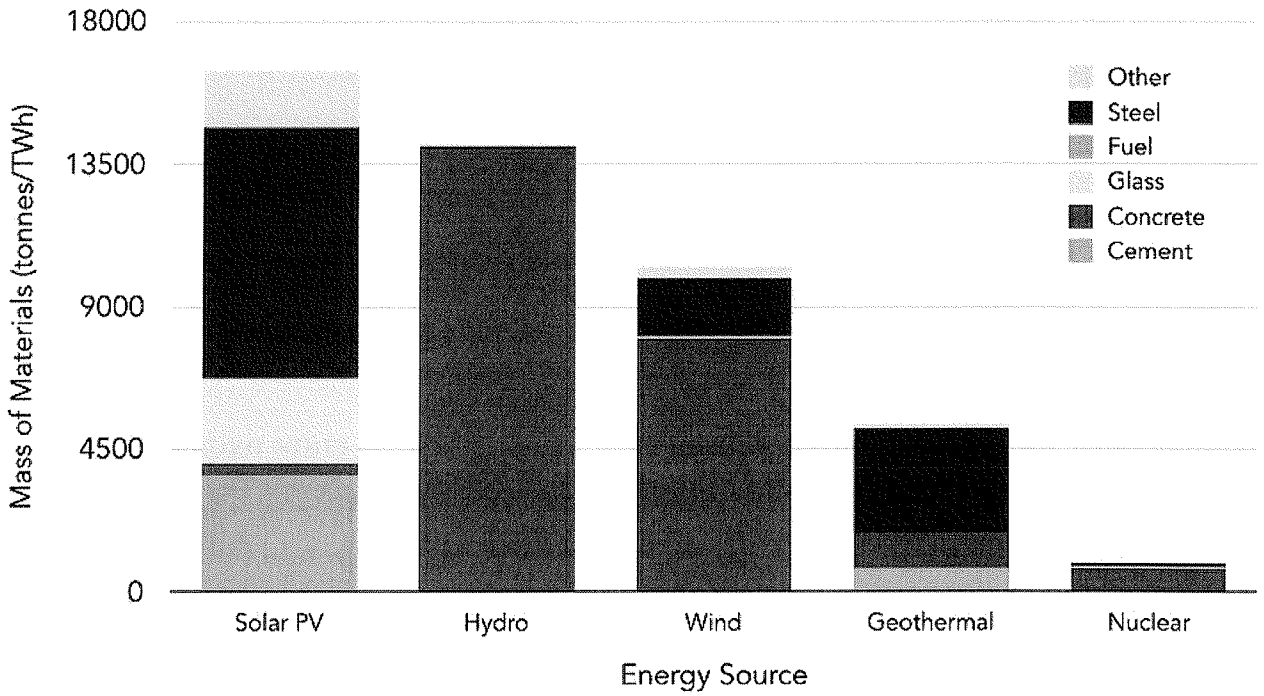
According to a 2015 United Nations Environment Program (UNEP) report, somewhere between 60 and 90 percent of electronic waste is illegally traded and dumped in poor nations. Writes UNEP:

> [T]housands of tonnes of e-waste are falsely declared as second-hand goods and exported from developed to developing countries, including waste batteries falsely described as plastic or mixed metal scrap, and cathode ray tubes and computer monitors declared as metal scrap.

Unlike other forms of imported e-waste, used solar panels can enter nations legally before eventually entering e-waste streams. As the United Nation Environment Program notes, "loopholes in the current Waste Electrical and Electronic Equipment (WEEE) Directives allow the export of e-waste from developed to developing countries (70% of the collected WEEE ends up in unreported and largely unknown destinations)."

A Path Forward on Solar Panel Waste

Perhaps the biggest problem with solar panel waste is that there is so much of it, and that's not going to change any time soon, for a basic physical reason: sunlight is dilute and diffuse and thus require large collectors to capture and convert the sun's rays into electricity. Those large surface areas, in turn, require an order of magnitude more in materials — whether today's toxic combination of glass, heavy metals, and rare earth elements, or some new material in the future — than other energy sources.



Solar requires 15x more materials than nuclear EP

All of that waste creates a large quantity of material to track, which in turn requires requires coordinated, overlapping, and different responses at the international, national, state, and local levels.

The local level is where action to dispose of electronic and toxic waste takes place, often under state mandates. In the past, differing state laws have motivated the U.S. Congress to put in place national regulations. Industry often prefers to comply with a single national standard rather than multiple different state standards. And as the problem of the secondary market for solar shows, ultimately there needs to be some kind of international regulation.

The first step is a fee on solar panel purchases to make sure that the cost of safely removing, recycling or storing solar panel waste is internalized into the price of solar panels and not externalized onto future taxpayers. An obvious solution would be to impose a new fee on solar panels that would go into a federal disposal and decommissioning fund. The funds would then, in the future, be dispensed to state and local governments to pay for the removal and recycling or long-term storage of solar panel waste. The advantage of this fund over extended

producer responsibility is that it would insure that solar panels are safely decommissioned, recycled, or stored over the long-term, even after solar manufacturers go bankrupt.

Second, the federal government should encourage citizen enforcement of laws to decommission, store, or recycle solar panels so that they do not end up in landfills. Currently, citizens have the right to file lawsuits against government agencies and corporations to force them to abide by various environmental laws, including ones that protect the public from toxic waste. Solar should be no different. Given the decentralized nature of solar energy production, and lack of technical expertise at the local level, it is especially important that the whole society be involved in protecting itself from exposure to dangerous toxins.

"We have a County and State approval process over the next couple months," Fogarty of Concerned Citizens of Fawn Lake told me, "but it has become clear that local authorities have very little technical breadth to analyze the impacts of such a massive solar power plant."

Lack of technical expertise can be a problem when solar developers like Sustainable Power Group, or sPower, incorrectly claim that the cadmium in its panels is not water soluble. That claim has been contradicted by the previously-mentioned Stuttgart research scientists who found cadmium from solar panels "can be almost completely washed out...over a period of several months...by rainwater."

Third, the United Nations Environment Programme's Global Partnership for Waste Management, as part of its International Environmental Partnership Center, should more strictly monitor e-waste shipments and encourage nations importing used solar panels into secondary markets to impose a fee to cover the cost of recycling or long-term management. Such a recycling and waste management fund could help nations address their other e-waste problems while supporting the development of a new, high-tech industry in recycling solar panels.

None of this will come quickly, or easily, and some solar industry executives will resist internalizing the cost of safely storing, or recycling, solar panel waste, perhaps for understandable reasons. They will rightly note that there are other kinds of electronic waste in the world. But it is notable that some new forms of electronic waste, namely smartphones like the iPhone, have in many cases replaced things like stereo systems, GPS devices, and alarm clocks and thus reduced their contribution to the e-waste stream. And no other electronics industry makes being "clean" its main selling point.

Wise solar industry leaders can learn from the past and be proactive in seeking stricter regulation in accordance with growing scientific evidence that solar panels pose a risk of toxic chemical contamination. “If waste issues are not preemptively addressed,” warns Mulvaney, “the industry risks repeating the disastrous environmental mistakes of the electronics industry.”

If the industry responds with foresight, Mulvaney notes, it could end up sparking clean innovation including “developing PV modules without hazardous inputs and recycled rare metals." And that's something everyone can get powered up about.

Michael Shellenberger

Michael Shellenberger is a Time Magazine “Hero of the Environment” and Green Book Award Winner. He is also a frequent contributor to The New York Times, Washington Post,... **Read More**

Code of Virginia
Title 15.2. Counties, Cities and Towns
Chapter 22. Planning, Subdivision of Land and Zoning

§ 15.2-2241.2. Bonding provisions for decommissioning of solar energy equipment, facilities, or devices.

A. As used in this section, unless the context requires a different meaning:

"Decommission" means the removal and proper disposal of solar energy equipment, facilities, or devices on real property that has been determined by the locality to be subject to § 15.2-2232 and therefore subject to this section. "Decommission" includes the reasonable restoration of the real property upon which such solar equipment, facilities, or devices are located, including (i) soil stabilization and (ii) revegetation of the ground cover of the real property disturbed by the installation of such equipment, facilities, or devices.

"Solar energy equipment, facilities, or devices" means any personal property designed and used primarily for the purpose of collecting, generating, or transferring electric energy from sunlight.

B. As part of the local legislative approval process or as a condition of approval of a site plan, a locality shall require an owner, lessee, or developer of real property subject to this section to enter into a written agreement to decommission solar energy equipment, facilities, or devices upon the following terms and conditions: (i) if the party that enters into such written agreement with the locality defaults in the obligation to decommission such equipment, facilities, or devices in the timeframe set out in such agreement, the locality has the right to enter the real property of the record title owner of such property without further consent of such owner and to engage in decommissioning, and (ii) such owner, lessee, or developer provides financial assurance of such performance to the locality in the form of certified funds, cash escrow, bond, letter of credit, or parent guarantee, based upon an estimate of a professional engineer licensed in the Commonwealth, who is engaged by the applicant, with experience in preparing decommissioning estimates and approved by the locality; such estimate shall not exceed the total of the projected cost of decommissioning, which may include the net salvage value of such equipment, facilities, or devices, plus a reasonable allowance for estimated administrative costs related to a default of the owner, lessee, or developer, and an annual inflation factor.

2019, cc. 743, 744.

The chapters of the acts of assembly referenced in the historical citation at the end of this section may not constitute a comprehensive list of such chapters and may exclude chapters whose provisions have expired.

8/16/2019

Attachment (11)