FINAL REPORT

OF THE

TASK FORCE ON FAIR, NONDISCRIMINATORY, LOCAL TAXATION CONCERNING SOLAR ENERGY SYSTEMS

December 2022
Prepared by:
Senate Research

December 31, 2022

The Honorable Dave Schatz, President Pro Tem of the Senate
State Capitol Building, Room 326
Jefferson City, MO 65101

The Honorable Rob Vescovo, Speaker of the House of Representatives
State Capitol Building, Room 308
Jefferson City, MO 65101

Dear Mr. President and Mr. Speaker:

The Task Force on Fair, Nondiscriminatory, Local Taxation Concerning Solar Energy Systems has met, taken testimony, and discussed various facets of the taxation of solar energy systems. In this final report, we present the information received from various sources along with our observations and formal recommendations. The undersigned members of the Task Force are pleased to submit the attached report.

Sen. Mike Cierpiot, Chair

Rep. Bishop Davidson, Vice Chair

Sen. Cindy O'Laughlin

Sen. Karla May

Rep. Doug Richey

Rep. David Tyson Smith

Bob Boyer

Mark Gardner

Danny Gray

Kevin Gunn

Debbi McGinnis

Donald Nikodim

Garrett Riekhof

Jeffrey Smith

Carol Wuerffel

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I. Charge of the Study Commission

The Task Force on Fair, Nondiscriminatory, Local Taxation Concerning Solar Energy Systems (hereafter referred to as the "Task Force") was formed by HCS/SS#2/SCS/SB 745 in 2022 and is composed of fifteen members representing both the public and private sectors. The Task Force is charged with researching and providing information on the following:

1. The economic benefits and drawbacks of solar energy systems to local communities and the state;
2. The fair, uniform, and standardized assessment and taxation of solar energy systems and their connected equipment owned by a retail or wholesale provider of electricity at the county level in all counties;
3. Compliance with existing federal and state programs and regulations; and
4. Potential legislation that will provide a uniform assessment and taxation methodology for solar energy systems and their connected equipment owned by a retail or wholesale provider or electricity that will be used in every county of Missouri.

In October and November of 2022, the Task Force held public hearings and solicited public testimony. Hearings were held on the following dates:

- October 19, 2022 State Capitol, Jefferson City
- November 3, 2022 State Capitol, Jefferson City
- November 14, 2022 State Capitol, Jefferson City

II. Task Force Activities

A. Summary of the October 19, 2022 meeting

The Task Force elected Sen. Mike Cierpiot as Chairman and Rep. Bishop Davidson as Vice-Chairman.

The Task Force discussed questions that it would like to research, including how many megawatts solar panels can produce per acre, the expected life of solar panels and depreciation schedules, and the cost of solar energy systems compared to wind energy systems.

Members of the Task Force also expressed interest in finding a single methodology to be used by all counties in the state in order to provide certainty to both counties and providers.

Finally, the Task Force discussed potentially looking into the impact of *Johnson v. Springfield Solar*, SC99441 (2022) on the taxation of residential solar systems.

B. Summary of the November 3, 2022 meeting

The Task Force took testimony from industry stakeholders as well as members of the public. The following witnesses provided testimony:

AmerenMO
Joseph LaMacchia, Carol Wuerffel, and Scott Wibbenneyer from AmerenMO presented information on items that are pertinent to the local valuation of solar facilities, including methods to determine the true value in money of solar energy system property. They stated that AmerenMO desires a fair, uniform, and easily understandable valuation method.

Daniel Franks, Missouri State Assessors Association
On behalf of assessors throughout the state, Mr. Franks testified that assessors are seeking a fair, equitable, and easily administered state-wide valuation method to assess solar energy system property. Assessors generally strive to avoid appeals, as appeals are costly to the county, to the property owner, and to the taxpayers generally.

The Task Force discussed the drawbacks and benefits of classifying solar energy system property as real property versus personal property, and whether it should be classified as commercial or agricultural property.

Jeff Danielson, Clean Grid Alliance
Mr. Danielson testified that his organization of private solar energy developers favor a per megawatt nameplate tax because of its simplicity and the certainty it provides to the producers and the taxing jurisdictions as compared to the method currently used to assess wind energy property or a production tax.

Tim Vought
Mr. Vought testified about the multi-year process that it takes to bring a project to completion. He states that certainty about property taxes are important when making investment decisions.

Jay Hahn, Missouri Solar Industry Association Group
Mr. Hahn testified that his organization believes that the original intent of the solar energy system property tax exemption that was struck down in *Johnson v. Springfield Solar*, SC99441 (2022) was to provide the exemption for residential rooftop solar panels, and expressed his organization's desire to have any potential legislation provide protections for producers and purchasers who relied on the exemption.

Jason Zamkus, Association of Missouri Electric Cooperatives
Mr. Zamkus testified that his organization would like to see a recently passed sales tax exemption for purchases of certain solar energy systems to be extended to other types of energy production.

Callaway County Residents
Roger Fischer, Marelyn Snuth, and Charles Greg Crawford of Callaway County testified that they would like the Task Force to consider the impact of solar farms on the reduction of productive farm lands in the state.

C. Summary of the November 14, 2022 meeting

The Task Force met to discuss issues that the Task Force has come to general agreement upon, and to discuss issues that are still outstanding and will need to be addressed in the future.

III. Findings and Recommendations

Upon holding its meetings and taking testimony from industry stakeholders and members of the public, the Task Force has reached the following findings and makes the following recommendations:

1. A single, uniform, and fair method of assessing solar property for the entire state is preferable to a potentially unfair and difficult to understand process of 114 counties using different methodologies.
2. All commercial solar property, whether owned by private industry or by investor owned utilities, should be assessed locally by county assessors and not by the State Tax Commission.
3. The tax revenue generated from the assessment of solar property should be retained in the county in which the property is located, and not distributed as other investor owned utility property taxes are.
4. Any Enhanced Enterprise Zone or other tax abatement program entered into pursuant to state law should be honored for existing projects.
5. The solar industry should pay its fair share of property taxes to counties, school districts, and other taxing jurisdictions.
6. Both local governments and the solar industry are seeking certainty in the methodology used to assess solar property in order to have predictable tax revenue and to make future investment decisions.
7. The Supreme Court's decision in *Johnson v. Springfield Solar*, SC99441 (2022) has created uncertainty for retail residential solar, but this issue is beyond the scope of the Task Force.

During the course of the Task Force's meetings, the following issues were discussed and the Task Force recommends that further study should be done to address them:

1. What method should be used to assess solar property? Options discussed were a flat percentage of the construction cost of the solar property, similar to the current treatment of wind energy generation property, and a nameplate capacity tax.
2. Is it necessary to reclassify solar property to something other than commercial property, such as agricultural property?
3. Should solar property be classified as real property or personal property, or some mix of both?
4. How should the land underneath the solar property be assessed?

Appendix of Information Submitted to the Task Force

Task Force on Fair, Nondiscriminatory Local Taxation Concerning Solar Energy Systems From Ameren Tax Department-Property Tax Group

Date November 3, 2022

Topic Valuation of Solar Generation Facilities for Property Tax Purposes

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BACKGROUND & FACTS

In August 2022, the Missouri Supreme Court ruled that the Missouri Constitution does not grant the legislature the power to exempt "solar energy systems not held for resale" from taxation and section 137.100(10) is unconstitutional. Accordingly, beginning in tax year 2023, a solar generation facility owned by Ameren Missouri or a private developer is no longer property tax exempt. The Task Force on Fair, Nondiscriminatory Local Taxation Concerning Solar Energy Systems has been established to propose a solar valuation method to the next legislative session for use in the enactment of solar property taxation legislation.

CURRENT SOLAR VALUATION

Beginning in tax year 2023, Ameren Missouri-owned solar facilities will be centrally assessed by the Missouri State Tax Commission, and private developer solar facilities will be locally assessed by the county assessor.

For Ameren Missouri, the solar value will be included in the value of all facilities used in the generation, transmission and distribution of electricity throughout the Ameren Missouri System. This distributable value will be apportioned to all counties and taxing districts within the Ameren Missouri System, based on circuit mileage existing within each tax district, then taxed by that tax district. (Exception: All school districts in a county receive property taxes, regardless of whether any circuit mileage actually exists within the school district.)

PROPOSED HOUSE BILLS FOR LOCAL VALUATION OF SOLAR

For reference, HB 1997, introduced by Representative Haden, and HB 1914, introduced by Representative Porter, have been submitted in prior legislative sessions.

ITEMS PERTINENT TO THE LOCAL VALUATION OF SOLAR FACILITIES

l) The determination of the true value in money of all real generation property, excluding land or tangible personal property, associated with a project that uses solar energy to generate electricity should begin the year immediately following the year of construction of the property. This value should be based on the actual and documented original property cost to the taxpayer.
(Note: The centrally assessed value for solar generation property using the "cost approach to value" is based on the original cost of the property. Also, the locally assessed value for wind generation property is based on the original cost of the property.)

2) Any valuation percentage applied to original cost to determine real value should reflect an appropriate reduction to original cost for physical depreciation, functional obsolescence, and economic obsolescence.

3) The locally assessed solar valuation method should be transparent, consistent, and uniformly applied by assessors in all counties. The valuation method should be easily understandable to both the assessor and the taxpayer.

4) Any solar valuation method should result in fair and reasonable property taxes to enable Ameren Missouri to control costs to keep electric rates low, thereby delivering the most value to its customers and the communities it serves.

5) A solar project should not be prohibited from engaging in enhanced enterprise zone agreements under sections 135.950 and 135.973, RSMo. or similar tax abatement agreements with state or local officials or to affect any existing enhanced enterprise zone agreements.

6) Other solar local valuation methods exist in other states. In Illinois, the true value in money is based on a fixed cost per megawatt of nameplate generation capacity. If Missouri would adopt this methodology, there would need to be new statutes written for Missoun.

7) If Missouri adopts the current wind methodology, then a proper valuation percentage would need to be determined.

COMMITTED TO CLEAN

Keeping the grid reliable and resilient on the transformational path to net-zero carbon emissions

Ameren

2022 Integrated Resource Plan Update

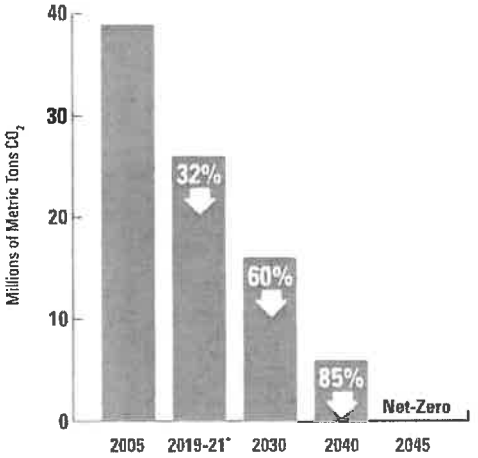
Ameren's updated plan:

- **Safeguards** energy reliability and resiliency for customers while focusing on affordability.
- **Commits** to an accelerated goal of net-zero carbon emissions by 2045.
- **Increases** renewable solar and wind energy generation additions by 2030.
- **Invests** billions of dollars, creating thousands of jobs.

Details include:

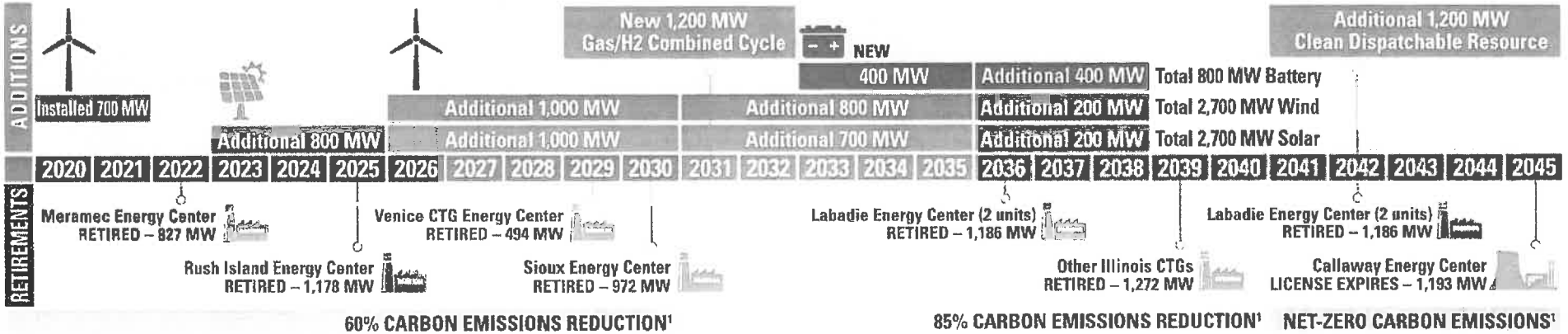
- **Accelerating** Ameren's companywide net-zero carbon emissions goal to 2045 while increasing the 2030 carbon emissions reduction target from 50% to 60% based on 2005 levels. The net-zero goal now encompasses both Scope 1 and 2 emissions including greenhouse gas emissions of methane, nitrous oxide and sulfur hexafluoride.
- **Retiring** more than 3,500 megawatts (MW) of fossil-fired generation by 2030, an increase from the 2020 IRP by more than 1,600 MW. By the end of 2030, three of the four Ameren Missouri coal-fired facilities are scheduled to retire.
- **Adding** 2,800 MW of additional new, clean, renewable generation by 2030 and a total of 4,700 MW by 2040.
- **Building** on an already solid base of Ameren Missouri's clean energy resources including nuclear, hydro, wind and solar.

Targeting Net-Zero Carbon Emissions by 2045[1]



* Three-year average CO_2 emissions for 2019, 2020 and 2021.

Timeline



NOTE: Final timing of Rush Island retirement is dependent on a revised order from the U.S. District Court, including consideration of MISO reliability assessment. The company continues to evaluate the potential for additional energy efficiency and demand response programs. Reductions are presented as of the end of the period indicated and based off 2005 levels. Wind and solar additions, energy center retirements by end of indicated year.

1. Ameren's goals encompass both Scope 1 and 2 emissions including other greenhouse gas emissions of methane, nitrous oxide and sulfur hexafluoride.

Learn more at AmerenMissouri.com/Clean

Illinois Department of Revenue 1
01 Jefferson St.
Springfield, IL 62702

Commercial Solar Energy Systems Valuation

Beginning with assessment year 2018 (taxes paid in 2019), the fair cash value for a commercial solar energy system in Illinois is based on its nameplate capacity per megawatt. (35 Il-CS 200/10720 et seq.)

What is a "commercial solar energy system"?

"Commercial solar energy system" is defined as any device or assembly of devices that is ground installed and uses solar energy from the sun for generating electricity for the primary purpose of wholesale or retail sale and not primarily for consumption on the property on which the device or devices reside.

Are solar energy systems installed for on-site consumption included in this valuation?

No. Solar energy systems that use solar energy for generating electricity that is primarily consumed on the property on which the solar energy system resides (including systems that are connected to the electrical grid and the meter "runs backwards" during peak generating times) are not subject to this valuation method.

In September 2021, a new law was enacted that provided further clarification concerning the assessment of solar energy systems. Solar energy systems subject to power purchase agreements (PPAs) or leases for solar energy between a third-party owner, an operator, or both, and an end user of electricity, where such systems are located on the end user of the electricity's side of the electric meter ("behind the meter") and which are primarily used to offset the electricity load of the end user behind whose electric meter the system connected are not considered to be "commercial solar energy systems." The system is primarily used to offset the electricity load of the end user of electricity if the system is estimated to produce 110% or fewer KWH of electricity than consumed by the end user at that meter in the last 12 full months prior to the system being placed in service.

How is the fair cash value for property taxes determined?

Beginning assessment year 2018, in counties with fewer than 3,000,000 inhabitants, the fair cash value of a commercial solar energy system is $218,000 per megawatt of nameplate capacity. This includes the owner of the commercial solar energy system's interest in the land within the project boundaries and real property improvements. The chief county assessment officer (CCAO) will add an inflationary increase, called a "trending factor," to the 2018 value. The result is called the "trended real property cost basis." An amount for depreciation is then subtracted from the trended real property cost basis to determine the taxable value for the current assessment year.

Formula:

($218,000 X trending factor) - Depreciation

Is personal property included in the $218,000 fair cash value?

No. Illinois does not impose personal property tax; as a result, any value attributable to the portion of the commercial solar energy system that is be considered "personal property" was excluded from the prescribed base fair cash value of $218,000. The fair cash value does include the land on which the commercial solar energy system is located and the portion of the solar

energy system that is considered "real property". Because Illinois assesses real property for tax purposes at one-third of its fair cash value, the non-trended, non-depreciated assessed value for each solar energy system is $72,659 per megawatt ($218,000 x .3333). The breakdown between land and improvement is within the discretion of the assessing officer.

What is the trending factor and how is it determined?

The trending factor is an annual inflationary percentage increase in the fair cash value of the commercial solar energy system. For purposes of valuing these solar energy systems, the trending factor is the annual increase in the consumer price index (U.S. city average for all items), published by the Bureau of Labor Statistics for the December prior to the January 1 assessment date, divided by the consumer price index (U.S. city average for all items), published by the Bureau of Labor Statistics for December 2017. This index is commonly called the "CPI-U". This data is found on the Bureau of Labor Statistics website at this address: http://www.bls.gov/cpi/. The Illinois Department of Revenue annually publishes the CPI-U on its website.

Note: The trending factor for assessment year 2022 is 1.13. The statutory definition of trending factor requires the CPI-U for December of the year immediately before the assessment date be divided by the CPI-U for 2017. The December 2021 CPI-U was 278.802 and the December 2017 CPI-U was 246.524. so, the 2022 trending factor is 278.802 + 246.524 = 1.13.

How is the amount allowed for physical depreciation calculated?

The actual age of the commercial solar energy system is divided by 25 then multiplied by the trended real property cost basis. The amount allowed for physical depreciation cannot reduce the commercial solar energy system to less than 30 percent of the trended real property cost basis.

Are buildings and substations included in the value?

Yes. The valuation procedure is for commercial solar energy systems and the parcels on which they are located. The parcel is the area immediately surrounding the commercial solar energy system over which the owner of the system has exclusive control.

If a project is completed in 2021, is a trending factor applied?

Yes. The $218,000 per-megawatt value is for the 2018 assessment year. For example, for assessment year 2022, the 2018 real property cost basis of $218,000 is multiplied by the trending factor which is the CPI-U published for December 2021 divided by the CPI-U published December 201 7, which equals 1.13. In subsequent years, the trending factor may be different; the trending factors are published annually on the department's website.

Are commercial solar energy systems subject to state or local equalization factors (i.e., "multipliers")? No.

What are the specific platting requirements?

The owner of the commercial solar energy system is required to obtain a metes and bounds survey description of the land upon which the commercial solar energy system is installed, including access routes, over which the commercial solar energy system has exclusive control. (35 ILCS 200/10-740)

The owner of a commercial solar energy system shall, at his or her own expense, use an Illinoisregistered land surveyor to prepare the survey. The owner of the commercial solar

energy system must deliver a copy of the survey to the chief county assessment officer (CCAO) and to the owner of the land upon which the commercial solar energy system is constructed. Upon receiving a copy of the survey and agreed written acknowledgement to a separate parcel identification number by the owner of the land, the CCAO shall issue a separate parcel identification number for the real property improvements, including the land containing the commercial solar energy system, to be used only for the purposes of property assessment for taxation. The property records shall contain the legal description of the commercial solar energy system parcel and describe any leasehold interest or other interest of the owner of the commercial solar energy system in the property. A plat prepared under this Section shall not be construed as a violation of the Plat Act.

The separate parcel number is issued so that the tax bill can be sent to the solar energy system owner when the system is situated on leased ground.

How is farmland valued once the commercial solar energy system is decommissioned? Real property assessed as farmland in accordance with Section 10-110 in the assessment year prior to valuation as a commercial solar energy system shall return to being assessed as farmland in accordance with Section 10-110 in the year following completion of the removal of the commercial solar energy system so long as the property is returned to a farm use defined in Section 1-60 of the Property Tax Code. The tand will not have the two-year primary farm use requirement to be eligible for the farmland assessment.

Is there a breakdown between land value and improvement value?
No. The $218,000 per megawatt hour value includes both the improvements and the land that lies within the solar project's boundaries.

Example 2022 fair cash value:
1 -year old commercial solar energy system
2MW nameplate capacity

2018 real property cost basis:	436,000 ($218,000 per megawatt)
2022 Asmt Yr trending factor:	x 1.13
Trended real property cost basis	$ 492,680
Depreciation allowance:	
Actual age: 1 year/25 =	× .04
Depreciation	19,707
2022 fair cash value (trended reaf property cost basis minus depreciation)	$ 472,973
Assessment level:	x .3333
2022 assessed value	$157,642

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Thursday, November 3, 2022

Task Force on Fair, Nondiscriminatory Local Taxation Concerning Solar Energy Systems

Chairman: Senator Cierpiot
Vice Chair: Representative Bishop

Chairman Cierpoit, Vice Chair Bishop & Members of the Task Force,

Good morning. It is a pleasure to be with you. And thank you for the opportunity to present before the Task Force. My name is Jeff Danielson and I'm the Vice President of Advocacy at Clean Grid Alliance (CGA). CGA is a Midwest-based regional non-profit representing 50+ members, including renewable energy developers, working together with a common interest in facilitating access to clean, affordable and reliable wind, solar and battery storage resources, along with a modern grid. We retain Scott Swain and Jeremy LaFaver to represent CGA, on behalf of our members.

CGA works across the Midwest in nine states, including Missouri, advocating for policies that support good business practices for clean energy and grid modernization. We also participate as a stakeholder with the Mid-Continent Independent System Operator (MISO), providing technical expertise and regulatory advocacy. In addition, we advocate for interregional transmission across the "seams" at both the Southwest Power Pool (SPP) and MISO.

Prior to coming to CGA, I was the Midwest Director of State Affairs at the American Clean Power Association, formerly known as the American Wind Energy Association. And prior to that I served four terms as an Iowa State Senator. As a former lawmaker myself, I want to thank you for your service and thank you for taking up this important issue in a thoughtful, transparent way. This is an important moment in Missouri's clean energy history, with issues like taxation, permitting & grid modernization all shaping Missouri's energy future.

With this background in mind, I would like to focus on two items for the task force:

1. The current clean energy market dynamics, with an emphasis on Missouri specific utility scale solar projects, both completed and under development.
2. CGA's preferred methodology and rate for utility scale solar.

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First, the business case is strong for clean energy in the Midwest and will likely strengthen given the passage of recent, multiple policy and budget bills in Congress and signed by the President. Simply put, the next decade will see the largest investment potential in clean energy in U.S. history. Here closer to home, MISO just authorized this summer the single largest transmission investment in Midwest history. When complete, the 18 line transmission project known as "Tranche 1" of the Long Range Transmission Plan will connect clean energy economies all over the Midwest. Three more "tranches" are already in the planning stages. So the public and nonprofit sectors are implementing policies and investments that will grow the clean energy sector significantly beyond its current book of business.

In the private sector, companies big and small are seeking sustainable business models with a foundation in clean energy. A recently formed trade association called the Clean Energy Buyers Association is helping companies share best practices for buying clean energy. Literally, companies whose names you would recognize, who are not energy companies are thinking and making business decisions about procuring energy as a business input as if they were energy companies. This is pushing private sector demand for clean energy up in every corner of the United States, with the Midwest being no exception. The market and customer demands, not government or government regulation, is the overwhelming driver for the development of renewable energy nationwide. The definition of sustainability is rapidly evolving to mean a near real-time zero carbon footprint, with this goal even extending to B-to-B supply chain partners. The banking and financial communities are paying attention to energy generation of the future and as a business input for non-energy companies, in new and important ways, which is increasing demand for clean energy.

This impact on energy markets and clean energy in particular cannot be overemphasized. If the interstate highways under Eisenhower's leadership fueled the U.S. economy forward after the 1950's by connecting commerce through roads, similarly the electric super highway of the 21 st Century, fueled by zero carbon energy will do the same ... connecting clean energy economies throughout the U.S. and the Midwest in particular as a location of choice for clean energy companies and their business partners. The Midwest is on the cusp of a clean energy boom, where the wind is at our back, our future is bright and our batteries are charged up and ready to go. Utility scale wind, solar and battery storage, coupled with a modern grid, will drive economic growth across the region, as businesses make location decisions based on access to clean, affordable and reliable energy.

Turning to Missouri specifically, and focusing on utility scale solar, the favorable business environment has already attracted investment, ranking 38th in the US for operating utility scale projects, totaling about 90 MW, which is the equivalent of powering about 16,000 homes, creating 3,100 plus jobs and investing nearly $191 million dollars into the overall economy.

Looking to the future, we estimate a nearly threefold increase of utility scale solar already in the pipeline which totals 264 MW's under advanced development. The MISO que gives us another window into Missouri's potential, showing nearly 3,000 MW's of utility scale solar waiting in line to get through the process of connecting to the electricity grid. By any measure, there is increased interest in Missouri from utility scale developers, no and in the future.

So, getting the tax rate right, at this particular moment in time, is important to send a positive signal to clean energy developers that Missouri will remain open for business or potential projects may go to other states.

Turning to the tax discussion at hand, CGA believes that a $1200 per megawatt tax ($1200/MW) on utility scale solar projects is appropriate given current market conditions, and is a better methodology as opposed to a percentage of project costs (like wind) or a production tax based on megawatt hour generation. In addition, a lower "grandfather" rate for all existing exempted projects (with interconnect agreements prior to 1/1/2026) of $100 per megawatt ($100/MW) to satisfy the recent Supreme Court decision and grandfathering all existing county agreements that that currently pay something will be important, as well. Creating a forward looking policy with a single tax rate per MW, along with necessary grandfathering provisions, strikes the right balance. It's conservative, certain & simply calibrated.

A conservative approach at the beginning of Missouri's potential growth in utility scale solar will encourage the new market to develop. It will ensure Missouri can compete with surrounding states for potential projects. A high rate will cripple this initial growth and place Missouri at a competitive disadvantage, pushing projects to other places in the Midwest. In the end, whatever the rate is, it will be passed onto electricity customers, potentially driving up costs unnecessarily.

For perspective, the tax revenue over the life of a typical project with a $1200/MW rate at 150 MVV total project size (about the average size of future Missouri projects) over a 30 year life is $5,400,000 total taxes or $180,000 per year (150(1200)30 = $5,400,000 or $180K per year).

This conservative flat tax would ensure Missouri compares favorably to other states and attract new business. In contrast, other taxing methodologies would unduly burden new utility scale solar businesses with high taxes. If Missouri adopted a tax rate percentage of project costs (like wind), taxes would be so high developers would seek better business environments in other states.

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For example, the tax revenue over the life of a typical project under the wind assessment methodology (37.5%) at 150 MW (about the average size of current prospective Missouri solar projects) with a total project cost of $175,000,000 and applying an illustrative business real property local tax rate of 2.08%, the payment over a 30 year life span is $40,950,000 total taxes or $1.37 million per year $\$175{,}000{,}000(0.375)(0.0208)30 = 50{,}000$ or approx. $1.37 million per year). This equates to a nearly 7-and-a-half-fold difference in tax burden compared to the proposed flat tax rate methodology.

Similarly, a production tax based on megawatt hour generation can result in high and unnecessary taxes at times, but also could result in low to no payments based on a projects inability to inject electricity onto the grid, through no fault of their own, under a policy called curtailment. This see-sawing of potential revenue can result in unnecessary uncertainty and is not easily calibrated by project owners and local governments. This policy is the least optimal choice if viewed from a conservative, certain and simply calibrated perspective.

Beyond the rate itself, other tax methodologies still present uncertainties around factors such as depreciation schedules, levy rates, assessment values and other discretionary and dynamic factors under the control of the assessors and local taxing authorities.

Grandfathering is important in two ways. For those who have existing agreements with abatements already, the nominal increase to $100/MW will satisfy the Supreme Court guidance, but make it easier for companies to comply who have existing financial obligations and constraints tied to those agreements. Also, some counties have existing agreements that do raise revenue and should continue based on the negotiations when the projects were being discussed.

In short, any new proposal should be a go forward policy, but allow grandfathering to account for present situations with the least amount of disruption to those existing agreements that that case law will allow.

Further, separate from rates, methodology decisions or grandfathering, lawmakers should consider past practice and other economic considerations.

It is presently common practice and an unwritten industry standard to negotiate contribution agreements with counties based on a per megawatt basis and it's what companies and counties are familiar with. The ease of implementing this as a new framework for utility scale solar could help acceptance and follow on agreements.

The ability to sell power into the market is an important consideration and price matters greatly. Oftentimes, when companies are looking to sell the power from projects, they are competing regionally or nationally with projects in other states. A Missouri based facility

does not exist in a vacuum, it must compete in the larger market and be competitive. Tax rates are important in this regard for energy generators of all types, including clean energy.

With a higher general tax rate, fewer of these projects would reach construction and that would mean less money coming into local communities. It could also create an advantage for communities that have separate incentives to mitigate these increases (i.e. Enhanced Enterprise Zones) making if unfair to those who don't within Missouri. Lastly, and arguably most importantly, a conservative flat dollar per megawatt tax rate for utility scale solar helps keep high utility bills in check, since many of the solar projects that are developed in Missouri are sold to utilities or electric co-ops for ownership and operation.

A discussion about the tax rate should not be done in isolation. Overall, our companies want flexibility in providing the highest benefit to the counties. Projects do have other, perhaps more important revenue sources and benefits that would be impacted by increased taxes. One example, is additional funds to a county as a development agreement. A conservative tax rate of $1200/MW gives companies and local decision-makers room to still consider entering development agreements to allocate additional money where the County needs it most, whether that be the School District, First responders, General Fund, etc. A high tax rate crowds out this potential opportunity. Another consideration is the farmers and landowners ability to receive land lease payments. This is an important value-added opportunity for farmers/landowners unique to clean energy companies. It will be considered in the overall project costs by companies. If government demands a higher tax rate, it means less for private land lease payments to farmers.

Policy makers also need to consider how a high tax rate on a specific industry will impact the overall economy if projects go elsewhere as a result. These projects create short and long term jobs regionally, along with purchases outside of the energy supply chain, like hotel rooms, restaurants and like as the construction of the projects take place. Without doing an economic impact analysis, the multiplier effects of clean energy projects could be significant and the loss of these opportunities, in particular in rural communities, is meaningful.

Chairman Cierpoit, Vice Chair Bishop & Members of the Task Force, thank you for your time and consideration. We welcome any questions you might have.

Respectfully submitted,
Jeff Danielson
VP, Advocacy
Clean Grid Alliance

CLEAN GRID

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FACT SHEET

Solar Power in Missouri

Solar power has become a low-cost source of electricity generation in Missouri, providing new jobs, new businesses, and new economic development in the state. Missourians benefit from powering our economy with solar energy.

53%
Decrease in the cost of solar years [1]

38th
In the nation for operating over the last 10 utility-scale solar [2]

89.4 MW
Utility-scale solar

264 MW
Utility-scale solar in 2 online2

Advanced Development

More and more utilities, corporations and the general public want electricity produced from clean, renewable energy, including solar. Some large companies have invested in solar in Missouri, such as Ikea. [1]

113
Solar companies [1]

3,153
Solar jobs* [3]

15,875
Homes that can be powered by currently installed utility- scale solar resources [4]

$191 M
Capital invested in utility-scale solar [4]

Solar is a new cash crop for farmers. Solar power only takes up a small amount of land and provides a new source of income for landowners and rural communities.

1 Solar Energy Industry Association, Missouri Spotlight 02 2022 *Includes jobs in the following sectors of the solar industry: operations & maintenance, construction, manufacturing of parts, wholesale trading, professional 2 American Clean Power Association, Data Search, services, and other related services. Clean Power IQ

3 U.S. Department of Energy, United States Energy & Employment Report 2022 Updated

4 American Clean Power Association 11/2022

ADDRESS	OFFICE	WEB
507 Asbury Street. Suite 201, St. Paul. MN 55104	651.644.3400	CleanCridAlliance.org

MOSEIA
Missouri Solar Energy Industries Association

MEMORANDUM

For: Chair, Vice Chair & Members
Task Force on Fair, Nondiscriminatory Local Taxation Conceming Solar Energy Systems

From: Jonathan Dolan, Executive Director, MOSEIA

Date: November 3, 2022

Subject: Answers to Questions & Solar 101 Info

Thank you Chair Cierpoit and members of the Task Force for your service, insightful questions and discussion at the first meeting. As we all look forward to the testimony, listening, and learning that will come through the hearing process and the vital work of the task force, I wanted to share answers to the questions I received or obtained that were posed at the first meeting and some additional information on Solar Energy.

I have attached a packet of information that hopefully provides a Solar 101 Introduction and even deeper Info
Briefs and Fact Sheets of relevant infonnation from my national association the Solar Energy •Industries Association (SEIA). With many state affiliates and varied solar regulations and approaches to fair taxation, I called on them for background information you may find informative and useful.

Other organizations are planning to provide further information and they assisted me and members of the task force in obtaining these answers:

Q#1: How many acres does it take to produce how much solar energy?

A#l : A conservative estimate for the footprint of solar development is that it takes 6-10 acres to produce one megawatt (MW) of electricity. This estimate also accounts for site development, maintenance and site access.

Q#2: How much agricultural land is or would be taken up by solar in Missouri?

A#l: Estimates put Missouri farmland totals at 27.8m acres. MISO (Midcontinent Independent System Operator) estimates have Missouri at 3K MW of Solar on 25K acres of farmland (.2%). Even if estimates for doubling that number in a decade of aggressive solar growth in Missouri would occur, it would still be under (.5%).

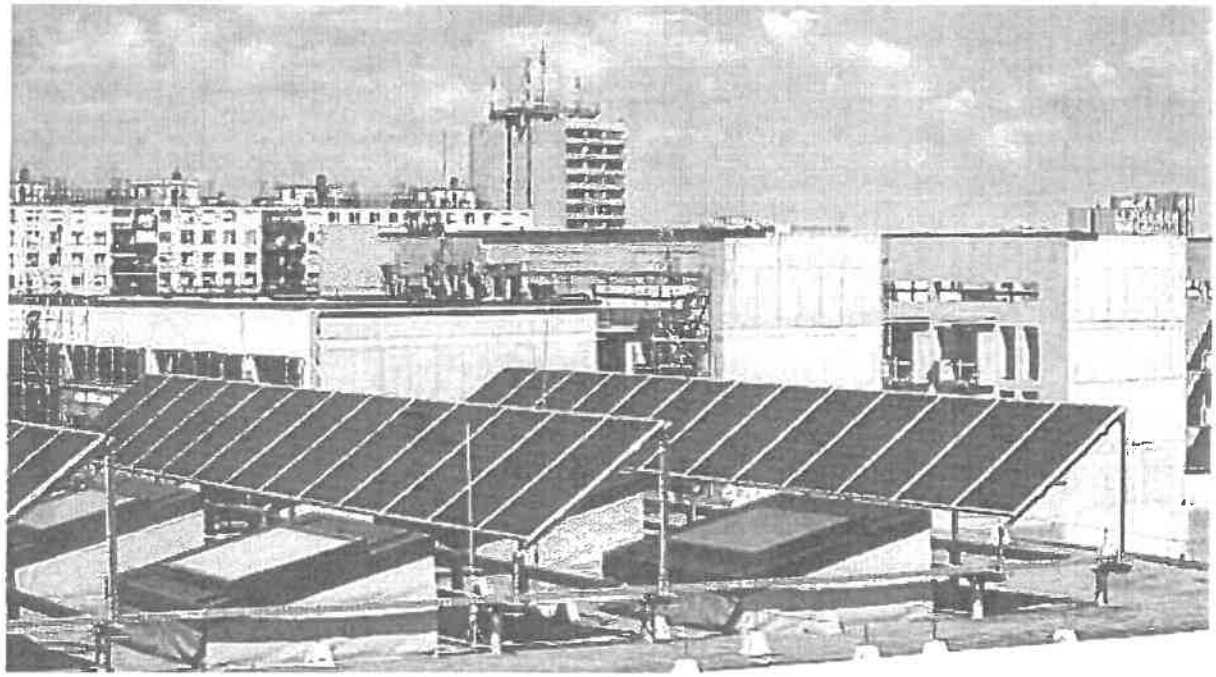
Q#3: Can Solar be place on Grassland Conservation Reserve Program (CRP) land?
A#3: Yes.

Q#4: Are there lifespans for a project and how is depreciation calculated?
A#4: A switch in members of the Task Force is being/has been made and Mark Gardner, an attorney, investor, develop of Solar projects may/will join the task force. He has extensive knowledge in this area and will speak to such matters as needed.

258 Madelines Park Circle, Jefferson City, Missouri 65109
Phone: (314) 5404400 dolan@moseia.com www.mosei•a.com

Solar Energy - Introduction

Solar energy is the energy obtained by capturing heat and light from the Sun. Energy from the Sun is referred to as solar energy. Technology has provided a number of ways to utilize this abundant resource. It is considered a green technology because it does not emit greenhouse gases. Solar energy is abundantly available and has been utilized since long both as electricity and as a source of heat.



Solar technology can be broadly classified as -

- Active Solar - Active solar techniques include the use of photovoltaic systems, concentrated solar power and solar water heating to harness the energy. Active solar is directly consumed in activities such as drying clothes and warming of air.
- Passive Solar - Passive solar techniques include orienting a building to the Sun, selecting materials with favorable thermal mass or light-dispersing properties, and designing spaces that naturally circulate air.

Conversion of Solar Energy

The solar energy is the energy obtained by capturing heat and light from the Sun. The method of obtaining electricity from sunlight is referred to as the Photovoltaic method. This is achieved usin

https://www.tutorialspoint.com/renewable energy/solar_energy_introduction.htm 1/2

11/2/22, 9:37 AM Solar Energy - Introduction semiconductor material.

The other form of obtaining solar energy is through thermal technologies, which give two forms of energy tapping methods.

- The first is solar concentration, which focuses solar energy to drive thermal turbines.
- The second method is heating and cooling systems used in solar water heating and air conditioning respectively.

The process of converting solar energy into electricity so as to utilize its energy in day-to-day activities is given below —

- Absorption of energy carrying particles in Sun's rays called photons.
- Photovoltaic conversion, inside the solar cells.
- Combination of current from several cells. This step is necessary since a single cell has a voltage of less than 0.5 V.
- Conversion of the resultant DC to AC.

In the next chapter, we will learn the Photovoltaic method of converting solar energy into electricity.

Solar Energy Technologies

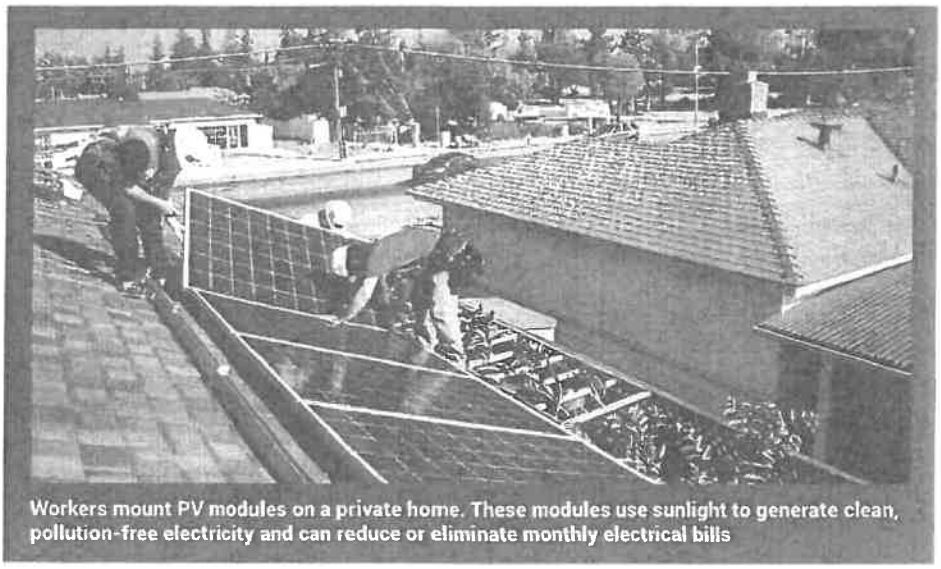
Solutions for Today's Energy Needs

Overview

Solar energy is the cleanest, most abundant renewable energy source available. The U.S. has some of the world's richest solar resources. Today's technology allows us to harness this resource in several ways, giving the public and commercial entities flexible ways to employ both the light and heat of the sun.

There are three primary technologies by which solar energy is commonly harnessed: photovoltaics (PV), which directly convert light to electricity; concentrating solar power (CSP), which uses heat from the sun (thermal energy) to drive utility-scale, electric turbines; and heating and cooling systems, which collect thermal energy to provide hot water and air conditioning.

Solar energy can be deployed through distributed generation, whereby the equipment is located on rooftops or ground-mounted arrays close to where the energy is used. Some technologies can be further expanded into utility-scale applications to produce energy as a central power plant.



Workers mount PV modules on a private home. These modules use sunlight to generate clean, pollution-free electricity and can reduce or eliminate monthly electrical bills

Photovoltaics

Photovoltaic (PV) technologies directly convert energy from sunlight into electricity. When sunlight strikes the PV module, made of a semiconductor material, electrons are stripped from their atomic bonds. This flow of electrons produces an electric current. PV modules contain no moving parts and generally last thirty years or more with minimal maintenance.

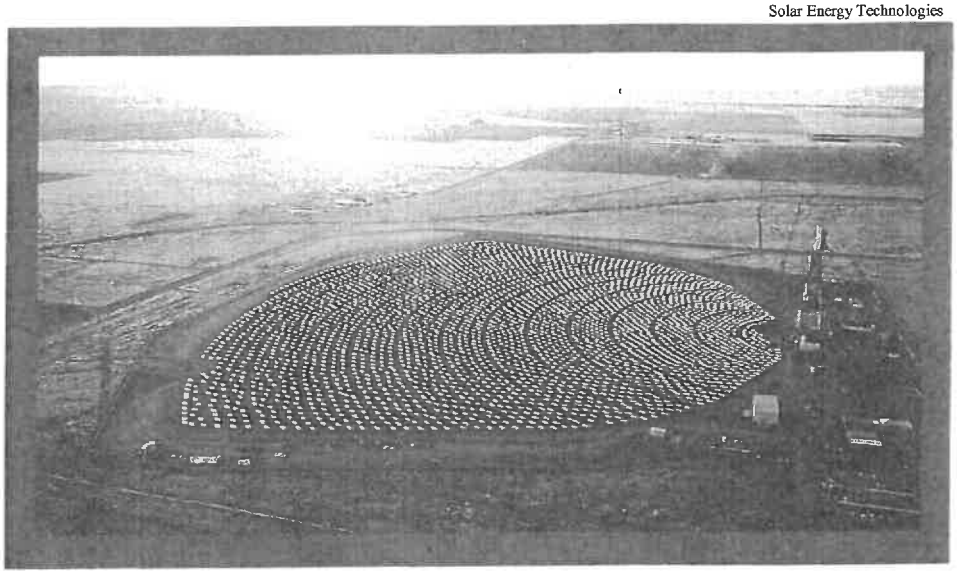
PV electricity output peaks mid-day when the sun is at its highest point in the sky, and can offset the most expensive electricity when daily demand is greatest. Homeowners can install a few dozen PV panels to reduce or eliminate their monthly electricity bills, and utilities can build large "farms" of PV panels to provide pollution-free electricity to their customers.

Semiconductors are used in most electronic products, including computer chips, audio amplifiers, temperature sensors and solar cells. Traditionally, PV modules are made using various forms of silicon, but many companies are also manufacturing modules that employ other semiconductor materials often referred to as thin-film PV. Each of the various PV technologies have unique cost and performance characteristics

that drive competition within the industry. Cost and performance can be further affected by the PV application and specific configuration of a PV system.

Concentrating Solar Power

Concentrating solar power (CSP) plants use mirrors to concentrate the sun's thermal energy to drive a conventional steam turbine to make electricity. The thermal energy concentrated in a CSP plant can be stored and used to produce electricity when it is needed, day or night. Today, over 1,400 MW of CSP plants operate in the U.S., and another 340 MW of CSP projects will be placed in service within the next year.

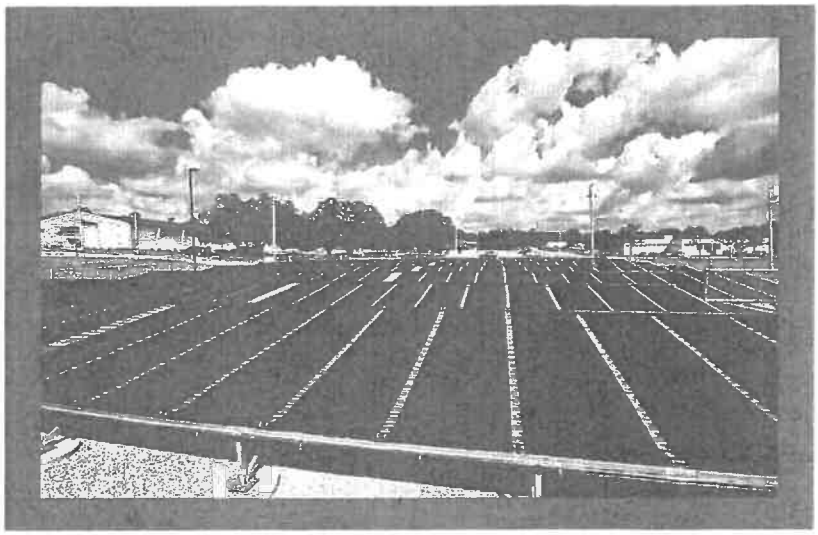


The two commercialized CSP technologies are Power Towers and Parabolic.Troughs. Other CSP technologies include Compact Linear Fresnel Reflector (CLFR) and Dish Engine. CSP specific conditions to produce power, such as areas where direct sunlight is most intense (e.g., the U.S. Southwest) and contiguous parcels of dry, flat land.

Solar Heating and Cooling

Solar heating and cooling technologies collect thermal energy from the sun and use this heat to provide hot water and space heating and cooling for residential, commercial and industrial applications. There are several types of collectors: flat plate, evacuated tube, Integral Collector Storage (ICS), thermosiphon and concentrating. These technologies provide a return on investment in 3-6 years.

Water heating, space heating and space cooling accounted for 69 percent of the energy used in an average U.S. household in 2005 – representing significant market potential for solar heating and cooling technologies. For example, solar water heating systems can be installed on every home in the U.S., and a properly designed and installed system can provide 40 to 80 percent of a building's hot water needs. Similarly, solar space heating and cooling systems circulate conditioned air or liquid throughout a building using existing HVAC systems, without using electricity.



For more information about SEIA and solar technology, visit us online at www.seia.org

Solar + Storage

SEIA Solar Energy Industries Association®

Why Energy Storage?

Energy storage systems are critical to building a resilient, reliable and sustainable electrical grid. Encompassing a multitude of technologies, including chemical batteries, thermal, and pumped hydro, energy storage stores excess energy and converts it back to electricity when most needed. SEIA supports legislation to grant full investment tax credit (ITC) eligibility for energy storage, with the same rampdown assigned to the ITC for solar technology through 2021.

Quick Facts

- Energy storage can help integrate ITC-eligible renewables systems with the larger utility network.
- Solar plus storage offers incredible promise for supporting solar energy growth which means cleaner electricity generation.
- Legislation is needed to grant full investment tax credit (ITC) eligibility for energy storage.

The Energy Storage Tax Incentive and Deployment Act

Without clear statutory guidance and market certainty, businesses and investors will continue to face hurdles to expand and innovate. The U.S. tax code should grant full ITC eligibility for investment in the business and home use of energy storage, with the same ramp-down assigned to the ITC for solar technology through 2021. Under that extension enacted in 2015, the ITC is at a rate of 30% for 2017-2019, 26 %/0 %/0 in 2020, 22% in 2021 and 10% thereafter for commercial and utility-scale projects. The Energy Storage Tax Incentive and Deployment Act would result in the acceleration of the energy storage deployment and would encourage continued innovation and reconfiguration of existing storage technologies to realize other benefits.

Under this bill, all energy storage technologies would qualify for the ITC regardless of energy source. The congressional Joint Committee on Taxation (JCT) estimates this legislation would only cost an estimated $300' million over 10 years.

Home energy storage systems help support a resilient, reliable and sustainable electric grid.

Photo courtesy of Sunrun, Inc.

Investment Tax Credit for Energy Storage

The Current State of Energy Storage and the ITC

Currently, storage systems integrated with solar have proven to be a viable alternative in markets where conventional energy sources dominate the grid. Despite the benefits, renewable energy plus storage projects face numerous regulatory and financing challenges.

Current IRS guidance regarding eligibility of storage to receive the federal solar ITC is unclear. The IRS has concluded that storage systems owned by homeowners must derive 100% of their power from an onsite solar array to qualify for the ITC. The IRS previously said storage systems owned by businesses apply a different rule, as those systems would be eligible for the ITC only if at least 75% of the charging of the storage unit is provided through solar generation.

Both of these rules are inconsistent with the findings of a 1978 report on solar integration by the Congressional Office of Technology Energy storage Assessment. That report said storage equipment was required to systems provideensure grid reliability if solar deployment reached any significant level of adoption. This is consistent with tax regulations from 1964 the same benefits that permitted storage equipment to be ITC eligible if it were loosely used with the underlying project. The 1964 tax regulations were not as ITC-eligible repealed in 1993 when the IRS removed outdated regulations.

systems, and can Requiring the owner of storage technologies to account for the source help integrate of their energy imposes an unreasonable burden and undermines certainty. It also expressly prohibits most of the grid services a them with the solar plus storage system can provide to grid operators to help with resiliency. larger utility

This approach also sacrifices the potential economic gains of energy network storage and the increased rate of returns that would otherwise be achieved if the tax credit is fixed at the outset.

About SEIA

The Solar Energy Industries Association (SEIA@) is the driving force behind solar energy and is building a strong solar industry to power America through advocacy and education. As the national trade association of the U.S. solar energy industry, which now employs more than 250,000 Americans, we represent all organizations that promote, manufacture, install and support the development of solar energy. SEIA works with its 1,000 member companies to build jobs and diversity, champion the use of cost-competitive solar in America, remove market barriers and educate the public on the benefits of solar energy.

Solar Energy Data & Facts

Top 10 Solar States

State ranking based on the cumulative amount of solar electric capacity installed through Q2 2022

1 California

37,086 MW

10,133,299

6 Nevada

5,003 MW

857,303

2 Texas

15,079 MW

1,753,863

7 Georgia

4,566 MW

527,774

3 Florida

9,539 MW

1,144,171

8 New Jersey

4,097 MW

662,947

4 North Carolina

8,018 MW

941,999

9 Massachusetts

3,987 MW

672,249

5 Arizona

5,984 MW

945,767

10 Virginia

3,845 MW

429,217

Equivalent of the number of homes supplied by solar energy.

All data is sourced from SEIA/Wood Mackenzie Power & Renewables Solar Market Insight@ 2022 Q3 Report.
For more information, contact -

Solar Energy Association@ research@seia.org www.seia.or smi

SOLAR DATA

People are currently employed by the solar industry[l] 255,037

Value of the U.S. solar Amount instaled of solar in the currentlyU.S.

130.9 GW market in 2021

$33.0 billion

Today, over 4% of U.S. solar electricity comes from solar industry to help address climate change, the solar energy, more than 80 times its share a decade ago 300/0 electricity 2030 generation by

Number of solar businesses in the U.S. [a]

10,000+

Top corporate solar users through 2019

1 . Apple - 398.3
Amazon - 369.0
Watmart - 331.0
Target - 264.8
Google 6. Kaiser Permanente -
7. Switch -
8. Prologis -
9. Facebook - 3 19.5 ML'
10. Solvay - ffi.4

33%

average annual growth of the solar market over the past 10 years

480 GW

of new solar capacity will be installed over the next 10 years...

4 times greater

than the amount installed through 2021

Number of solar energy systems installed in the U.S.

Carbon emissions reduced:

146 million

metric tons annually, equivalent to: 32 million vehicles off the road 17 billion gallons of gas not used

2 billion trees planted

Shuttering 39 coal-fired plants

In Q2 2022, solar accounted for

390/0

of all new generating capacity

There is enough solar energy installed in the U.S. to power million households4

Solar PV price decline over the past 10 years

530/0

State ranking by cumulative solar capacity

1 . California - 37,036
. Texas - 15.079
. Florida -
. North Carolina - 8,018
. Arizona - 5,984
. Nevada - 5.003 MW
7. Georgia - 4,566
8. New Jersey-
9. Massachusetts - 3,996 10 Virginia - 3,845

13 0

/0

of U.S. homes will have a solar PV system by 2030

In 2021, a new solar project was installed every 60 seconds

Sofc,' '.nèuskr:esEre•gy 02022 Solar Energy Industries Association. Cheat Sheet Updated 09/08/22 from Q3 2022 data. Alf data from SEIA/Waod Mackenzie Power & Renewables U.S. Solar Market Insight repon except as otherwise noted - SEIA.org/smi 1. solarjobscensus.org 2. SEIA.org/solarmeansbiz 3. SEIA.org/nsd 4. SEIAorg/whats-megawatt

Solar Energy State Tax Policy

dolan@moseia.com

From:	Rick Umoff <RUmoff@seia.org>
Sent:	Wednesday, November 2, 2022 12:05 PM
To:	dotan@moseia.com
Cc:	Sean Gallagher; Colin Silver; Markus Pitchford
Subject:	RE: Greetings & Thanks from Missouri - MOSEIA
Attachments:	ECONW_Kern Co Solar_March 2021 (l).pdf

Hi Jonathan,

ft was nice connecting this morning. We're excited to work with you in your new capacity as ED of MOSEIA. f am including some information below related to property tax exclusions and SEIA affiliates. Throughout the country, we see property tax exemptions and exclusions at varying levels. On the distributed solar side, the policy rationale tends to be that individuals and businesses shouldn't be taxed for making an investment in clean energy. On the utility scale side, the argument is that while utility scale solar projects have a large footprint, they don't typically require a level of local services that is commensurate with their footprint (i.e. once you build a utility scale solar plant it mostly just sits there and produces energy. It doesn't need a lot of local services to support it). A couple more arguments we've made successfully are around economic competitiveness and ratepayer impacts. Wrt competitiveness, the solar industry is a 50 state industry at this point and to the extent that solar companies can build projects in states with more favorable tax regimes, they will do so (and the jobs and investment will go to those states). Wrt ratepayer impact, higher taxes on solar projects will typically be passed through to ratepayers, which will only serve to increase rates. Bottom line, many states have some form of exclusion or exemption b/c it has been shown to be an effective way to incentivize in state deployment of solar energy to capture the various economic, jobs, environmental, and reliability benefits of solar.

A few state exclusion examples:

California	Nevada	Arizona	Texas
100% exclusion	55% abatement	80% exclusion	10 year exclusion

Property Tax Info: htt s: www.seia.or initiatives solar-tax-exem tions• Also see attached report showing economic benefits to Kern County (not directly relevant to your state but gives you a sense of other benefits provided by the industry in a county with a property tax exclusion.) Note that Kern County is one of the largest solar development areas in the country.

We are also working with our affiliates on implementation of the Inflation Reduction Act (IRA). I am cc'ing my colleague Colin Silver to help you plug into that work. And here is a link re: affiliate information: https:/ www.seia.org officialstate-affiliates

Finally, I am cc'ing our Central Regional Manager Markus Pitchford who is based in Illinois and is a good contact for you in the region.

Hope this helps and please feel free to reach out if you have any questions.

Regards,

Rick

1

Solar Tax Exemptions

Share

Solar tax exemptions include both property and sales tax exemptions provided by state and local governments to individuals and companies that install solar energy property.

Property Tax Exemptions

Property tax exemptions allow businesses and homeowners to exclude the added value of a solar system from the valuation of their property for taxation purposes. An exemption makes it more economically feasible for a taxpayer to install a solar system on a residential or commercial property. Because property taxes are collected locally, some states have granted local taxing authorities the option of allowing a property tax incentive for solar. There are 36 states that offer property tax exemptions for solar energy. For example, New Jersey enacted legislation exempting solar systems from locat property taxes if the system is used to meet on-site electricity, . heating, cooling, or general energy needs. In Nevada, one of their renewable energy property tax exemptions allows businesses to apply for a property tax abatement of up to 55 percent for up to 20 years for real and personal property used to generate solar. Generation facilities must have a capacity of at least 10 megawatts.

Sales Tax Exemptions

Sales tax incentives typically provide an exemption from the state sales tax (or sales and use tax) for the purchase of a solar energy system. This type of exemption helps to reduce the upfront costs of a solar:installation. There are 25 states that offer sales tax exemptions for solar energy. Arizona, for example, provides a sales tax exemption for the retail sale of solar energy devices and for the installation of solar energy devices by contractors. Colorado exempts from the state's sales and use tax alf sates, storage, and use of components used in the production of alternating current electricity from a renewable energy source. The exemption also includes all sales, storage, and use of components used in solar thermal systems.

Other Solar Tax Exemption Links

- Solar Polic Guide Database of State Incentives for Renewables and Efficiency (DSIRE) - this guide describes provides a list and descriptions of solar tax exemptions across the United States.

Topics
Tax Polic
Finance & Tax

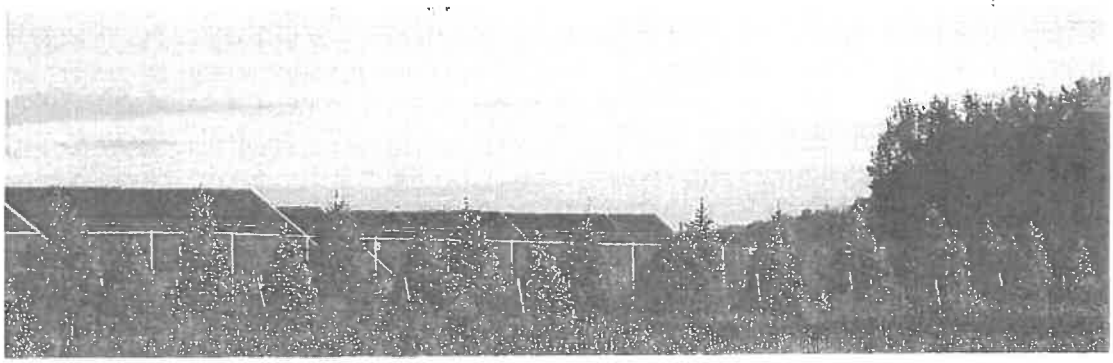
Solar Energy & Property Value

Solar and Property Value

Correcting the Myth that Solar Harms Property Value

It is a common misconception that ground mounted solar farms decrease nearby property values.

- Examining property value in states across the United States demonstrates that large-scale solar arrays often have no measurable impact on the value of adjacent properties, and in some cases may even have positive effects.
- Proximity to solar farms does not deter the sales of agricultural or residential land.
- Large solar projects have similar characteristics to a greenhouse or single-story residence. Usually no more than 10 feet high, solar farms are often enclosed by fencing and/or landscaping to minimize visual impacts.



Vegetative screening will grow to obscure panels from the road and nearby homes, when desired.
Photo Credit: Borrego Solar

The Numbers

- A study conducted across Illinois determined that the value of properties within one mile increased by an average of 2 percent after the installation of a solar farm. [1]
- An examination of 5 counties in Indiana indicated that upon completion of a solar farm, properties within 2 miles were an average of 2 percent more valuable compared to their value prior to installation?
- An appraisal study spanning from North Carolina to Tennessee shows that properties adjoining solar farms match the value of similar properties that do not adjoin solar farms within 1 percent.3

Paired Sale Analysis: Solar and Adjoining Land	Farms	
	Potentially Irrvæted by Solar Farm	Adjusted Median Price Per SF
Control Area Sales (5)	No: Not adjoining solar farm	$79.95
Adjoining Property 10 (Test Area)	Yes: Solar Farm was completéd by the sale date	$82.42
Difference		3.09%

Various studies have shown that solar can potentially have a positive impact on adjoining property value. The

above table references one of many in a report written by
CohnReznick.4

Kirkland, Richard C. Grandy Solar Impact Study. Kirkland Appraisals, 25 Feb. 2016, kirdlandapprasials.com.
Lines, Andrew. "Property Impact Study: Solar Farms in Illinois." Mcleancounty.gov, Nexia International, 7 Aug. 2018. [3]
McGarr, Patricia. Property Value Impact Study. Cohn Reznick LLP Valuation Advisory Services, 2 May 2018.

Solar and Property Value

lue SEIA

Harmony with Nearby Residential and Agricultural Property

1. Appearance: Large solar projects have similar characteristics to a greenhouse or single-story residence. Usually no more than 10 feet high, solar farms are often enclosed by fencing and/or landscaping to minimize visual impacts.

2. Noise: Solar projects are effectively silent. Tracking motors and inverters may produce an ambient hum that is not typically audible from outside the enclosure.

3. Odor: Solar projects do not produce any byproduct or odor.

A ground-mounted solar system sited in a rural area.

Credit: Blattner

4. Traffic: Solar projects do not attract high volumes of additional traffic as they do not require frequent maintenance after installation.

5. Hazardous Material: PV modules are constructed with the solar cells laminated into polymers and the minute amounts of heavy metals used in some panels cannot mix with water or vaporize into the air,

Even in the case of module breakage, there is little to no risk of chemicals releasing into the environment.[1]

Solar Energy & Agricultural Land Use

[1] "Clean Energy Results, Questions and Answers, Ground Mounted Solar Photovoltaic Systems." Energy Center, June 2015. htt ://www.mass.gov/eea/@ocs/@oer/renewables/solar/sp]ar-pv-guide.pdf

Solar & Agricultural Land Use

Solar and Agricultural Land Use Can Occur Harmoniously

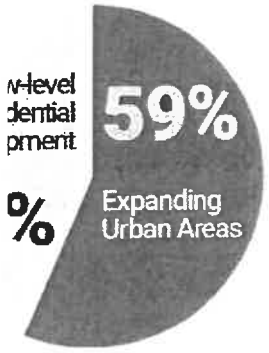
As solar continues to expand into new markets, both rural and urban, land use discussions are likely to occur. In these discussions, it's important for participants to understand that solar in not a threat to agricultural activity, but rather a harmonious development that can assist the farming community.

- Solar can provide land with an opportunity to recover, when paired with the planting of native grasses and pollinators and be used for agricultural purposes in the future.
- Farmers can utilize solar as a steady revenue stream to help smooth out the impact of grain and produce market volatility.
- Installations of utility-scale solar continue to expand; however, they are still not a significant cause of the loss of agricultural land. .

Solar Land Needs in the U.S.

As ground-mounted solar is expanding into more states, developers and farmers are looking to agricultural land for installations. Though renewable energy critics have claimed t] ground-mounted solar farms are taking up large swaths of Løw4e,gel viable agricultural land, expanding urban areas and residenti Residential development accounted for nearly all lost farmland. [1] In the la: Development decade, while North Carolina rose to become the #2 state in th U.S. in solar installations, the state lost one million acres of 41% cropland to development and housing, yet only 1% of that tota was due to solar development? Moreover, many solar developments strengthen agricultural communities and augment local agricultural production.

Agricultural Land Loss



expand, they still do not pose a significant risk to the loss of agricultural land. To generate enough electricig to power the entire country, solar facilities would need to occupy roughly the same area devoted to surface coal mining,[3] with a much cleaner outcome.

Total U.S. Land Area

In Pennsylvania, the Department of Environmental Protection found that only 124 square miles (79,200 acres) of land will be needed to increase grid solar sufficiently to generate 10 percent of electricity.[4] This i less than three-tenths of 1 percent of Pennsylvania's total land area of 46,055 square

miles. In addition, land that is already in use, such as landfills and abandoned mine land, could also host grid-scale solar installations

Land Area Needed to Power the U.S. with Solar PV

.a eek.com business i l ure 4443480-31-million-acr t-develo menl-cui.s-u.s-f rml nd

[2] North Carolina Sustainable Energy Assn, "North Carolina Solar & Agriculture" (April 2017). https://energync.org/wpcontent u loads 2017 04 C EA NC Solar and A ric.ulture 4 19. clf.

[3] htt p s: // solar. u.ed ultiow-much-land-wou]d-it-take- ower-us-solar

[4] *htt s: www-de . a- ov Business Ener OfficeofPollutionPrevention SolarFuturefPa espenns Ivania's-Solar-Future-Plan-as*

Solar & Agricultural Land Use ('IA Industrie

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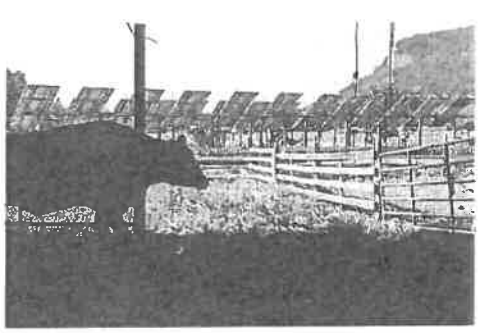
Solar Allows Land to Recover

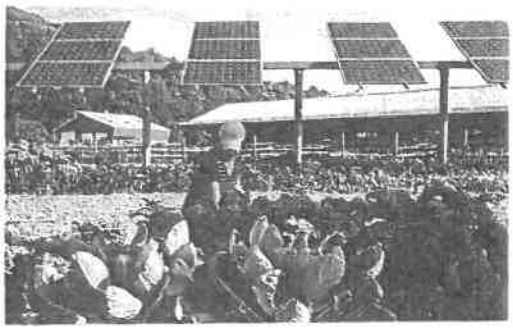
Soil can be improved by planting native grasses/pollinators and effectively letting the soil rest. In the. future, when a solar project is decommissioned, farming can once again resume on that land. This is a stark contrast to other development, which often leaves land unusable for agriculture After the panels are installed, native vegetation— often friendly to bees and other pollinators—is planted. The deep roots of the planted native vegetation retain more water than turf grass and gravel during heavy storms and periods of drought. They also help retain topsoil and improve soil health over time, even in "brownfield" areas with polluted soils. [7]

Solar Projects Provide Economic Benefits to the Farming Community

Solar paired with native grasses and pollinators can provide overused soil an opportunity to recover and a healthy revenue stream to farmers.

- Keeps farmers on their land o Solar lease payments tend to be higher than leasing for traditional agriculture operations.
- Farming is an extremely low-margin, competitive industry. If a farmer can add solar to a portion of the property and get a long-term steady income, it can help them to keep their farm.
- Steady income from solar projects means that farmers are less vùerable to fluctuations in market prices or crop yields.
- Downstream benefits from O&M and tax revenue have lasting positive community impact
- Solar can offset power required for pumping and provide electricity to remote irrigation systems • Provides substantial tax revenue to local communities.[8] Detailed data collection in NC shows local tax revenueup 2000% after the state's big solar build up through 2017.[9] • Provides local construction jobs





NREL, Photos by Dennis Schroeder

Co-location of Agricultural Activities and Solar

Solar and agriculture are not mutually exclusive. In fact, the U.S. Government incentivizes co-locating solar with agricultural production. USDA's REAP program provides grants to those interested in investing in solar energy. However, to qualify, applicants must receive at least 50% of their income from agricultural operations [10] Additionall' pollinators and sheep farmers are two examples of co-located agricultural activities that exist in harmony with solar projects.[11] According to a study, co-location and solar grazing bring net positive benefits for both farmers, in the forr of additional income, and solar facilities, through increased energy production and reduced maintenance expenses. Please see SETA's Multiuse Farming Factsheet for more information.

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[5] htt s: Þvww.nrel. çv/news features 2019 beneath-solar-panels-the-seeds-of-opportunity-syrout.html [6] https:(/www.energy.gov/eere(s olar/farmers-guide-going-solar
[7] https:(lwww.nrel.gov/news/features(20191beneath-solar-panels-the-seeds-of-opp ortunity-sprout .htmI
[8] North Carolina Sustainable Energy Assn, "North Carolina Solar & Agriculture" (April 2017). https://energync.org/wpcontentíuploads/2017/04[NCSEA NC Solar and Agriculture 4 19.pdf.
[9] htt s:flener c.or -contentlúploads/2019/07 Small Increased-NC-County-Tax-Revenue-from-Solar-Develo mentv3. df [10] htt s: /Www.rd.usda.gov files1RD FactSheet RBS REAP RE EE.pdf
[11] htt s:' ener c.or-content u loads 2017 04 NCSEA NC Solar and A riculture 4 19. df

Co-locating Utility-scale Solar with Livestock & Pollinators

Solar development and agricultural use can exist not only side-by-side, but increasingly are found together.

- A farmer can add solar to their property and get steady income from a land or rooftop array.
- Solar energy facilities can also collaborate with local farms and bee-keeping organizations to incorporate pollinator friendly plants and bee hives onto their sites.
- Responsible solar development could improve soil health, retain water, nurture native species, produce food, and provide even lower-cost energy

Benefits to Farmers

According to a study conducted by

to local communities.

- Sheep farmers have opportunities to contract for vegetation management of solar sites and thus increase farm viability

n

industry. and get steady If a farmer income can from add a solar and to or their rooftop propertyarray,

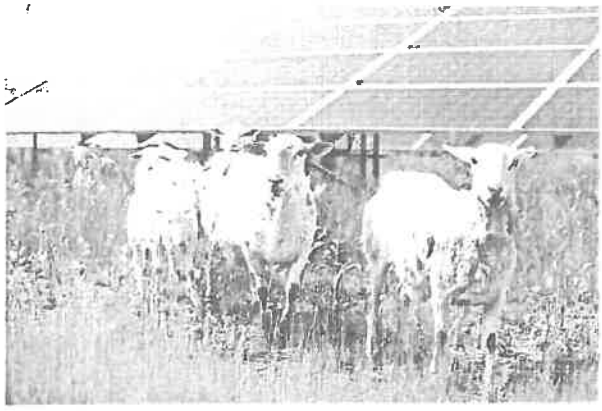
from the National Renewable Energy it can enable hem to keep their farm. [1] Steady

Laboratory in 2016, [4] co-location and less income vulnerable from solar to fluctuations projects means in market that farmers prices areon solar grazing bring net positive their products. Especially for larger solar projects, benefits for farmers, in the form of local government and communities benefit from collected taxes and localized spending. hundreds of dollars per acre each year

Farming is an extremely low-margin, competitive

Photo Credit: American Solar Grazing Association

Cornell University 2018 [3] and a study



"Solar grazing" is a method of vegetation control for in additional income, and solar sites, solar sites that utilizes livestock, primarily sheep.[2] through increased energy production While solar grazing is currently in pilot phases on

and reduced maintenance expenses. various companies sites, can it is contract increasing with in local

ɔopularity. farmers, Solarresulting

in a relationship that is financially beneficial for both farmers and solar developers. Properly installed systems are benign to nearby animals.

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[1] https:flwww.renewableener orld.com articles 2016 04 solar-power-more-lucrative-than-crops-at-some-us-farms.html

[2] Various livestock, and sheep in particular, may be sensitive to the preexisting mineral contents of the soil, and proper soil testing should always be done prior to grazing.

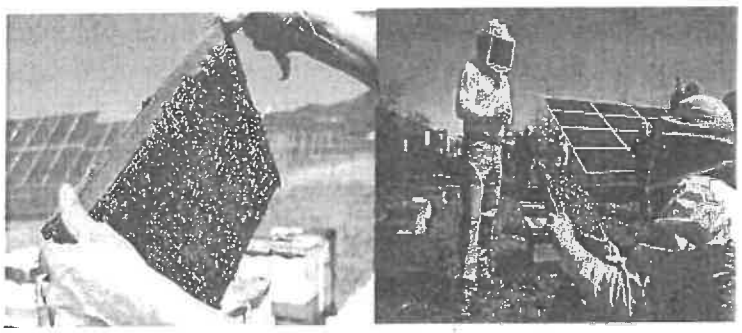
[3] Kochendoerfer, N. Hain, L., Thonney, M.L. (2018) The Atkinson Center for a Sustainable Future at Cornell University

ht s: www.solar razin .or g [4] httpsfflwww.nrel.gov/news features 2019 !beneath-solar-panels-the-seeds-of-opvortunity-sÿrout.html

Solar & Multiuse Farming

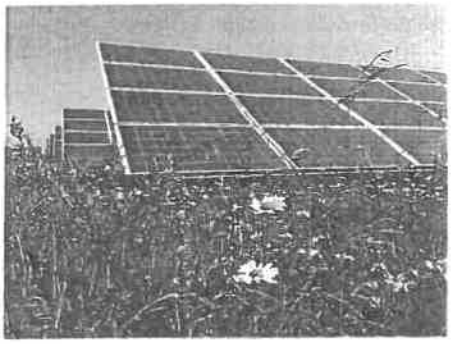
Solar energy facilities can also collaborate with local farms and bee-keeping organizations to incorporate pollinator friendly plants and bee hives onto their sites. There are many benefits to combining solar facilities with pollinator habitats. [1]

- Using one large solar field or perimeter screening area is akin to planting thousands of backyard pollinator gardens, which ultimately increases the productivity of farmland for miles around the facility. • Planting native pollinator habitats reduces waste water runoff, and pollinator-friendly vegetation management practices, including minimal use of pesticides, results in more stable bee populations, benefiting Photo Credit: Pine Gate Renewables, North Carolina farmers in the surrounding area.



Solar Projects Can Improve Biodiversity

Solar farms can support a greater diversity of plants as well as greater numbers of butterflies and bees, particularly under management which focuses on optimizing biodiversity when compared to equivalent agricultural land. This increase in plant and invertebrate availability may lead to more opportunities for foraging birds in terms of invertebrate prey and seed availability. [2] When joint solar and vegetation designs are developed together, the benefits achieved can be maximized. [3]



Solar Installations Could Be Win-Win-Win for Food, Water, and Renewable Energy

[1] htt s:] www.greenbiz.com article solar-farms-could-make-fertile-habitats-bees-and-butterflies

[2] Montag, H., Parker, G., Clarkson, T. (April 2016). The Effects of Solar Farms on Local Biodiversity: A Comparative Study.

[3] Macknick, J., NREL (June 2016) Overview of o portunities for co-location of a riculture and solar PV [8] htt s: www.nrel. ov news features 2019 beneath-solar- anels-the-seeds-of-o ortunit -s rout.html and https: o enei.org/wiki InSPIRE

Photo: SouthHill Community Energy

Responsible solar development could improve soil health, retain water, nurture native species, produce food, and provide even lower-cost energy to local communities. The Department of Energy's (DOE) Innovative Site Preparation and Impact Reductions on the Environment (InSPIRE) project brings together researchers from DOE's National Renewable Energy Laboratory (NREL), Argonne National Laboratory, universities, local governments, environmental and clean energy groups, and industry partners to better understand how to maximize local benefits.[8]

At several InSPIRE sites, local beekeepers and university and national laboratory researchers are tracking their bees' visits to the pollinator-friendly vegetation under the solar panels. The goal is to determine how vegetation at solar sites can benefit insect populations and to understand the extent to which pollinator-friendly solar installations can boost crop yields at surrounding farms.

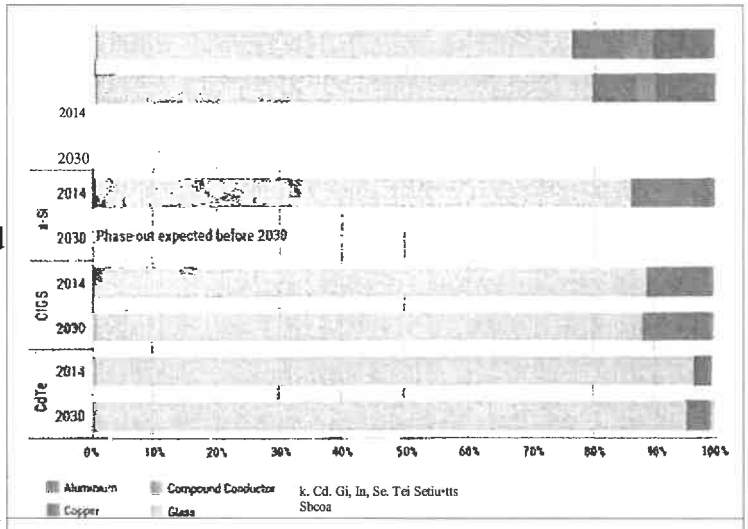
End-of-Life Management for Solar Photovoltaics: Recycling

SEIA Solar Energy Industries Association

SEIA PV Recycling Partner Network

SEIA's PV Recycling Working Group has been actively seeking and developing recycling partners across the U.S since 2016. Over 95% of PV modules deployed in the U.S have been installed since 2012, and such modules will stay in service for more than 25+ years. Nonetheless some waste is generated when panels are damaged during production, shipment or installation, determined to be defective, by weather events, and for warranty-related claims.

SEIA's National Recycling Program is preparing now for larger volumes of waste to come in future years. Already SEIA's recycling partners have processed >4M pounds of PV modules and related equipment since the program launched.



Source: IRENA and IEA-PVPS (2016), 'End-of-Life Management: Solar Photovoltaic Panels: internationat Renewable Energy Agency and Enter-

national Energy Agency Photovoltaic Power Systems.

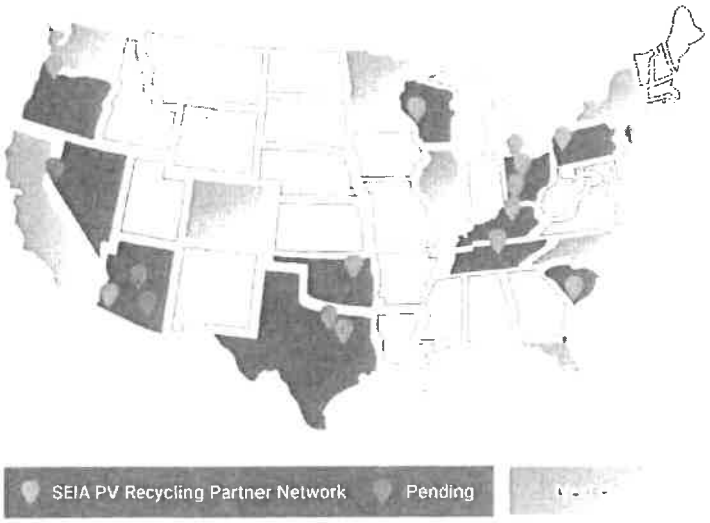
While they offer specific benefits to SEIA members, the recyclers provide their services to interested installers, project and system owners, developers, distributors and other parties.

SEIA's current partners have prior expertise in recycling glass, polymerics, aluminum, scrap metal, and electronics; all of which provide a good foundation for recycling PV modules, inverters, racking systems and other components of a PV system. Our current network partners offer and provide services to SEIA members and industry throughout the U.S. SEIA is continually working to find new parmers in more geographies to make recycling more accessible in areas where solar is installed.

The graphic below shows where SEIA's current partners are located and where we are in process of adding new partners. As we expand our network to more areas, we help partner companies to develop their processes and equipment for our technology. Overall, we aim to add 2-4 new partners yearly and for both new and existing partners to expand their collection and processing locations.

www.seia.org

Solar in



CEM

CLEANLITES RECYCLING

DYNAMIC

Echo Environmental.

First Solar.

January 2020

Energy

Economic Development, Workforce & Markets

Solar Means Business 6ÈlA Solar Energy

Industries Association@ Tracking Corporate Solar Adoption in the U.S.

U.S. businesses and top global brands are making historic investments in solar energy. As of 2019, Apple leads the nation with the most solar capacity installed, followed closely by Amazon, Target, Walmart and Google. There is 15 times more solar capacity installed by American businesses today than there was a decade ago.

SEIA's eighth annual Solar Means Business Report follows solar adoption by businesses across the U.S., ranging from some of the country's largest and most recognizable brands to the small businesses that make up our communities.

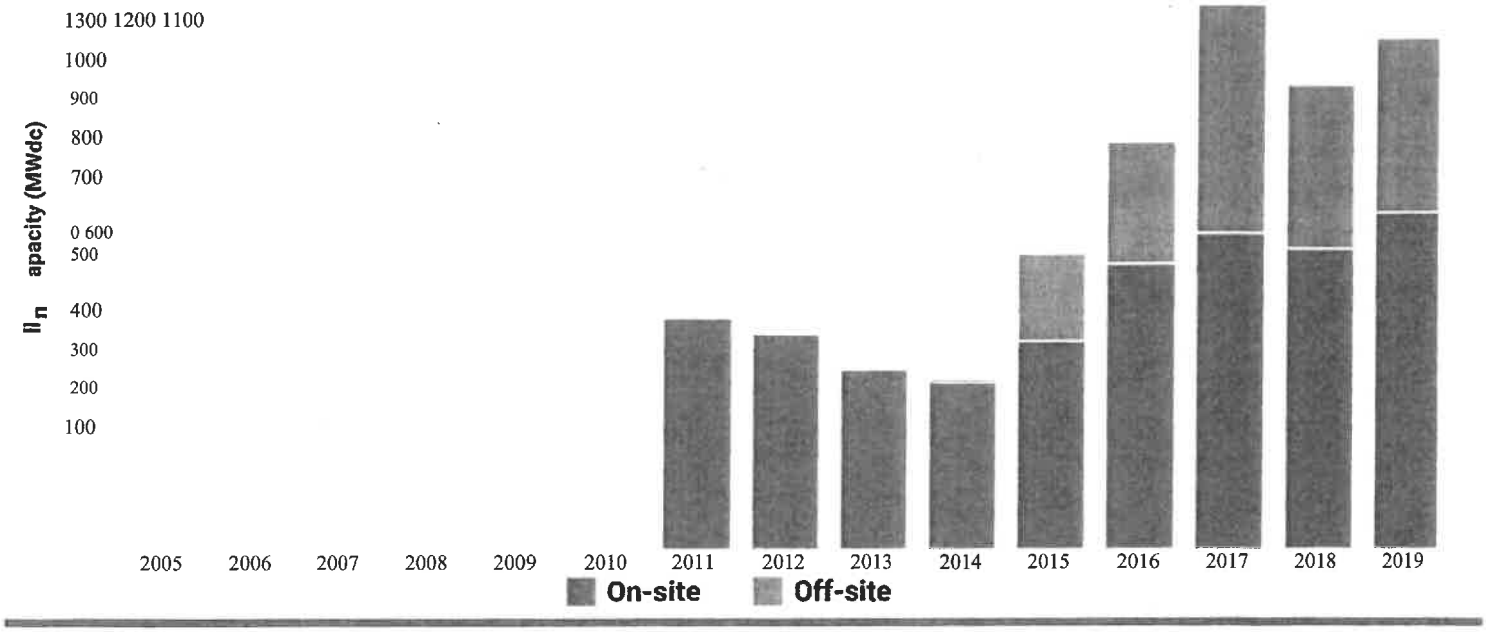
Top 10 Rankings (MW Installed)

Apple	398.3	6.	Kaiser Permanente 181.8
2. a Amazon	369.8	7.	Switch 179.0
Walmart	331.0	8.	Prologis 133.7 @ Target
284.4	9.	Facebook 119.5	
5. G Google	245.3	10.	Solvay

Growth of Commercial Solar Installations

Through 2019, this report tracks more than 8,350 megawatts (MW) of installed solar capacity across 38,000 projects in 43 states. Corporate solar adoption has expanded rapidly over the past several years, with two thirds of all capacity installed since 2015. The 1,286 MW installed in 2019 represents a 10% increase from 2018. The systems tracked in this report generate enough electricity each year to power 1.6 million U.S. homes.

1400



All data sourced from the SEIA Solar Means Business Report

October 2020

Learn more and explore the report at ~~www.solarmeansbusiness.com~~

The U.S. Solar Workforce

SEIA Solar Energy Industries Association®

Quick Facts

- AS of 2018, The United States has 242,343 solar workers, defined as those who spend 50% or more of their time on solar-related work.
- Roughly 32% of all solar employment is reported to be in administrative, management, and professional positions; 38% in installation and repair, 7% in manufacturing, and 15% in sales.
- Solar employment declined by nearly 8,000 jobs in 2018, or 3.2 percent, since 2017. Overall, the solar workforce has grown 159 percent since 2010, adding nearly 150,000 jobs.
- The decline in solar jobs is largely attributable to the solar tariffs that the Trump administration imposed in early 2018 and the uncertainty that solar companies faced
- Solar jobs increased in 29 states in 2018, including many states with emerging solar markets. States with the highest employment gains include Florida, Illinois, Texas, and New York State.
- The manufacturing sector makes up 14% of the solar workforce (33,700 jobs).
- Overall, companies said they require a Bachelor's degree for 21% of new hires; a vocational or technical certificate for 14% of new hires; and an Associate's degree for 9%.
- In 2018, there were 63,806 women working in solar, or 26.3% of the workforce

- According to The Solar Foundation's 2018 National Solar Jobs Census, the median wage for mid-level solar installers is $32/hour for electricians and $28/hour for non-electricians, well above the $18 national average.
- For those who are willing to pursue some training in solar-specific technologies, it's possible to move into sustainable, well-paying careers in as little as 12 months. An in-depth case study by The Solar Foundation found that entry level installers were typically promoted within 6 to 12 months of hire, with an average pay increase of 45%.

The Solar Workforce Opportunity

In the next five years, the solar energy market in the United States may more than double in size. In order to meet the expected demand, the solar workforce will require tens of thousands of new employees. SEIA members are hiring more workers every year and a well-equipped, diverse talent pool is central to their success. Workforce development that reflects the diversity of the communities we aim to serve is one of our member companies' highest priorities.

Solar provides an opportunity for workers from all education levels. Approximately 79% of solar companies do not require a bachelor's degree for new hires. For those who are willing to pursue some training in solarspecific technologies, it's possible to move into sustainable, well-paying careers in as little as 12 months.

We must ensure that people of all races, genders, ethnicities, and economic backgrounds have access to both solar jobs and solar energy itself. Everyone deserves access to the incredible benefits of solar energy — cleaner air, lower energy bills, and well-paying jobs.

www.seia.org

July 2019

(SEIA Solar Energy Industries Association)

The U.S. Solar Workforce

Solar Installation and	Female	Gender Non-Binary	Latino or Hispanic	American Indian or Alaska Native	Asian	Black or African American	Native Hawaiian or Other Pacific Islander	White	Two or More Races	Veterans	Two or More Races	Veterans	and Over

Pioject Development	24.5 %	1.0 %	17.3 %	1.0%	7.1 %	7.7%	1.3%	73.7%	8.9 %		
U.S. Construction			29.8%		1.9 %	6.21%		88.8%			- 21.8 %
Solar-WhoJesaIe Trade & Distribution	35.9 %	0.1 %	21.4%	1.3%	9.2 %	5.7%	2.8%	59.3%	11.6 %	7.2%	9.9 %
U.S. Wholesale Trade	29.9 %				5.80/ 0	9.3%		82.4%			26.4 %
Solar Operations & Maintenance	25.5 %	1.6 %	15.2%	0.4%	8.5 %	8.3%	0.5%	79.3%	3.7 %	8.1%	9.2 %
U.S. General Repair & Maintenance	11.9 %		25.4%					83.0%			22.9%
Solar Manufacturing	28.3 %	4.3 %	20.9%	1.0%	15.5 %	8.8%	1.5%	56.8%	13.3 %	10.2 %	14.3 %
U.S. Manufacturing			16.6%			IOAO/ o		79.9%			24.9 %
Solar All Others	33.6 %	1.2 %	15.5%	1.1%	11.1 %	4.6%	0.8%	79.1%	6.0 %		16.7 %
SOLAR OVERALL	26.3 %	1.4 %	16.9%	1.1%	8.5 %	7.6%	1.2%	73.3%	8.3 %	7.8 %	10.5 %
U.S. WORKFORCE OVERALL	46.9 %		16.9%			12.1 %		78.4%			

Solar Workforce Demographics by Sector in Comparison to Other Industries

The solar industry has been one of America's leading job creators over the past decade, but like many high-growth sectors, it does not yet reflect the country's diversity in the demographic makeup of its employees.

Fortunately, a growing number of industry leaders are making it a top priority to improve the representation of women, people of color, the LGBTQ community, and veterans among their staff and leadership teams.

About SEIA

The Solar Energy Industries Association (SEIAÐ is the driving force behind solar energy and is building a strong solar industry to power America through advocacy and education. As the national trade association for the U.S. solar energy industry, which em»loys more than 242,00ÓAmericans, we represent all organizations that promote, manufacture, install and support thé developmenðof Solar energy. SEIA works with its

1,000 member companies to build jobs and diversity, Champion the use pfcost-competitive solarin America, remove market barrier and educate the public On the benefits of solar energy.

Solar in Sports

Solar Energy Industries Association®

Solar on Professional Sports Facilities in the U.S.

The total cumulative solar capacity in professional sports has reached 46 megawatts (MW) as of June 2018, enough to power nearly 8,000 American homes! These numbers are thanks to a great deal of recent growth nearly half of the total capacity has been installed in the last 3 years. Last year, more than 42 million Americans attended an event at a stadium, arena or raceway with a solar system.

Solar Systems in U.S. Professional Sports Facilities by League

Major League Baseball

'(6 h #1: San Diego Padres	330 kW
#2: San Francisco Giants	123 kW
#3: Arizona Diamondbacks	75 kW
#4: Seattle Mariners	33 kW
#5: Kansas City Royals	29 kW
#6: St. Louis Cardinals	25 kW
#7: Colorado Rockies	10 kw
#8: Cleveland Indians	

#3: Boston Celtics[2]	1,300 kW
#4: Utah Jazz	700 kW
#5: Los Angeles Clippers & Lakers[3]	364 kW
#6: Phoenix Suns[4]	194 kW
#7: Golden State Warriors	164 kW
#8: Miami Heat	19 kW
#9: Denver Nuggets[5]	10 kW

Shared with the NVashington Capitals (NHL) & Mvsties (WN BA) I aShared with the Boston Bluins (NHL) •3Shaled with the Angeles Kings (NHL) & Sparks (\VNBA) f '(Shared with the Phoenix Mercurv OVNBA) I [5].Shared with the Colorado Avalanche (NHL)

NASCAR

#1: Pocono Raceway	3,000 kW
#2: Daytona International Speedway	2,100 kW
#3: Sonoma Raceway	353 kW
#4: Michigan International Speedway	40 kW

National Basketball Association

#1: Sacramento Kings	11,000 kW
#2: Washington Wizards [1]	3,500 kW

IndyCar

Indianapolis Motor Speedway

9,600 kW

National Football League

Philadelphia Eagles 3,000 kW

#2: Washington Redskins	2,000 kW
#3: Atlanta Falcons	1,300 kW
#4: New England Patriots [1]	1,000 kW
#5: Seattle Seahawks[2]	800 kW

#6: New York Jets[3]	690 kW
#7: Baltimore Ravens	375 kW
#8: San Francisco 49ers	375 kW
#9: New York Giants & Jets[3]	
#10: Houston Texans	180 kW
#11: Kansas City Chiefs	25 kW

Shared with the New England Revolution (MLS) 1 [2].Shared with the Seattle Sounders (MIS) he New York Jets -i raining Center has its own 690 kW solar system, while the 350 svstcm at Centuryl.ink Field is shared with the New York Giants

Major League Soccer

Real Salt Lake [1]	2,020 kW
#2: New England Revolution [2]	1,000 kW
#3: Seattle Sounders FC[3]	800 kW
#4: San Jose Earthquakes	220 kW

[1]Shared with the Utah Royals FC (NWSL) [2]Shared Wilh the New lingland Patriots (NFL) I Shared with the Seattle Seahawks (NFL)

National Hockey League

[R] #1: Washington Capitals [1]	3,500 kW
#2: Boston Bruins [2]	1,300 kW
#3: Los Angeles Kings[3]	364 kW
#4: Colorado Avalanche[4]	10 kW

!Shared with the Washington Wizards (NBA) & Mystics (WNBA) 1 [2]Shared with the Boston Celtics
(NBA) [1 3]Shared with the Los Angeles Clippers & Lakers (NBA) 1 [4]Shared with the Denver Nuggets

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(sĒIA Solar Energy

September 2018

Industries

Association@

Solar in U.S. Professional Sports

Legend

InàyCar
Major League Baseball
Major League Soccer
NASCAR
National Basketball Association
Naüonal Football League
National Hockey League

Vivint Smart Home Arena

Solar Capacity: 700 kW
Installer: Vivint Solar
Location: Salt Lake City, UT Team: Utah Jazz

Fun fact: The panels will produce enough energy over their lifetime to offset the carbon equivalent of 1 million pounds of coal.

Busch Field

Solar Capacity: 25 kW
Installer: Microgrid Energy, Electrical Connection, Sachs Electric
Location: St. Louis, MO
Team: St. Louis Cardinals

run fact: Every season, 950.000 hot dogs are sold at Busch Stadium, which sports 106 solar PV panels.

Case Studies

Mercedez-Benz Stadium

Solar Capacity: 1,300 kW
Installer: Georgia Power
Location: Atlanta, GA
Team: Atlanta Falcons

Fun fact: this solar array generates enough electricity each year to power 10 home games each season.

Daytona International Speedway

Solar Capacity: 2,100 kW
Installer: Florida Power & Light
Location: Daytona Beach, FL

Fun fact: The C02 emissions offset by this system are the equivalent of driving a car around the track 2 million times.

For more information and to access the full database of solar on professional sports facilities in the U.S., visit us online at www.seia.org/sports

Economic Impact to Callaway County

1. Financial impact to rural communities: Fair compensation to the communities affected.

As of October 13, 2022, we have identified 8696 acres in Callaway County that are proposed solar industrial projects and we know there are much more, the solar companies don't have to disclose the prime farmland under lease agreements. The economic loss of farmlagricultural revenue would be $5.3 - $8.6 million** a year.

What would be fair compensation to the communities affected? Consider this, the economic loss will be even greater during the life of these 3040 yr contracts. For

example, In 2002 (20 yrs ago), corn was $2.321bushel and soybeans was $7.34/bushel so if similar market forces occur, the county's future economic loss will rise to 2-3 times the present day or $10.6 - $25.8 million a year. >> I suspect this loss to be even greater when you factor in the advances in genetics over the life of these contracts.

**8500 acres x 1501bushels (up to 200 bushels) x $6.75/bushel (current corn price) = $8,606,250 or 8500 acres x 451bu soybeans (up to 60 bushels) x $14/bushel = $5,355,000.

—Present day - Productive land can expect to gross $600 - $1200 per acre.

2. Solar is unlike Wind turbines because the prime farmland is totally out of production for 30-40 yrs. Large solar industrial complexes are devastating to agricultural productive land like no other industry. Unlike wind turbines where the land can still be farmed and kept in production, solar removes the land from production for 3040 years and this could be much longer if the land isn't properly reclaimed at the end of these long term leases.

3. Results: Loss of agricultural jobs and businesses. Loss of federal agriculture dollars and tax revenue. Seed sales, equipment sales, repair and parts, crop insurance, chemical and fertilizer sales, farm co-ops, etc

4. State Revenue: Solar Companies revenues will not stay in the State whereas farm revenue primarily stays within the State. Farmers do not keep their earned revenue, but recirculate the dollars throughout the local economy.

5. Recently, the Missouri Supreme Court, case no. SC99441, Springfield Solar 1 LLC vs Greene County, MO, ruled that Statute 137.100 (10) was unconstitutional which resulted in the striking down of the solar energy system property tax exemption.

This is a legislative opportunity: These industrial solar farms' property, equipment and the involved acres should be assessed at a commercial tax rate that's compensatory to the annual loss farm revenue to the local communities. We need legislation that will provide a uniform assessment and taxation methodology for solar farms, so the affected communities are rightfully compensated and will not go backwards and be worse off. Also, these tax dollars should stay in the affected community and county.

According to Ranger Power, their Kingdom City project will consist of a $300 million installation/complex. According to one of our county commissioners, if it was any other business, such as Walmart distribution center, the tax revenue would be $6 million. These private Solar companies are not public utilities.

6. What happens to these large industrial solar farms when the federal subsidies end, will we have another Solyndra, but at a massive scale? Who will be left to clean up the decommission solar complexes and reclaim the prime farmland?

7. Example of what happens when agricultural farmland is taken out of production, just look at the effects of the small rural communities north of highway 36 after the CRP program was implemented in 1985. The CRP program removed large amounts of farmland from production which resulted in jobs drying up and businesses closing their doors because there was no longer recirculation of farm revenue in these communities.

Carroll Road Solar Farm LLC. Estimated Economic Impacts of Reduced Agricultural Production

The Carroll Road Solar Farm LLC. solar panel installation is expected to be placed on 1,674.53 acres of mostly farmland in Lenawee County, MI. We assert that 90 percent of these parcels will have agricultural production diverted through the 35 year life of this installation. Based on current yield and cost of production estimates, we estimated the expected loss in economic activity from lost agricultural production.l

Estimate direct annual loss of:

- $1,092,850 in gross farm revenues (cash sales of farms)
- $473,800 in farm net revenues (Farm revenues to proprietor, farm capital and farm land)
  - $49,000 in farm labor earnings

Over 35 years of the installation, this represents a decline in (2020 $ values held constant):

- $38,249,700 in gross farm revenues
- $23,260,600 in farm net revenues
- $1,714,300 in farm labor earnings

We simulated how the loss in annual farm sales translates to economy-wide impacts on Lenawee County, MI. Economy-wide impacts are larger than direct impacts because dollars recirculate throughout the economy. For example, the sales revenues earned by the grower are partially re-spent in the local economy to purchase seed inputs to the next year's harvest, to purchase fuel, maintain or expand capital like tractors and enclosures, etc. Those receiving payments from the farmers will also respend a share to restock on inventories, pay labor, taxes and operating expenses. Households increase their expenditures from labor and proprietary income, creating a second channel of impacts. Together, the business to business transactions and household to business transactions make up what we call secondary expenditures (indirect and induced effects, respectively). The cycle continues, decreased only to the extent that purchases are made to suppliers from outside of Lenawee County. The table below shows estimates using annual estimates described above,

Model simulation: Lost Farm Sates Impacts on Lenawee County, MI

Impact Type	Employment	Labor Income	Regional Income	Output
Direct Effect	6	$48,980	$713,567	$1,092,848
Indirect Effect	2	$106,285	$209,064	$320,187
Induced Effect	0	$35,682	$21,220	$110,923
Total Effect	8	$184,030	$943,851	$1,523,958

Direct loss of agriculture sales of $1,092,848 will create a decrease in total transactions in Lenawee

County, totaling $1.5 million per year. This would result in a reduction of regional income of just under

[1] Estimates provided by the Center for Economic Analysis at Michigan State University under the directorship of Steven R. Miller. For more information contact Steven Miller at 517.355.2153 or by email at mi111707 arnsu.edu.

$1,000,000 per year.[1] Total labor income will be expected to decline by $184,030, impacting a total of 8 Lenawee County workers.[2]

These estimates only take into account of expected impacts tied to reduced agricultural activities as currently exercised on these farms and do not take into consideration employment by Carroll Road Solar Farm LLC in maintaining and operating the solar panel installation. It also does not take into consideration the expected impacts of any annual payments made on behalf of Carroll Road Solar Farm LLC for personal property taxes, income taxes and land lease

[1] Regional income is the combined labor income, proprietor's income, payments to capital and landowners and indirect business taxes.

[2] Employment may include self-employed proprietors.

payments. Finally, the estimates do not take into account any substituted economic activity that may be applied to these lands in the presence of the solar panel installation.

MARY MCCLINTON CLAY, MAI
218 Main Street
Paris, Kentucky 40361
859-987-5698

September 3, 2021

Senator Paul Hornback
Chairman
Agriculture Committee
702 Capital Avenue
Frankfort, KY 40601-3415

Dear Senator Hornback:

My name is Mary McClinton Clay and I am a real estate appraiser from Paris, Kentucky specializing in eminent domain and environmental damage studies.

As requested, I am attaching a summary chart of examples of diminution in property value as a result of proximity to utility scale solar farms.

I have documented these case studies in a report entitled "A Summary of Solar Energy Generation Power Systems (Solar Farm) Damage Studies as of May 25, 2021 ," which I prepared for the Clark Coalition for a hearing before the Clark County Planning Commission on May 25, 2021. The report summarizes peer review journal articles, professional appraiser's reports, and solar developer's neighbor ageements, as summarized on the attached chart.

I have also documented addiüonal examples ofvalue diminution in four recent reviews of Impact Studies prepared by appraisers for solar developers as part of their applications to the Kentucky Siting Board.

In addition to five previously published studies, indicating property decline of up to -20.0 percent, four case studies, prepared by my office, are included.

The North Branch, MN case study analyzes a developer buy-out of 7 abutting properties purchased by North Star Solar. The sale-resale analysis compares the sale prior to and after the purchase by the developer. The data indicates a property decline of -6.3 to -28.0 percent with an average and median decline of -17.0 percent.

The McBride Place solar farm case study from Midland N.C. includes the analysis of single family sale-resales indicating value declines ranging from -15.5 to -16.8 percent.

The Sunshine Farms case study analyzes 13 single family lots from a subdivision that abuts a solar farm in Grandy, N.C. The sales that adjoin the solar farm sold for -15.5 percent less than the lots that did not abut, despite a required 300.0 foot set back from the rear property line.

Senator Paul Hornback
September 3, 2021

The Spotsylvania Solar case examines single family lot sales before and after the announcement of the 6,350 acre 617 MW solar facility. The adjoining sales sold for -30.00 percent less than those not abutüng the solar farm.

Solar developers use "Neighbor Agreements" to limit local opposition to their solar farms. The Western Mustang Solar Agreement consists of a monetary offer of $17,000 to adjacent property owners to not oppose their solar farm

The Lighthouse BP Neighbor Agreement offers $5,000 to $50,000 to adjacent property owners depending on proximity to the solar farm.

The Posey Solar, LLC agreement offer is equal to 10.0 percent of appraised value for neighbors within 300 feet of the solar field, plus an annual $1,000 payment, or $35,000 for the life of the project. Apparently, Posey Solar considers any property within 300.00 feet of a solar farm to be at risk of value decline.

These payments are significant because the developers' own appraisers have determined that solar farms will have no adverse impact on adjacent property values.
However, the payments can only be interpreted as a tacit admission ofvalue impairment.

The evidence to date, indicates the need for a more robust and comprehensive analysis of the effect of utility scale solar farms on property values than that presented by solar developers; and prior to the approval of addiüonal solar farms in Kentucky. .

Sincerely,

Mary McClinton Clay, MAI

SUMMARY OF INDICATED VALUE DECLINE

DATE	STUDY	RESULT
2018	University	Assessor survey respones ranged from value impact of zero
	of Texas	to estimation of negative impact associated with close
		distance between the homes and the facility, and
		impact increased with increased size of the solar plant.
2020	University	Average decline within 3.0 mile radius was -1.7%, or $5,671.
	of Rhode Island	Average decline within 0.1 mile was -7.0%, or $23,682.
		The "results suggest extremely large disamenities for
		properties in very close proximity."
2013	Fred H, Beck &	Strata Solar Case Study: Potential Purchasers cancel contract
	Associates, LLC	upon learning of the solar facility.

		Clay County Case Study: Lot sales stopped after announce-
		ment of solar plant. Clay County Board of Equalization
		reduced affected property assessments -30.0%.
		Non-residential Use View Impariment Study: Adjacent
		incompatible use adversly impacted nearby properties -10.7%
		to -25.1%, or an average of -15.2%.
		AM Best Solar Farm Study: No diminution in value due to
		pre-existing industrial zoning for solar farm.
2020	Mark W,	Adams County, PA View Case Study: The loss of view results in
	Heckman, R.E.	a -15% to -20.0% loss in value.
	Appraisers	
2019	Madison County	Potential purchaser offered -16.43 % less than
	Indiana	appraised value upon learning of the proposed solar plant.

SUMMARY OF INDICATED VALUE DECLINE

DATE	STUDY	RESULT
2021	Mary McClinton	North Star Solar Case Study (MN): An Analysis of the 7 adjoining
	Clay, MAI	properties purchased by North Star PV, LLC. A sale-resale
		analysis of the sale prior to and subsequent to the purchase
		by the solar developer. The sale-resales indicate a range of
		diminution from -6.3% to -28.0% with a median decline of
		of -16.9% and an average decline of -16.8%.
2021	Mary McClinton	McBride Place Solar Farm Case Study (NC): Analysis of 3 sate-
	Clay, MAI	resafes and a comparison of the sale price and tax assessment.
		The sale-resales indicate -15.65%, -15.51% and -16.44 percent

		diminution in value, The sale price/tax assessment indicates
		a -16.81% loss of value.
2021	Mary McClinton	Sunshine Farms Case Study (NC): Analysis of 13 vacant single
	Clay, MAI	family lot sales from a subdivision that abutts a solar farm. The
		sales that adjoin the solar farm sold for -15.5% percent less than
		the lots that did not abutt the solar farm.
2021	Mary McClinton	Spotsylvania Solar Case Study (VA): Analysis of 5 vacant single
	Clay, MAI	family lot sales from a section of Fawn Lake Subdivision that is
		adjacent to the solar farm. The lots that adjoin the solar farm
		sold for -30.0% less than those that did not adjoin.
2020	Western Mustang	Monetary offer of $17, to adjacent property owners to
	Neighbor Agreem lt	quel opposition to the proposed solar facility.
2020	Lighthouse BP	Monetary offer of $5,000 to $50,000 to adjacent property
	Neighbor	owners depending on proximity to the solar facility to quel
	Agreement	opposition.
2021	Posey Solar, LLC	Monetary offer equal to 10% of appraised value for neighbors
	Neighbor	within 300 feet of the solar field, plus an annual $1,000
	Agreement	payment ($35,000 for project life).

MARY MCCLINTON CLAY
PROFESSIONAL QUALIFICATIONS

Mary McClinton Clay, MAI
218 Main street, Paris, KY 40361
859-987-5698/Ce11: 859-707-
5575 mclayky@bellsouth.net

Market Area: Commonwealth of Kentucky

Primary Practice Focus: Litigation and zoning support with an emphasis on damage studies, including environmental and eminent domain,

Appraisal Experience:

1985 to Present: Self-employed - engaged in commercial, indusfrial and farm valuation.
1979-1984: Employed by Realty Research - engaged primarily in income property appraisal.
1976-1979: Residential appraisal experience with fee appraisers.

Previous assignments include: Eastern State Hospital; Gateway Shopping Center; Lakeside Heights Nursing Home, N. KY; L&N Office Building, Louisville; Alltech Biotechnology Center, Nicholasville, Paris Stockyards; Comad Chevrolet, Lexington; CSX Rail Yards in Mt. Sterling and Pais[a], First Baptist Church, Cold Spring; Lusk-McFarland Funeral Home, Paris; Feasibility Study ofproposed Hamburg Place Office/IndustrialPark, Lexington; Rent Analysis of IRS Service Center, Covington; Surtech Coating, Nicholasville; Clem Refrigerated Warehouse, Lexington; Bluegrass Manuñcturing, Lexington; Finley Adhesives, Louisville; Cent•al Manuñcturing and Cenfral Light Alloy, Paris; Review Appraisal of Rand McNally Plant, Versailles and Timberland Distibution, Danville; Old Scott County Jail; Millspring Battlefield; Truck Terminals, Fast Food Restaurants, Retail Centers, Lumber Mills, Car Wash, Multi-Family Residential, Mobile Home Parks, Convenient Stores and Subdivision Analyses.

Thoroughbred Horse Farms including Pin Oak Farm, Bunker Hunt Farms, Pillar Stud Farms, Elmendorf Farm, Summer Wind Farm, Hidaway Farm, Stoner Creek Stud, Runnymede Farm, Wilshire Farm, Lynnwood Farms, Stonereath Farm, Idle Hour Farm, Canefield Farm, Elk Creek Farm, Lochness Farm, Stoneleigh Farm, Elizabeth Station Farm.

Right of Way Experience: Rose Street Extension, Lexington, 1986-87; AA Highway: Greenup co., 1989, co., 1990-91; U.s. 27 Campbell co. 1991-1992, 1993; Bridge gnment, Walton, 1992; Rd, Louisville, 1993; 19th St, Bridge, Covington, 1994; U.S. 27, Alexan&ia, 1994; S. Main St., London, 1995; Paris Pike, Paris and Botrbon County, 1995-98; KY Hwy 22 at 1-75, Dry Ridge, 1996; Bridge Projects on KY Hwy 19, Whitley County, 1997; US 150, Danville, 1998; US 460 Morgan co., 1999; US 62 South, Georgetown, 2000; Bluegrass Pkwy and KY 27 Interchange, Anderson Co., 2001 ; KY 519, Rowan County, 2002; US 641, Crittenden County, 2005; US 25, Madison County, 2008-09; US 68, Bourbon County, 2009-10; Clark 2011; US 68 Millersburg By-pass,

Bourbon County, 2012-13; US 119, Bell County, 2014-15; US 25, Madison County, 201617; Excess Land, Georgetown By-pass, 2020; Access Break, Industrial Drive, Lebanon, 2020.

Railroad Right of Way Experience: CSX in Floyd, Perry, Clark, Woodford, Franklin, Montgomery, Johnson, Magoffin, Breathitt, Fayette, Madison, Mason, and Bourbon Counties, 1987-2016.

Rails to Trails: Rowm County, 2005; Montgomery County, 2009, Franklin County, 2014; Floyd County, 2016.

Environmental Damage Studies: Yellow Creek Concerned Citizens v. Middlesboro Tannery: effect of tannery contaminationon 350 properties along Yellow Creek, Bell County, KY, 1988; James E. Sullivan et al v. Bow-d ofRegents, et al: effect of Animal Waste Fermentation Project at the Organic PastelTimtion Plant at North Farm of Murray State University on Sullivan's Execuüve Par 3 Golf Course and Sports Center, Mtrray, KY, 2003; West Farm Subdivision, Pulaski County: effect of contaminaüon of groundwater from underground storage of dry cleaning solvents on residential lot values, 2004; Gene Nettles, et al v. Environmental and Public Protection Cabinet: Division of Water, David Morgan, Director and J.P. Amberg Hog Farm: Diminution of Value Analysis As a Result of Proximity to Hog Facilities in Daviess, Warren, Calloway, Graves, Hickman and Carlisle Counties, Kentucky, 2006; Terry Powell, et al v. Tosh, et al: Diminufon ofValue Analysis as a Result of Proximity to Hog CAFOs in Marshall County, KY, 2007; City of Versailles v. Prichard Farm Parffiership, Ltd,: effect of sewage freatment pump station and ancillary easements upon Woodford County cattle farm, 2008; Kentucky Utilities Company v- James and Mary Jent, CDHPreserve, LLC and FTnz Credit Services ofMid-America, FLC, Violet Monroe: the effect of High Voltage Transmission Lines on three Hardin County agricultural properties, 2011 ; Terrence G Kerschner, et al v. BWIey Oil Company, et al: the effect of Leaking Underground Gasoline Tanks on Lane Estates, Frankfort, KY, 2013; Jerry Whitson v- Donnie Cross: effect of Drainage Encroachment upon Adjacent Property, 2013; the effect of Cell Tower on Bourbon County Farm, 2014; Steve D Hubbard v. Prestress Services Industries, LLC: effect of Fugitive Parüculate Emissions upon a Single Family Dwelling, 2016; Henderson City-County Airport v. Mary Janet Williams, et- al.: the effect of Proximity of a Regional General Aviation Airport on Agricultural Values, 2019; Patricia Kushino, et al Y. Federal Aviation Administration, et al: the effect of Stormwater Drainage on Woodland value, 2021.

Additional Damage Studies:
Faulty Consü•uction: 172 Post Oak Road, Paris, KY; 152 Cross Creek Drive, Paris, KY; Hartland Subdivision, Lexington, KY
Flood Damage: 208 Cary Lane, Elizabethtown, KY
Blasting Damage: Chicken Farm, Tolesboro KY
Super Fund Sites: KY Wood Preserving, Inc., Winchester, KY; River Metals Recycling, Somerset, KY

Expert Witness: Circuit Courts of Bourbon, Carter, Fayette, Franklin, Hardin, Laurel and Woodford Counties

MARY MCCLINTON CLAY

PROFESSIONAL QUALIFICATIONS

Court Testimony:

Laurel Circuit Court: Yellow Creek Concerned Citizens v. Middlesboro Tannery, 1995.

Franklin County Circuit Court: RichTd McGehee v. Commonwealth ofKentucky Transportation Cabinet, 2008; Terrence G. Kerschner, et al v. Burley Oil Company, et al, 2014.

Hardin County Circuit Court: Richard McGehee v. Commonwealth ofKentucky Transportation Cabinet, 2008.

Woodford County: Horn v. Horn, 2009

Bourbon County Circuit Cotrt: Blasting Case, 1980s; Waterway Impediment Case, 2000; Faulty Construcüon, 2009, Hadden v. Linville, 2015.

Fayette County Circuit Cotrt: Faulty Construction, 1980s; Bluegrass Manufacturing (Divorce Case), 1999, Whitson v- Cross: Drainage Encroachment, 2013.

Carter County: Condemnation for Commonwealth ofKY Transportation Cabinet.

Conservation and Wetland Easements; Bluegrass Heights Farm, Fayette County:

Conservaüon and Preservation Easement; Wetland Easements in Pulaski, Lincoln, and Fulton Counties for NRCS.

Zoning Support: John Vance, et al v. Pa'is City Commission 2019; Citizensfor Progressive Growth and Development v. Bourbon Counw Planning Commission 20042007 and 2016; Paris First v. Paris Bowbon County Planning Commission 2003-2006;***Paris***

First v. Pris City Commission 2002-2003; Coppers Run Historic District, Inc. v. Abundant Life Worship Center 1995; Sugar Grove Farm v. East Kentucky Power 1994-1996; Lawrence Simpson, et al v. Hary LaytŒt 1986-1996.

Professional Organizations:

Appraisal Insütute: MAI, 1985; SRPA, 1982; SRA, 1980

Appraisal Institute Education Certification:

The Appraisal Institute conducts a voluntary program of continuing education for its designated members. I am cerüfied under this program through December 31 , 2023.

Education: Hollins College, B.A., 1972

Appraisal Education: Society of Real Estate Appraisers Course 101, 1977; SREA Course 201, 1978; SREA C01rse 301, 1981; AREA Course Vlll, 1979; AIREA Course VI, 1979; AIREA Course Il, 1980; AIREA Course in Analysis, 1980; AIREA Course in Valuaüon Litigation, 1986; Appraisal Institute ofProfessional Practice, 1992; AIREA Comprehensive Examination, August, 1983; Courses in Real Estate Finance, Income Property Appraisal, Real Property Valuaüon, and Analysis, 1977-1978, Eastern Kentucky University; Appraisal Institute Cotrse 400G, Analysis/Highest and Best Use, 2008, Conservation Easement Certification, 2008.

Attended numerous seminars covering a variety oftopics including investment analysis, feasibility and market analysis, eminent domain and condemrution, valuaüon of lease interests,

component depreciaüon, risk analysis, current issues in subdivision and zoning law, Yellow Book and appraiser as expert wimess.