



November 20, 2019 (rev. 12/18/19)

Solar Energy: Yes or No?

I'm Dr. Calvin Luther Martin, retired Rutgers University professor of history (with, incidentally, graduate training in molecular biology/immunology and B.A. degree in biology). I am part of FARM, a bunch of crusty NYS old-timers who sized up the industrial solar proposition — and decided “no.”

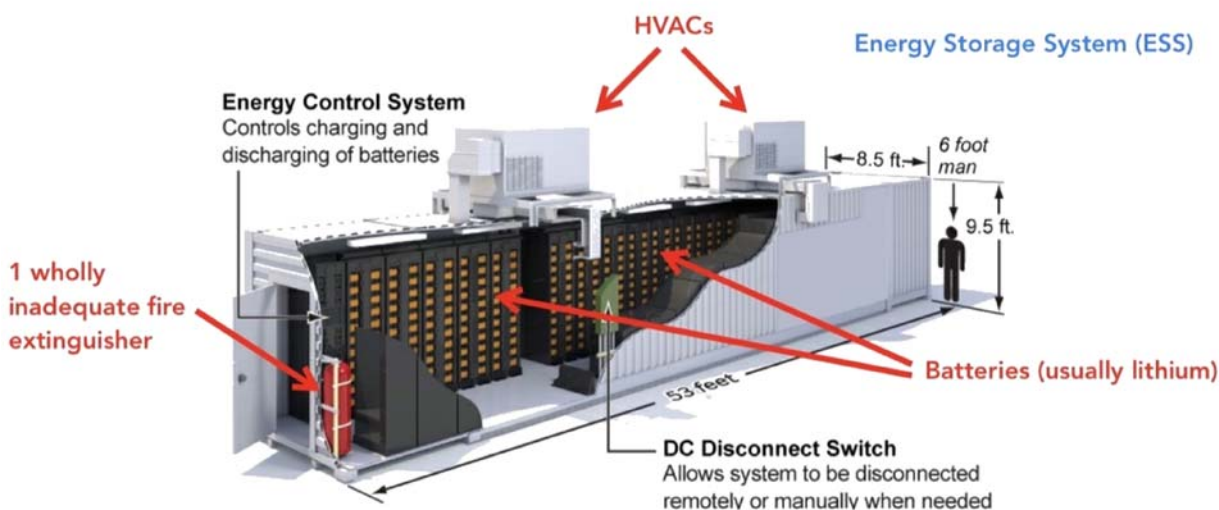
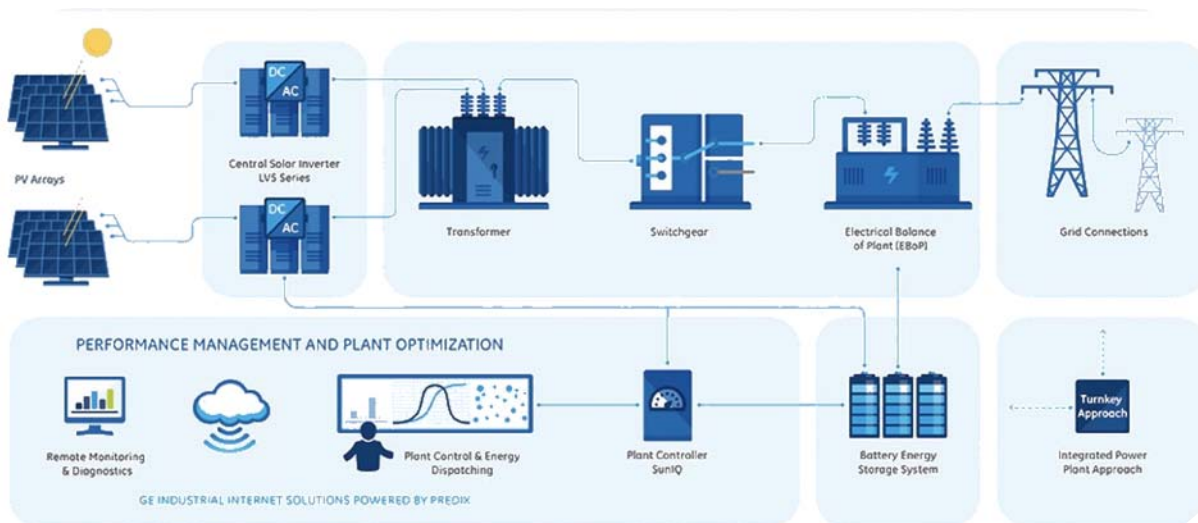
Photovoltaic (PV) panels on rooftops, brownfield sites, abandoned parking lots, abandoned shopping malls are a great idea. In other words, relatively small arrays for local power.



When you “inflate” solar power into a massive, utility-scale proposition, you’ve got

an industrial monster on your hands:

- Hundreds of thousands or millions of PV panels hard-wired to inverters (DC to AC), transformers, switch-gears, "electrical balance of plant systems," and large lithium-ion battery energy storage systems (ESS).



- Biologically-speaking, these zillions of panels are smothering hundreds or thousands of acres of oftentimes USDA Grade A farmland. The supreme irony is when the installation "requires" clear-cutting of forest. Irony because Mother Nature's trees and other green plants are carbon sequesters and energy producers of unmatched efficiency, ingenuity, and output.



- Once operational, this 3.4-square-mile sheet of glass (see, e.g., the Wisconsin Invenergy project, below) is billed as delivering electrons to the grid in response to split-second fluctuations in regional demand (if the sun is shining). Whereas if PV panels are churning out electricity when the grid has no use for it, the electricity is superfluous and dumped, presumably into the ground. Onsite energy storage systems (ESS), hyped as “smoothing” PV panel output and “stabilizing” the grid, are in fact ineffectual and unrealistic, despite Elon Musk’s fantasies otherwise (click [here](#)).
- The video, below, may not be relevant to industrial-scale solar. It has to do with EMF interference from neighbors’ solar panels. The date of the video is 2016. It’s possible that home solar installers have resolved EMF “trespass” since 2016 — I frankly don’t know. Whether EMF trespass is a problem with utility-scale solar plants — once again, I don’t know, yet it’s a possibility and worth exploring before allowing a huge solar plant to be built in your community.



You're beginning to get the picture. The problem with industrial solar is scale (size) and credibility (lack of honesty).



(Let me interject, it's okay to have strong convictions about global warming and fossil fuels; it's not okay to jettison your faculties of reasoning along the way. Hucksterism, lampooned in Herman Melville's [The Confidence Man](#), is ingrained in the American psyche. Watch out for the smilin' young man with a name like Chad and a suit that's cheap who turns up one day as Solar Man. The devil just came to town.)

Solar Man

Here's a graphic of the scaling-up process from little to big. Sort of like blowing up a balloon.



Notice the individual inflating the balloon. He's not a kid. It's Solar Man, the sales rep for Big Solar: The slick, heavily-lawyered, generally foreign energy company making piles of money from (1) upfront state cash grants, state renewable energy mandates and feed-in tariffs, (2) federal & state tax credits, (3) 5-year accelerated depreciation on the whole shebang, (4) deduction of loan interest from taxable revenues, and (5) the lucrative sale of carbon credits (renewable energy credits) to corporations and industries who now advertise themselves as 100% carbon-free.

Notice panel #3, above. What Solar Man is blowing into that "clean, green, renewable energy" bag is rhetoric that's soon to be transformed — presto! — into dollar bills. Hundreds of millions of your tax dollars. The perfect scam. (Melville subtitled his con-man book, "His Masquerade." What better masquerade than "clean, green, renewable" — to save Planet Earth?)



Solar Man is prepared to offer a few hundred thousand of those scammed tax dollars to your town government and municipal fire department (new fire engine) in what he calls a Host Community Agreement. He's also prepared to spread several hundred thousand among the lease-holders who have naively surrendered their land to his LLC (Limited Liability Corporation).

Surrendered? Read one of the leases (click [here](#)). People blithely sign away nearly all their property rights, virtually forever.

Solar Man will insist, however, on a PILOT (Payment in Lieu of Taxes) from all taxing entities in the county.





I've been dealing with these "clean energy" hucksters since 2004. In my 71 years I have never encountered a more loathsome sneaky lying bullying aggressive deceitful cynical callous collection of people. (Did I leave anything out?) Whatever intrinsic merit wind and solar may have is immediately pulverized by the jaw-dropping sleaze of wind & solar companies. I guarantee they will enrage you. I also guarantee they will tear your community to shreds. (Don't look to the state or feds for relief. Washington and your state house are in collusion with Solar Man.)



My town in NYS recently turned down a 950-acre project for reasons I will explain in a moment. Before I do, lest you think FARM is a bunch of Luddites, my town has a functioning brownfield of PV panels and more and more homeowners hereabout are mounting them on rooftops. All well and good.

In 2018 FARM submitted a series of 10 reports to the Siting Board of the NYS Dept. of Public Service, opposing 2 giant solar projects nearby: (1) the 950-acre Malone NY project just referred to, and (2) a 1600-acre project in Massena NY.

Here are highlights of the 10 reports, arranged by category and in no particular order. To read the full report (PDF) in each case, click where indicated. Help yourself; these reports are yours to use as you wish.

Prime farmland sterilized and otherwise damaged, and taken out of production. (Click [here](#) & [here](#) for FARM's 2 reports.)

Virtually all states either forbid or recommend against taking prime farmland out of production and smothering it with solar panels and their associated equipment. The developers of the proposed Malone & Massena projects callously ignored this common sense.

Solar developers will assure you that soil sterilization, toxic mineral contamination and water/soil runoff are non-issues. Speak to [Dr. Ron Heiniger](#), Professor of Crop & Soil Sciences at North Carolina State University, to get a different story. (I did. And I read his publications on the matter. He will give you an earful.)

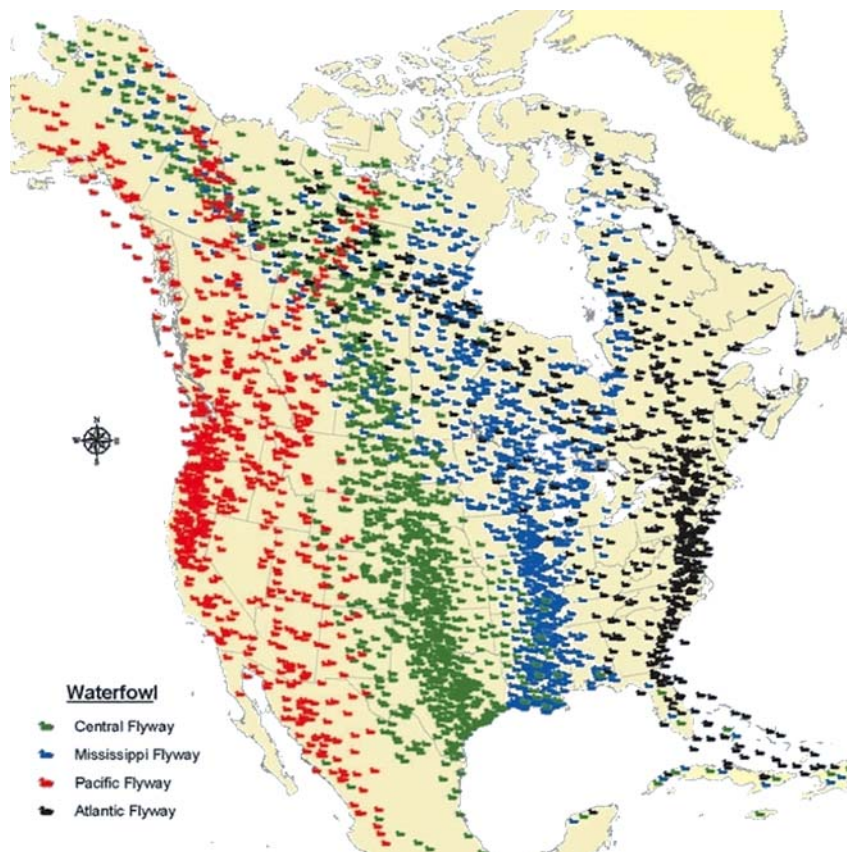


PVHI (Photo-Voltaic Heat Island) effect, Ecological Traps, and soil microbes. (Click [here](#) & [here](#) for FARM's 2 reports.)

Soil is a living, breathing organism. Fragile. Sensitive. Precious. Millions of years in the making. Loaded with marvelous, vital microbes working to create a substance — soil — unique in our solar system. Without it, there are no green plants. Without it, nothing lives.



One mustn't cook this "womb," hallowed by God in the biblical creation story, with solar panels and their PVHI effect. It's called a No Brainer. Solar Man is oblivious to this.



Then there is the problem of **Ecological Traps** (click [here](#)):



(1) the **Polarization Captivity Effect** (PCE) where arthropods (insects), especially those requiring water for breeding, lay their eggs on PV panels — mistaking them for water. I refer to insects that are vital to fish, bats, birds, and pollination — as in “food chain.”

(2) **Polarized Light Pollution** (PLP) and the **Lake Effect**, whereby aquatic birds (e.g., geese) that navigate by "polarized light" confuse industrial PV panels for bodies of water and attempt to land thereon — with disastrous results. (PV panels polarize light.)

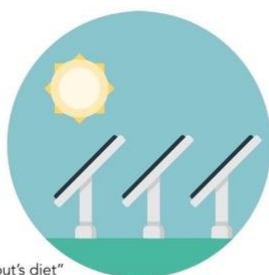


Consider Invenergy's proposed 2,200 acre (3.4-square mile) [Badger Hollow Solar farm](#) (Wisconsin), consisting of 1.2 million light-polarizing PV panels. This is going to look like a mighty big (fake) lake for migrating water birds that navigate by "polarized light = water!" What's Invenergy's plan — besides denial?



Mayflies & Stoneflies & Caddisflies

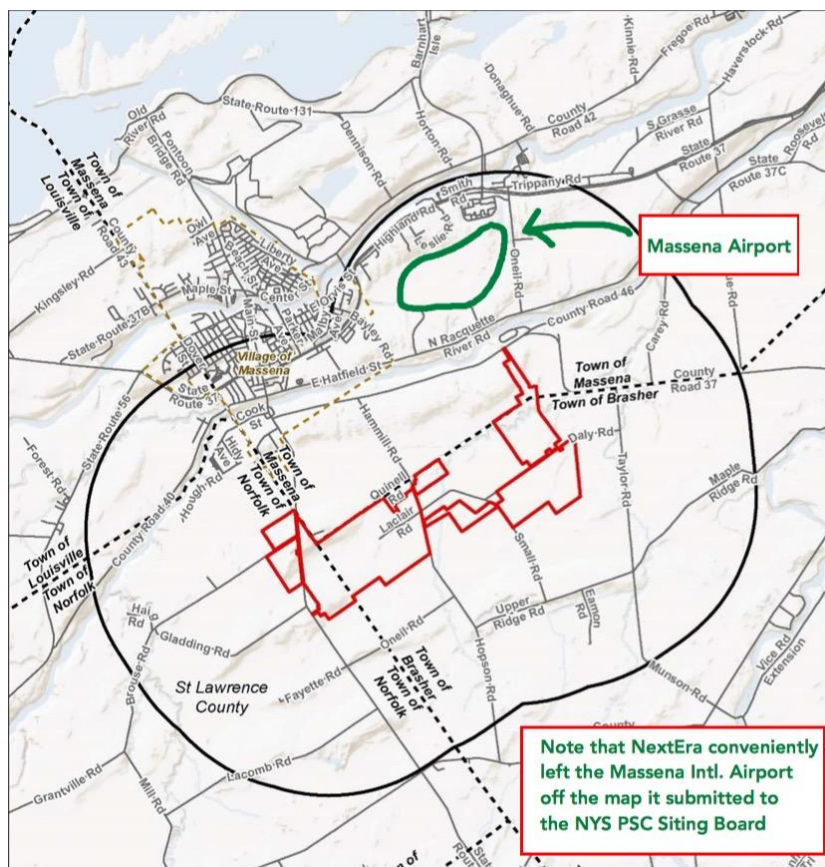
"The 3 insect species making up the staple of a trout's diet"



**= Ecological Trap:
"Polarization Captivity Effect"**

PV panel glare: Airports and, once again, the Lake Effect. (Click [here](#) & [here](#) for FARM's 2 reports.)

Then there's the
problem of nearby



airports, virtually all of which are federally-obligated. The FAA recommends strongly against PV panels in the “approach” and “take-off” air-space of airports. Not just large commercial airports, but all airports. You will discover that the solar companies like to minimize the airport glare issue.

Besides claiming that glare has never been a problem at airports (this is a lie), they likewise claim the FAA has no interest in the matter (another lie). Here, below, is what the FAA has to say about the matter. (The text in yellow boxes is quoted from the [FAA, “Interim Policy: FAA Review of Solar Energy System Projects on Federally Obligated Airports,” Federal Register, vol. 78, no. 205, Wed., October 23, 2013, p. 63276](#). The text below that is mine.)

2

Solar energy systems located on an airport that is not federally-obligated or located outside the property of a federally-obligated airport are not subject to this policy. Proponents of solar energy systems located off-airport property or on non-federally-obligated airports are strongly encouraged to consider the requirements of this policy when siting such systems (emphasis added).¹⁴

In other words, the FAA is not insisting that Geronimo (or NextEra in Massena) comply with these regulations (which we will get to in a moment); it is “strongly” encouraging them “to consider the requirements of this policy when siting such systems” off the grounds of a federally-obligated airport. (This perhaps explains why Geronimo fudged the identity of Malone-Dufort, calling it “privately owned and operated.” As I noted above, Geronimo is wrong: Malone-Dufort is publicly owned and operated and is federally-obligated. Hence, Geronimo is “strongly encouraged to consider the requirements of this policy when siting” its project.)

This brings us to (a) the FAA's requirements for on-site PV panels at federally-obligated airports and (b) the FAA's strongly encouraged requirements for off-site PV projects near a federally-obligated airport. Under the heading, **Standard for Measuring Ocular Impact**, we're told the following. Notice the passages underlined by me:

- 3** FAA adopts the *Solar Glare Hazard Analysis Plot* shown in Figure 1 below as the standard for measuring the ocular impact of any proposed solar energy system on a federally-obligated airport. To obtain FAA approval to revise an airport layout plan to depict a solar installation and/or a "no objection" to a Notice of Proposed Construction Form 7460-1, the airport sponsor will be required to demonstrate that the proposed solar energy system meets the following standards:
1. No potential for glint or glare in the existing or planned Airport Traffic Control Tower (ATCT) cab, and
 2. No potential for glare or "low potential for after-image" (shown in green in Figure 1) along the final approach path for any existing landing threshold or future landing thresholds (including any planned interim phases of the landing thresholds) as shown on the current FAA-approved Airport Layout Plan (ALP). The final approach path is defined as two (2) miles from fifty (50) feet above the landing threshold using a standard three (3) degree glidepath.
- Ocular impact must be analyzed over the entire calendar year in one (1) minute intervals from when the sun rises above the horizon until the sun sets below the horizon.¹⁵

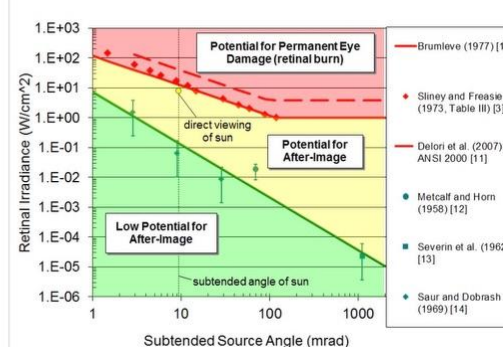
The policy notice goes on to direct all federally-obligated airports to use the **Solar Glare Hazard Analysis Tool (SGHAT)** to assess ocular impact, noting the SGHAT software is available online from the US govt.'s Sandia Labs. Readers and developers and airport officials are directed to www.sandia.gov/glare.

Solar Glare Hazard Analysis Tool

This tool determines when and where solar glare can occur throughout the year from a user-specified PV array as viewed from user-prescribed observation points. The potential ocular impact from the observed glare is also determined, along with a prediction of the annual energy production. Configurations can be quickly modified (e.g., tilt, orientation, shape, location) to identify a design that mitigates glare while maximizing energy production.

Meets FAA glare analysis requirements (78 FR 63276).

SGHAT requires a modern web browser



When you go to the Sandia site, you're directed to [ForgeSolar](http://www.sandia.gov/glare).

I followed these directions and did an ocular impact analysis for the Malone and Massena NY airports, using ForgeSolar's SGHAT software. Both projects failed. See results, below, for Geronimo Energy's Malone NY project.



FORGESOLAR GLARE ANALYSIS

Project: **Malone Airport**

Proposed PV sites near Malone Airport, New York

Site configuration: **Malone-Dufort Airport**


Analysis conducted by Calvin Martin (19clay@gmail.com) at 00:25 on 15 Apr, 2018.

U.S. FAA 2013 Policy Adherence

The following table summarizes the policy adherence of the glare analysis based on the 2013 U.S. Federal Aviation Administration Interim Policy 78 FR 63276. This policy requires the following criteria be met for solar energy systems on airport property:

- No "yellow" glare (potential for after-image) for any flight path from threshold to 2 miles
- No glare of any kind for Air Traffic Control Tower(s) ("ATCT") at cab height.
- Default analysis and observer characteristics (see list below)

ForgeSolar does not represent or speak officially for the FAA and cannot approve or deny projects. Results are informational only.



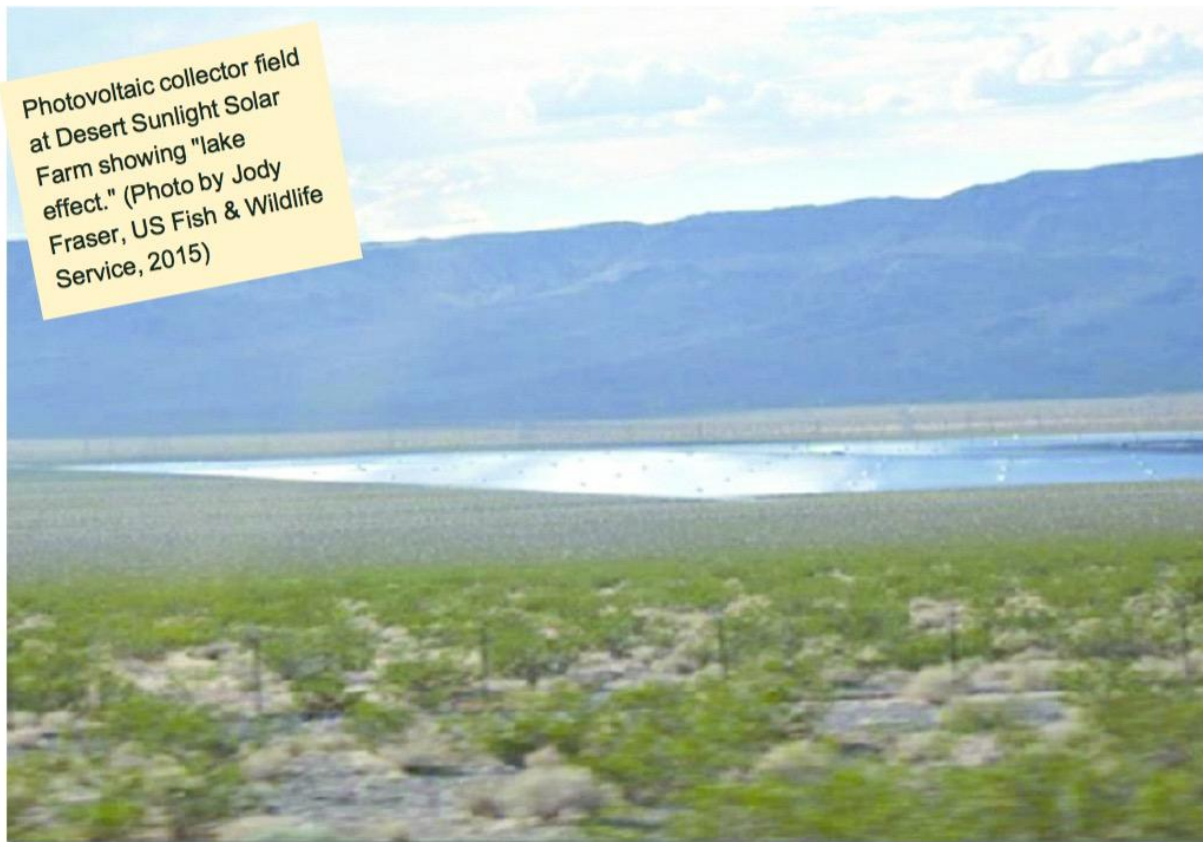
COMPONENT	STATUS	DESCRIPTION
Analysis parameters	PASS	Analysis time interval and eye characteristics used are acceptable
Flight path(s)	FAIL	Flight path receptor(s) receive yellow glare
ATCT(s)	N/A	No ATCT receptors designated

Default glare analysis and observer eye characteristics are as follows:

- Analysis time interval: 1 minute
- Ocular transmission coefficient: 0.5
- Pupil diameter: 0.002 meters
- Eye focal length: 0.017 meters
- Sun subtended angle: 9.3 milliradians

FAA Policy 78 FR 63276 can be read at <https://www.federalregister.gov/d/2013-24729>

I have yet to encounter a solar company that has done a FAA-advised Solar Glare Hazard Analysis.



Solar farm noise. (Click [here](#) for FARM's report.)

Wait a minute! Aren't solar "farms" supposed to be silent? Yes and no. The PV panels are silent; the equipment they are tethered to is not. Especially the inverters (DC to AC).

They hum and have a high-pitched buzz. (Watch videos, below. Turn up your speakers.)

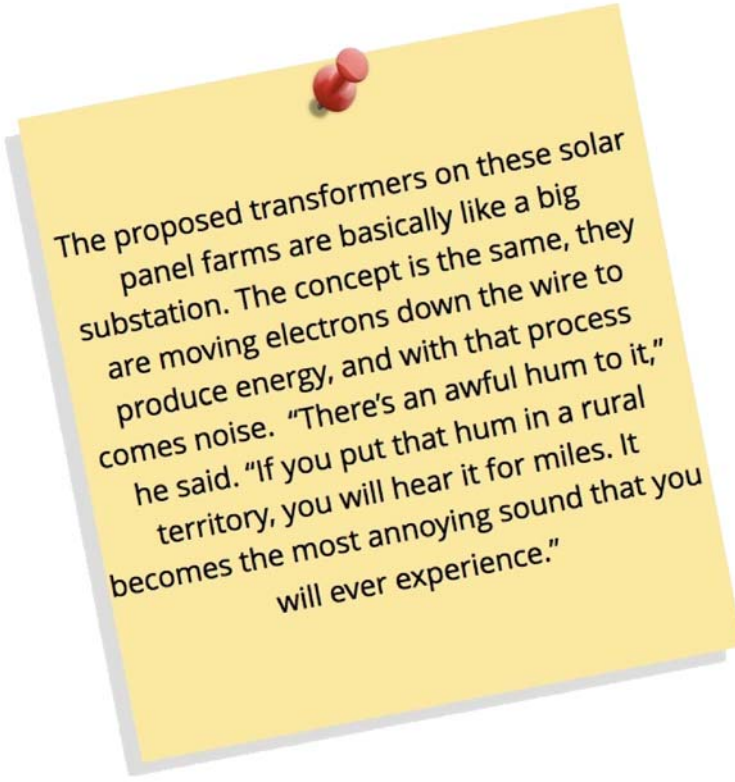
Inverter Noise





The inverters hum and the HVAC (heating, ventilation, and air conditioning) units attached to the ESS (energy storage systems) produce ILFN (infrasound and low frequency noise). (See photo toward the top of this page for an illustration of an ESS.)

If you live within a mile or so of one of these mammoth solar plants and it's a calm, hot July night, you're gonna go nuts. The statement, left, is from Frank Coyle, retired civil engineer and former



The proposed transformers on these solar panel farms are basically like a big substation. The concept is the same, they are moving electrons down the wire to produce energy, and with that process comes noise. "There's an awful hum to it," he said. "If you put that hum in a rural territory, you will hear it for miles. It becomes the most annoying sound that you will ever experience."

general manager for Simcoe Hydro (Ontario, Canada), recalling his experience building electrical substations.

Infrasound is a whole other topic. Suffice it to say that infrasound from wind turbines (which Big Wind and its hireling scientists denied for years, till they could do so no longer) is what is killing wind energy projects around the globe.

Bottom line: Big Solar is industrializing your neighborhood, your community, perhaps even the field across the road from your home. Solar Man calls it a "farm" in his folksy presentation to your gullible town board. It's not a farm. This is a farm. Adding insult to injury, the piker who leased that 1000 acres across the road from you doesn't even live there any more.



You're toast. So is your property value. (Remember I warned you: the devil just came to town.)

Decommissioning. (Click [here](#) for FARM's report.)

This one takes the prize! When Solar Man does his dog and pony show at a town meeting, pin him down on PV panel disposal (decommissioning). Here's an excerpt from our document on the subject as it pertains to Geronimo Energy's so-

called [Franklin Solar](#) project in Malone NY. (Geronimo being an aggressive and ludicrously named Minnesota energy company.)

At the bottom of this legal hairball we find the answer to, *What's Geronimo's decommissioning plan?* Answer: *They don't have one.* Sure, they can tell Malone and the Siting Board they have plan, but with the cunning exit clause at the end of the paragraph, all plans and solemn promises are meaningless. Exit clause: "Lessee shall not be relieved from liability ... *unless Lessee assigns or conveys all of its interests under the Lease to the assignee or transferee, in which event Lessee shall have no continuing liability.*"



Geronimo doesn't have a decommissioning plan; it has an escape plan. It's simple. At some point when the subsidies and tax write-offs have dried up, Geronimo (G) sells the Project to Fast Eddy Solar, LLC, whereby G assigns and otherwise conveys all its interests under the lease to Fast Eddy, whereupon G "shall have no continuing liability." Fast Eddy, of course, has zero assets — just a '39 Dodge with a blown engine.



⁴ Geronimo Energy, Memorandum of Land Lease & Solar Easement with Mobedick & Associates, Inc., Instrument #2017-4067 filed with the Franklin County Clerk, August 28, 2017, p. 3.

Dead PV panels are considered toxic waste by the federal EPA and state conservation and health depts. Hence, they can't be simply tossed in the county landfill. They must be trucked to a federally-approved toxic waste site and buried with suitable precautions & protocols. The cost of this is huge.

This is NYSERDA's estimate of decommissioning costs for a 2 MW project. ([NYSERDA](#): NYS Energy Research and Development Authority. A so-called public benefit corporation used by Gov. Cuomo to fund his pet energy projects — with wind and solar topping the list.)

HAZARDOUS WASTE

STATE AND FEDERAL LAWS PROHIBIT IMPROPER DISPOSAL. IF FOUND, CONTACT THE NEAREST POLICE OR PUBLIC SAFETY AUTHORITY, THE U.S. ENVIRONMENTAL PROTECTION AGENCY OR THE CALIFORNIA DEPARTMENT OF TOXIC SUBSTANCES CONTROL.

GENERATOR INFORMATION:

NAME _____ PHONE _____

ADDRESS _____ CITY _____ STATE _____ ZIP _____

EPA / MANIFEST ID NO. / DOCUMENT NO. _____

EPA NO. _____ CA WASTE NO. _____ ACCUMULATION START DATE _____

CONTENTS, COMPOSITION: _____

PHYSICAL STATE: ☐ SOLID ☐ LIQUID ☐ GASEOUS ☐ OTHER _____

HAZARDOUS PROPERTIES: ☐ FLAMMABLE ☐ TOXIC ☐ CORROSIVE ☐ REACTIVITY ☐ OTHER _____

D O T: PROPER SHIPPING NAME AND UN OR NA NO. WITH PREFIX _____

HANDLE WITH CARE!

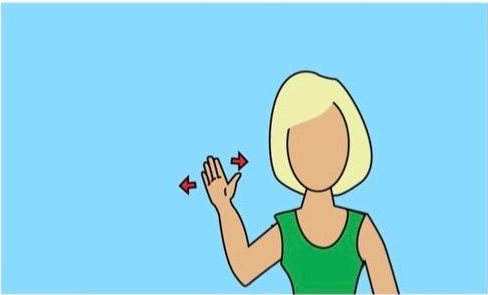
Table 1: Sample list of decommissioning tasks and estimated costs

Tasks	Estimated Cost (\$)
Remove Rack Wiring	\$2,459
Remove Panels	\$2,450
Dismantle Racks	\$12,350
Remove Electrical Equipment	\$1,850
Breakup and Remove Concrete Pads or Ballasts	\$1,500
Remove Racks	\$7,800
Remove Cable	\$6,500
Remove Ground Screws and Power Poles	\$13,850
Remove Fence	\$4,950
Grading	\$4,000
Seed Disturbed Areas	\$250
Truck to Recycling Center	\$2,250
Current Total	\$60,200
Total After 20 Years (2.5% inflation rate)	\$98,900



According to NYSERDA’s estimates, a 2 MW project will cost roughly \$60,200 to properly decommission. This suggests that Geronimo’s 150 MW project would cost roughly \$4,515,000 (\$4.5 million) in today’s dollars. Adding a 2.5% inflation rate over 20 years, today’s 2 MW project will cost \$98,900 to decommission in 2038. This suggests that Geronimo’s

150 MW project will cost something on the order of \$7,417,500 (\$7.4 million) to decommission in 2038. Notice that these figures do not include the costs of disposing of these tens of thousands of PV panels according to what will someday be government-mandated regulations for hazardous waste. The NYSERDA figures simply assume a fairly standard dumping fee at the local landfill, so it appears. These numbers are a way off the mark for dead solar panels being trucked to, and buried within, a special, biohazard landfill.

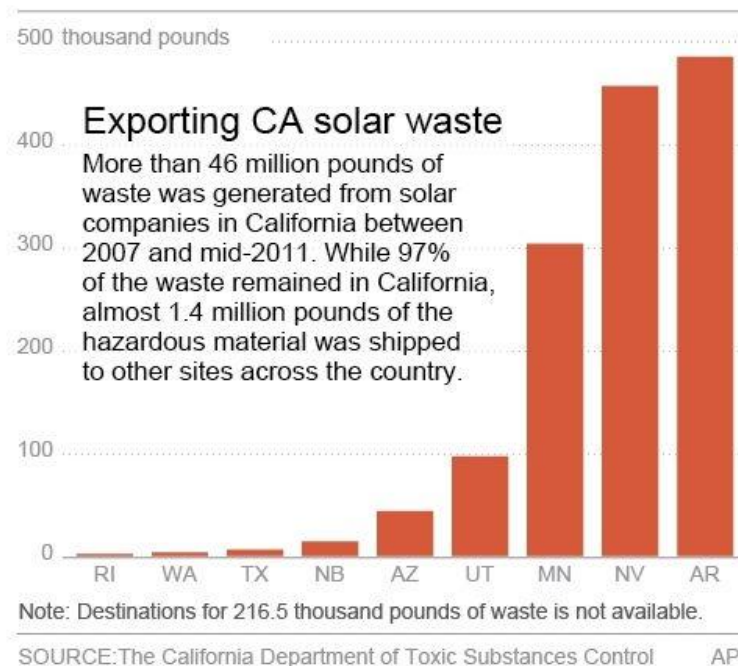


Little wonder that Geronimo is not eager to get into too much detail about decommissioning costs, and seems more interested in building an escape strategy into its property leases.

Geronimo is a Minnesota-based company. Minnesotans are noted for their practicality and thrift. In this instance, the most thrifty solution is to figure out a way to wave goodbye before getting stiffed with decommissioning costs in the tens of millions of

dollars.

The biggest fear in the Malone community is “abandonment”: Geronimo or one of its “successors” or “assignees” or “transferees” — aka Fast Eddy Solar, LLC — simply walks away from the project. (See the waving lady, above.)



In Wisconsin, I'll wager Invenergy (see above) doesn't have a plan for 1.2 million "dead" solar panels — except, maybe, to "give" them to the leaseholding farmers! (Don't laugh! Solar companies in North Carolina have proposed this — with a straight face.)



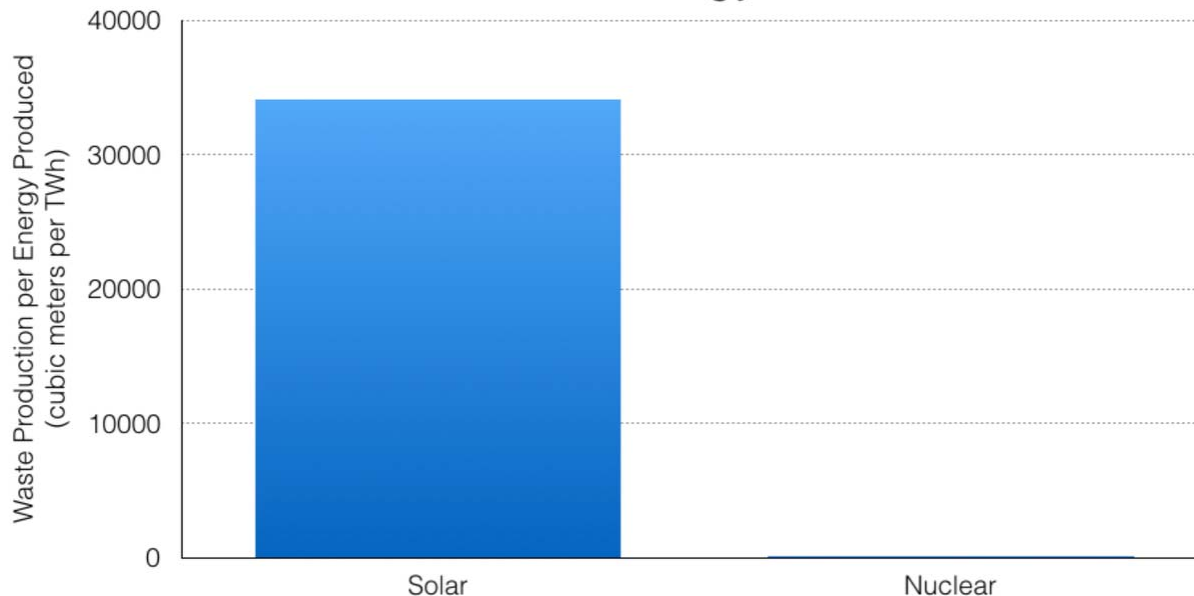
Here are several articles worth reading on PV panels as toxic waste:

(1) Jemin Desai and Mark Nelson, "[Are we headed for a solar waste crisis?](#)" Environmental Progress (June 21, 2017).

"Solar panels contain toxic metals like lead, which can damage the nervous system, as well as chromium and cadmium, known carcinogens. All three are known to leach out of existing e-waste dumps into drinking water supplies."

The following graph is taken from this article:

Solar panels produce ~300x more waste than nuclear reactors when providing the same amount of energy.



Sources and Notes:

US GAO, http://www.gao.gov/key_issues/disposal_of_highlevel_nuclear_waste/issue_summary

World Nuclear Association, <http://www.world-nuclear.org/information-library/nuclear-fuel-cycle/nuclear-wastes/radioactive-waste-management.aspx>

<http://www.world-nuclear.org/information-library/facts-and-figures/world-nuclear-power-reactors-archive/reactor-archive-december-2015.aspx>

IAEA, <https://www.iaea.org/PRIS/home.aspx>

BP, <http://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy.html>



Solar panels specifications vary. Panel specifications were standardized according to TrinaSolar's Duomax Dual Glass 60-Cell Module:

http://static.trinasolar.com/sites/default/files/PS-M-0474%20A%20Datasheet_Duomax_PEG5.XX_US_Feb_2017_A.pdf

(2) Daniel Wetzel, "[Study Warns of Environmental Risks from Solar Modules](#)," De Welt (May 13, 2018).

In a study commissioned by EU Ministry of Economic Affairs, "researchers investigated whether the pollutants used in the four main photovoltaic technologies are water-soluble. Contrary to previous assumptions, the result shows that 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."

Click [here](#) for the original article in German.

(3) David H. Nguyen, PhD, "[Toxic Chemicals in Solar Panels](#)," [Sciencing.com](#) (April 30, 2018).

"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."

(4) "[Will Solar Power Be at Fault for the Next Environmental Crisis?](#)" Institute for Energy Research (August 15, 2017).

"The waste disposal issues regarding solar panels are enormous. According to an analysis by Environmental Progress, solar panels create about 300 times more toxic waste per unit of electricity generated than nuclear power plants. For example, if solar and nuclear produce the same amount of electricity over the next 25 years that nuclear produced in 2016, and the wastes are stacked on football fields, the nuclear waste would reach 52 meters (the height of the Leaning Tower of Pisa), while the solar waste would reach 16 kilometers (the height of two Mt. Everests). Further, while nuclear units can easily operate 50 or 60 years, solar panels have relatively short operational lifespans (20 to 30 years), so their disposal will become a problem in the next few decades. While nuclear waste is contained in heavy drums and regularly monitored, very little has been done to deal with solar waste. Solar waste outside of Europe tends to end up in a large stream of electronic waste."

(5) Adriana Ramos-Ruiz et al., "[Leaching of cadmium and tellurium from cadmium telluride \(CdTe\) thin-film solar panels under simulated landfill conditions](#)," Jour. of Hazardous Materials (August 15, 2017), vol. 336, pp. 57-64.

4.3. Implications

The evidence found in this work indicates that the standardized TCLP and WET leaching tests might underestimate the leaching of Cd and Te from disposing decommissioned CdTe solar panels in landfills. Although some previous works have stated that CdTe is an insoluble form of Cd and that CdTe is expected to have low bioavailability in the environment, the results obtained in the present study . . . indicate that a high fraction of the Cd and Te in CdTe panels could be potentially released if non-encapsulated CdTe solar panels are discarded in municipal landfills. Leaching of Cd and Te is expected to occur mainly during the acidic phase of a landfill in which low pH values are dominant.

The leaching results reported in the current study were obtained in accelerated column tests simulating the conditions in the acidogenic and methanogenic phases of a MSW landfill. The actual Cd concentrations in a given landfill would depend on the amount of PV panels disposed, panel design, panel fragment size, climatic conditions, landfill management and design, etc.. . . Releases into groundwater are . . . particularly a problem in landfills that were not originally designed to prevent migration of the leachate (unlined landfills). Elevated concentrations of metals and metalloids have been measured in samples of groundwater collected in locations close to landfills receiving electronic waste. Furthermore, release of these highly toxic compounds into the landfill could impact the microbial communities degrading organic waste and, thereby, the waste stabilization process. Our findings from a previous work indicated the methanogenic activity of anaerobic sludge is highly inhibited by the presence of Cd and Te soluble species.



Environment Canada

Storage Batteries (ESS: Energy Storage Systems)

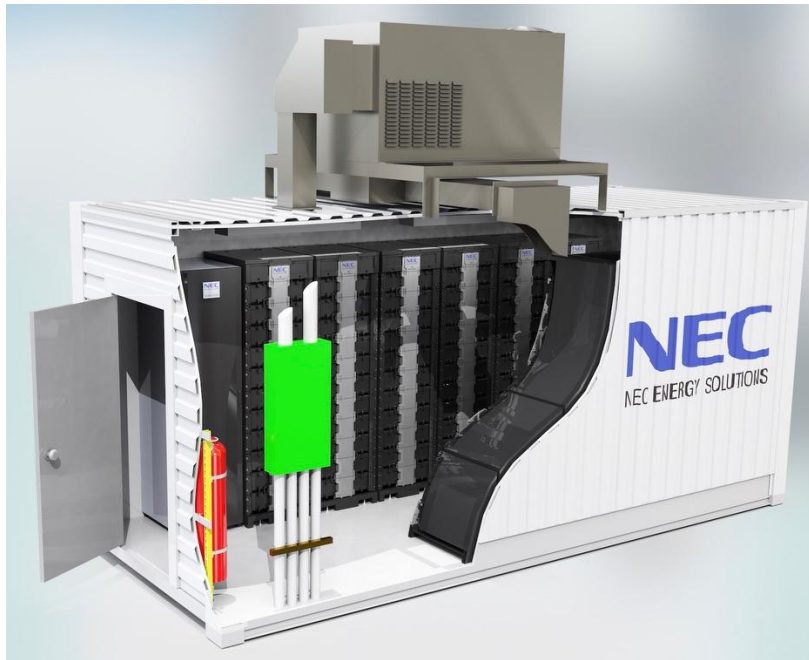
Here are several examples:



(a) The white “blocky” structures, below, filled with lithium-ion batteries.
 (b) The gray panels of lithium-ion batteries shown in the cutaway view, left.



Take a closer look at one of the storage units, with racks of lithium-ion batteries.



Here's what the Tesla [Hornsedale Power Reserve](#) looks like in Australia.





How well does the Hornsdale battery array perform? Answer: Not well (click [here](#) & [here](#)).

Storing the electricity in batteries seems like a good idea. Except:

1. It doesn't work in real life (click [here](#) & [here](#)).
2. To make it work would be astronomically expensive (click [here](#) & [here](#)).
3. Lithium-ion batteries are notoriously volatile and combustable (click [here](#)).



Then there's this nightmare (click [here](#)):

SCIENTIFIC REPORTS



Correction: Author Correction

OPEN

Toxic fluoride gas emissions from lithium-ion battery fires

Fredrik Larsson^{1,2}, Petra Andersson², Per Blomqvist² & Bengt-Erik Mellander¹

Received: 11 April 2017

Accepted: 28 July 2017

Published online: 30 August 2017

Lithium-ion battery fires generate intense heat and considerable amounts of gas and smoke. Although the emission of toxic gases can be a larger threat than the heat, the knowledge of such emissions is limited. This paper presents quantitative measurements of heat release and fluoride gas emissions during battery fires for seven different types of commercial lithium-ion batteries. The results have been validated using two independent measurement techniques and show that large amounts of hydrogen fluoride (HF) may be generated, ranging between 20 and 200 mg/Wh of nominal battery energy capacity. In addition, 15–22 mg/Wh of another potentially toxic gas, phosphoryl fluoride (POF₃), was measured in some of the fire tests. Gas emissions when using water mist as extinguishing agent were also investigated. Fluoride gas emission can pose a serious toxic threat and the results are crucial findings for risk assessment and management, especially for large Li-ion battery packs.

Is your fire dept. going to put out this fire? And what about the hydrogen fluoride (HF) gas released into the air? How close will you be living to this inferno and its toxic gas? Do a Web search for "[hydrogen fluoride gas toxicity](#)." You will quickly find a list like this one, below. (Keep this list on your refrigerator door, so you know what's happening to you when those lithium-ion battery containers ignite and go KABOOM!)

Main Risks and Target Organs

Hydrogen fluoride is highly corrosive to all tissues.

Skin: Burns, necrosis; underlying bone may be decalcified.

Eyes: Burns.

Gastrointestinal: After ingestion, the oropharynx and the oesophagus are the primary sites of injury.

Heart: Systemic absorption occurs following skin exposure or ingestion; severe and rapid hypocalcaemia may ensue with cardiac dysrhythmia and arrest.

Lungs: After inhalation, severe pulmonary injury may occur with pulmonary oedema and bronchopneumonia.

Neuromuscular: Tetany may occur due to hypocalcaemia after systemic absorption.

Smilin' Chad, the solar salesman – remember him?

He won't want to talk about this stuff. If you perversely bring it up, he'll doubtless laugh and tell you it's all hysteria – all bunk! (But he won't be anywhere near the site when it happens.) Just keep repeating to yourself: it's all "clean, green, renewable," so it's gotta be okay. Besides, the government wouldn't expose you to this risk – would it?



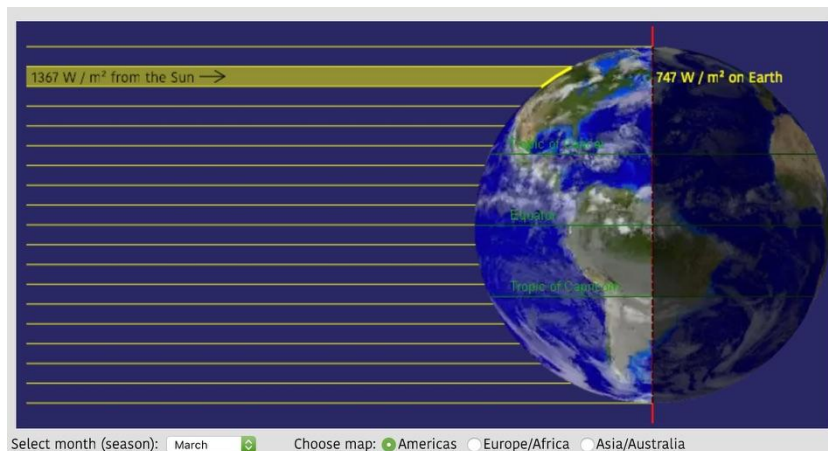
Does the project align with your county or town plan? (Click [here](#) for FARM's report.)

In the case of Malone NY, the Geronimo solar project directly violated the [Adirondack Trail Scenic Byway Corridor Management Plan](#), going back to 1992 when NYS created the Scenic Byways Program administered by the Dept. of Transportation and implemented by the Scenic Advisory Board. The program's express purpose was to celebrate and capitalize on the "extensive system of over 2,000 miles of roadways that offer exceptional driving experiences throughout the state" (Plan, p. 5).



How much sun does your community get, annually? (Click [here](#) for FARM's report.)

Latitude is the #1 issue when considering solar energy potential. Is your degree of latitude a good location for what's called "solar energy gain"?



Consider Malone NY, where I live. According to Tom Whittaker's applet (click [here](#)), the angle of the sun at 45° (Malone being at 44.842°) is optimal in June and at its worst in December. Malone has the potential to produce, for 1.5 to 2 months at peak for its latitude, 1183 W/m². This does not take into account other environmental factors, such as cloud cover and precipitation, nor factors affecting the panels directly (cleanliness of panels, angle relative to the path of the sun, shading, etc.).

At Malone's latitude, there is a fall-off of 761 W/m² from peak (June) to low (December). (Interestingly, the fall-off of solar gain is not uniform.) I repeat, the peak time for solar gain at the 45th parallel is pitifully short (click [here](#)).

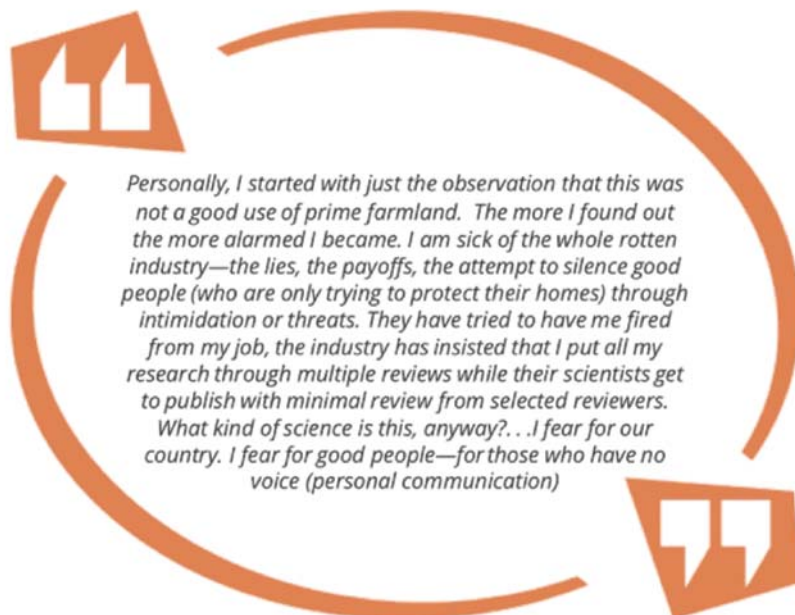
All this by way of saying that Malone NY is a poor choice for an industrial-scale solar plant.

What about your community? By the way, this doesn't deter the solar salesmen, since they're chiefly interesting in harvesting tax subsidies, cash grants, etc. — not electrons.



I close with a statement

from Ron [Dr. Ron Heiniger](#), Professor of Crop & Soil Sciences at North Carolina State University. Prof. Heiniger sent this to me in an email. I quote with his permission. (Yes, he is referring to the solar energy industry.)



If you want to access all 10 reports with a single click . . .

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. . . for a copy of Malone's "solar energy law." (Beware of boiler-plate, "recommended" solar laws provided

[Click here](#)

by your state government. They're basically written by Solar Man.)

Malone's solar law was written by NYS attorney, [Gary Abraham, Esq.](#) Smart man. Former college professor. I recommend contacting him. He has lots of experience with wind and, now, solar projects before the NYS Dept. of Public Service. (All industrial wind and solar projects in NYS must go through a DPS [Article 10](#) certification process.)



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Best wishes,

Calvin Luther Martin, PhD (ret. Rutgers Univ. professor)

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