AriSEIA
ARIZONA SOLAR ENERGY INDUSTRIES ASSOCIATION

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7144 E. Stetson Dr., Suite 300
Scottsdale, AZ 85251

July 11, 2024

Yavapai County Development Services
1120 Commerce Drive
Prescott, AZ 86305

RE: July 18th Planning and Zoning Meeting Agenda Item No. 6: Solar Facilities Zoning Ordinance Amendment – Sections 501 & 608

Supervisors, Commissioners, and Staff,

AriSEIA previously submitted a letter and redlines on the first draft of the ordinance on June 10th. We also submitted an economic impact study of utility scale solar in Yavapai County on June 14th. This study is attached here as **Attachment A** for your convenience. We do plan to attend the Planning and Zoning meeting on July 18th and will also submit another round of redlines once the second draft of the ordinance is available. In the interim, below are some additional comments as to the first draft.

Additionally, AriSEIA would encourage you to consider holding a working session open to all interested stakeholders before the next Planning and Zoning meeting on this topic. Both Eloy and Mohave County held such a meeting and it was incredibly valuable in coming to a final draft. This may require delaying the final vote on this item past September 4th. In Eloy and Mohave County, we spent closer to 6-8 months working on the ordinance.

Further, AriSEIA would like to alleviate the concerns that some Supervisors have expressed to date about the toxicity of solar panels and the fire risk of both solar and battery storage. We have included an excerpt from Columbia Law School's article: Rebutting 33 False Claims about Solar, Wind, and Electric Vehicles as **Attachment B**.[1] There is also a very helpful video available as to potential toxicity to soil or water that we recommend.[2] Tim Kreis,[3] the City of Phoenix's Assistant Fire Chief, presented on the safety of lithium-ion batteries at the Arizona Technology Council E-Mobility and Clean Energy Summit held on June 27th. Batteries used for electric vehicles and energy storage have *less* fires than other types of batteries found in the home. We recommend Yavapai County reach out to him with additional questions. Firefighter safety has been addressed by several organizations including Underwriters Laboratories (UL), the Interstate Renewable Energy Council (IREC) and the International Association of Firefighters (IAFF), resulting in guidelines involving solar products; IAFF, UL and IREC

[1] The full article can be found here. Toxicity of solar panels is address as False Claim #2, *available here* https://scholarship.law.columbia.edu/cgi/viewcontent.cgi?article=1218&context=sabin_climate_change.
[2] Are Solar Farms Toxic? Experts Say No, *available here* https://youtu.be/9f_p1a_S17A?feature=shared.
[3] Tim Kreis' bio can be found here https://www.phoenix.gov/fire/about-us/executive-staff.

have all developed related training. Finally, we have attached the American Clean Power Association's fact sheet on utility scale storage safety as **Attachment C**.

Section 501: (3) ground mounted PV panel height.

- We recommend a minimum height of 20' for ground mounted parking structures with solar at full tilt.

Section 501: (6) cap for small scale battery storage in residential.

- It should refer to the International Residential Code (IRC). This would allow it to follow the code updates as they come out.
- The limitation of 80 kWh should not apply if the IRC is used. The 2021 IRC, Section 327.5, allows up to 80 kWh of ESS, unless the system is installed in accordance with Sections 1206.1 through 1206.9 of the International Fire Code (IFC).
- Sections 1206.1 through 1206.9 of the IFC allows larger ESS to be installed. It does not apply to just multi-family or commercial/industrial use. It can be used in single family residential dwellings for larger ESS installations.

Section 608: (D) Solar Facility Use Permits

- (D)(2)(l)(4) we talked with two Line Siting attorneys and a member of the Line Siting Committee and we understand that this section is in conflict with the intent of the Line Siting statutes (Article 6.2 of the Arizona Revised Statutes). The Line Siting Committee was specifically established to provide a single venue in which to evaluate transmission impacts.[4] Also, if the ordinance is intended to apply to federal lands, that would also be preempted. Further, what does "other permits related to the solar facility mean"? Finally, permits should be permitted to be pursued in parallel to reduce delay.

Section 608: (F) Development and Performance Standards

- (F)(1)(a) the maximum development area of three thousand 3,000 acres is very limiting, we suggest >5,000.
- (F)(1)(b) we advocate for removal of the cumulative acreage maximum for all solar facilities located within Yavapai County, but at the very least match what other jurisdictions are doing e.g., the City of Eloy allows for 16% of their total incorporated area v. the 0.15% Yavapai is proposing here.

[4] Session Law 1971, Ch. 67, § 1, at pp. 180–183, *available here* https://azmemory.azlibrary.gov/nodes/view/20971?keywords=session%20laws%201971&highlights=eyIwIjoibGF3cyIsIjEiOiJzZXNzaW9uLCIsIjIiOiJzZWN0aW9uIiwiMyI6InNlc3Npb24uIiwiNCI6IjE5NzEpIiwiNiI6InNlc3Npb24iLCI3IjoibGF3cywiLCIxNSI6IjE5NzEsIn0=.

- (F)(1)(c) we propose 1/4 mile or 1/2 mile instead of more than one mile from incorporated town/city limits.
- (F)(1)(d) we recommend removal of the more than one mile from airports requirement. Anti-glare solar panels are not shown to impact airport activity.
- (F)(1)(f)(1) this is too vague. What "resources" are being contemplated?
- (F)(1)(f)(8) the restriction on development of areas with 25%+ canopy density of woody or cactus species is too low.
    - We typically only see revegetation requirements, not restrictions on developing in areas with a certain perennial coverage. Restrictions are typically reserved for areas with sensitive plants or riparian vegetative communities. We propose replacing this restriction with a requirement for a restoration plan or stipulations (mitigation) to restore back to 25% cover instead.
- (F)(2) Setbacks
    - (F)(2)(a) the setback from any lake, creek, perennial or intermittent stream, river, major tributary, riparian areas, wetlands, seeps, or FEMA floodplain should be 50'-100'.
        - Minor tributaries have a setback of 150' is also too high.
    - (F)(2)(d) a 500' setback from "federally managed lands" is unnecessary given there are project *on* federally managed lands.
    - (F)(2)(g) the slope grade is reasonable, but the distance from the slope is too high, especially if a project complies with the drainage plan requirements.
    - (F)(2)(i) 50-100 feet from a significant scenic, historic, cultural, or archeological sites is reasonable, but how is "significant" defined?
    - (F)(2)(j) we recommend setbacks of 50' from public road rights-of-way.
    - (F)(2)(k) 50-75' setbacks from all property lines is reasonable.
- (F)(8)(c) we confirmed this is already included within the Line Siting requirements and would be redundant.
- (F)(9) We recommend striking "Additional lightning after approval of the Use Permit may require an amendment to the Use Permit" and make clear that lighting plans are preliminary. It is atypical to provide this level of detail (especially if binding) at this stage of permitting
- (F)(10) Noise levels are too low due to battery HVAC units, which usually emit 85dB 3' away. We suggest increasing to 65dB.

Section 608: (K) Substations

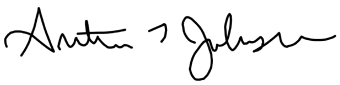
- (K)(1)(a) Substations should be permitted 100' from any residences. A more onerous requirement will inevitably make the gen-ties longer, which will be more onerous visually and have greater land use impacts.
- (K)(1)(b) severely limits flexibility in design and where substations can be sited, which may result in inefficient electrical design e.g., longer gen-ties and more impacted land.

The location of the substation is highly project-specific and depends on the project's design and POI. This requirement should be removed.

Section 608: (M) Decommissioning and Reclamation

- (M)(1)(e) projects typically need more than 12 months for decommissioning (typically takes as long to decommission as to construct). 24 months is more reasonable or the ordinance should provide flexibility based on project size.
- (M)(5) should be 12 months instead of 6 for a project to be abandoned.

Respectfully,



/s/ Autumn T. Johnson
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ATTACHMENT A

Yavapai County Solar (Example Project)
Economic Impact and Tax Revenue Analysis

Prepared for:

Arizona Solar Energy Industries Association

(AriSEIA)

July 2024

Prepared by:

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Summary of Impacts

There is a common misconception that solar projects do not contribute to the economy nor generate tax revenues for local governments. However, solar projects across all counties in Arizona are subject to personal property taxes on equipment and, thus, generate significant revenue for local taxing jurisdictions as outlined in this report. In addition, solar projects can contribute to increased real property taxes as well as generate use taxes levied on non-exempt equipment for the State (but these additional State taxes are not included in this analysis).

This report estimates the impacts of a typical solar project to be located in Yavapai County. This example solar power generating facility would sit on an estimated 1,200 acres and produce up to 200 MW of power and includes the addition of 200 MW (4 hours) of battery storage. A facility of this size is generally in range with recent power purchase contracts announced by Arizona Public Service and Salt River Project, two of the state's largest electric utilities.

The taxable original cost of a project of this size is estimated at $528.0 million. The taxable original cost is subject to personal property tax using a 30-year straight-line depreciation with a 10% floor for solar and 15-year straight-line depreciation with a 10% floor for battery storage. The full cash value of renewable energy equipment is 20% of the depreciated cost of the equipment per ARS 42-14155. This full cash value is subject to Arizona personal property taxes over the life of the project (40 years for the solar facility and 20 years for battery storage).

Impact Summary

During construction, an estimated $888,800 in tax revenues and 301 jobs would be created in the local economy from this example project. In addition, over the life of the project, more than $14.8 million in tax revenue would be generated by personal property tax on equipment. These taxes would directly benefit the county, its special districts (such as county fire, flood and library districts), and local school districts. Furthermore, employees working on the project generate an estimated $1.0 million in tax revenues.

In total, this example Yavapai County Solar Project would generate an estimated $16.8 million in tax revenues during the life of the project. The total economic output of the project over the life of the project is estimated at $201.0 million.

Yavapai County Solar Project Summary Impact

Construction related jobs	301
Taxes generated during construction	$888,800
Personal property tax generated during life of project	
Yavapai County and special districts	$7.6 million
Local school districts	$7.2 million
Tax revenues generated by employees	$1.0 million
Grand total of taxes generated during life of Project	**$16.8 million**
Total economic activity during life of project	**$201.0 million**

Economic Impact and Tax Revenue Analysis

Economic Impacts

- Development would provide an immediate $37.7 million in direct construction impact in the County, generating a direct, indirect and induced total of $51.0 million in total economic impact from construction activity. This investment would create 301 construction and related jobs and $16.4 million in wages over the projected construction schedule.

- Once operating, an estimated $3.8 million in annual economic activity would occur within the County's economy each year.

- All totaled, the example solar project would create over $201.0 million in economic activity within Yavapai County during construction and 40 years of operations for solar and 20 years of operations of the battery storage.

Economic Impact Summary
Yavapai County Solar Project
(2024 dollars)

Construction

Impact Type	Jobs	Wages	Economic Output
Direct	225	$12,936,000	$37,700,000
Indirect	33	$1,685,000	$6,295,000
Induced	43	$1,825,000	$6,958,000
Total	**301**	**$16,446,000**	**$50,953,000**

Ongoing Annual Operations

Impact Type	Annual Jobs	Total Wages	Economic Output
Direct	4	$448,000	$2,836,100
Indirect	2	$129,100	$625,000
Induced	2	$76,100	$289,900
Total	**8**	**$653,200**	**$3,751,000**

Total economic output during construction and 40 years of operations:	**$200,993,000**

Source: Elliott D. Pollack & Company; IMPLAN

Tax Revenues Generated

Construction and operations of the solar project would create significant tax revenue for Yavapai County and other entities. While the project would be exempt from prime contracting transaction privilege tax (under ARS 42-5075(b)(7) and ARS 42-5061), there is still substantial value from solar equipment that would increase the personal property revenues for the County. Revenues would also be generated from secondary sources of employee generated revenue.

- Yavapai County would receive an estimated $888,800 in cumulative tax revenue from construction related impacts. These impacts are generated by the share of employees that would spend within Yavapai County during the construction phase.

Tax Revenues during Construction
Yavapai County Solar Project
(2024 dollars)

	Secondary Revenues			
Impact Type	Employee Spending Sales Tax	Resident Property Tax	State Shared Revenues	**Total Revenues**
Direct	$145,000	$521,100	$2,350	**$668,450**
Indirect	$20,200	$76,700	$340	**$97,240**
Induced	$24,100	$98,600	$430	**$123,130**
Total	**$189,300**	**$696,400**	**$3,100**	**$888,800**

1/ The figures are intended only as a general guideline as to how the taxing jurisdictions could be impacted by the project. The above figures are based on the current economic structure and tax rates of the State of Arizona, county and other taxing jurisdictions.

Source: EDPCo; IMPLAN; ADOR; ATRA

Operations of the example solar project would create tax revenue for the County and local school districts.

- Yavapai County property taxes include taxing jurisdictions such as Yavapai County the fire district assistant tax, county flood and library, community college district and the vocational district. These jurisdictions would receive an average of $191,200 per year in personal property taxes. The school districts would receive an average of $180,300 in tax revenue each year.

- Average annual taxes generated for the County from employees total an estimated $25,300 each year.

In total, the combined annual taxes generated for the County average an estimated $396,800 each year.

Average Annual Tax Revenues Yavapai County Solar Project (2024 dollars)	
Average Annual Operating Taxes Generated	
Personal property tax	
County and Special Districts	$191,200
Local School Districts	$180,300
Tax revenues generated by employees	$25,300
Total Operations Related Revenue	**$396,800**

1/ The figures are intended only as a general guideline as to how the county could be impacted by the project. The above figures are based on the current economic structure and tax rates of the State of Arizona and county.

Source: Elliott D. Pollack & Co.; IMPLAN; AZDOR; AriSEA; ATRA

- Over the life of the project, the County and its school districts would receive an estimated $16.8 million in total from construction and ongoing annual tax collections generated by the Yavapai Solar Project.

- If the site is located within an incorporated area, the property taxes for that area would be collected in addition to the County and School Districts. The following table also provides the projected taxes for each of those jurisdictions.

Tax Revenues: Life of Project Yavapai County Solar Project (2024 dollars)	
Construction related tax revenues	$888,800
Operations Impact	
Personal property tax	
County and Special Districts	$7,646,300
Local School Districts	$7,210,700
Tax revenues generated by employees	$1,012,000
GRAND TOTAL FISCAL IMPACT	**$16,757,800**
Personal property tax for incorporated areas*	
Clarkdale	$2,947,000
Prescott	$525,000
Sedona	$563,000
Wickenberg	$968,000

*Collected if the site is located within the respective incorporated area.

1/ The figures are based on a 40-year life and intended as a general guideline as to how the local governments could be impacted by the project. The above figures are based on the current economic structure and tax rates of the State of Arizona and other taxing jurisdictions.

Source: Elliott D. Pollack & Co.; AriSEA; IMPLAN

About Elliott D. Pollack & Company

Elliott D. Pollack & Company has been in business for more than 30 years and is headed by one of Arizona's most noted economists. The firm is known for its expertise in two primary areas – real estate and economics, with its primary practice in the State of Arizona. The firm has been employed by public institutions, state, county, and local governments, private entities, and Native American Communities, in a variety of assignments that include economic impact analyses, real estate market studies, forecasting, and public speaking at events around the State.

Assumptions & Methodology

The typical 1,200-acre solar power generating facility would produce up to 200 MW of power and includes the addition of 200 MW (4 hours) of battery storage. The total value of the example project is estimated at $528.0 million including construction and equipment. A facility of this size is generally in range with recent power purchase contracts announced by Arizona Public Service and Salt River Project, two of the state's largest electric utilities.

Project Assumptions Yavapai County Solar Project (2024 dollars)	
Acres	1,200
Solar Facility (MW)	200
Battery Storage - 4 hours (MW)	200
Taxable Original Cost of Equipment*	
Solar Equipment	$207,000,000
Battery Storage Equipment	$321,000,000
Total value of project	$528,000,000
*Taxable Original Cost is subject to personal property tax per the ADOR	
Source: AriSEA; Elliott D. Pollack & Company	

The following table outlines the weighted average tax rates used in estimating the property tax impacts of the example Yavapai County Solar Project. These rates are applied to every $100 of net assessed value. The rates are current as of this report and are used for the entire duration of the estimated project life.

Average Property Tax Rates Yavapai County Solar Project	
DISTRICT	**RATE**
Yavapai County	1.715
Fire District Assistance Tax	0.083
County Flood	0.175
County Library	0.140
Community College	1.508
VIT	0.050
Local School Districts	3.462
Grand Total	**7.133**
Municipal Property Tax Rates	**RATE**
Clarkdale	1.4150
Prescott	0.2520
Sedona	0.2703
Wickenberg	0.4646
Source: County Assessor's Office	

Economic Impact Methodology

Economic impact analysis examines the economic implications of an activity in terms of output, earnings, and employment. For this study, the analysis focused on the construction impacts as well as the ongoing operations including direct expenditures by the residents.

The different types of economic impacts are known as direct, indirect, and induced, according to the manner in which the impacts are generated. For instance, direct employment consists of permanent jobs held by project employees. Indirect employment is those jobs created by businesses that provide goods and services essential to the operation or construction of the project. These businesses range from manufacturers (who make goods) to wholesalers (who deliver goods) to janitorial firms (who clean the buildings). Finally, the spending of the wages and salaries of direct and indirect employees on items such as food, housing, transportation and medical services creates induced employment in all sectors of the economy, throughout the region. These secondary effects are captured in the analysis conducted in this study.

Multipliers have been developed to estimate the indirect and induced impacts of various direct economic activities. IMPLAN developed the multipliers used in this study and were selected based on the land use type. The multipliers used for this project represent the construction of power and communication as well as electric power generation for ongoing operations.

The construction multipliers specific to Yavapai County are used in this study. For the solar generation multiplier, an average of similar economies was used, as the current multiplier set for Yavapai County does not exist.

The economic impact is categorized into three types of impacts:

(1) **Employment Impact** – the total wage and salary and self-employed jobs in a region. Jobs include both part time and full-time workers.

(2) **Earnings Impact** – the personal income, earnings or wages, of the direct, indirect and induced employees. Earnings include total wage and salary payments as well as benefits of health and life insurance, retirement payments and any other non-cash compensation.

(3) **Economic Output** – also referred to economic activity, relates to the gross receipts for goods or services generated by the company's operations.

Economic impacts are by their nature regional in character. Such impacts are best illustrated when not assigned to a specific municipality or locality, although clearly the primary impact of job creation would be in the municipality and county where the project is located. Indeed, many communities in the surrounding region would also benefit from the operations of the project.

Fiscal Impact Methodology

Fiscal impact analysis studies the public revenues associated with a particular economic activity. The primary revenue sources of local, county, and state governments (i.e., taxes) are analyzed to determine how an activity may affect the various jurisdictions. This section would evaluate the impact of the project on State, county and local school districts.

The fiscal impact figures cited in this report have been generated from information provided by a variety of sources including the U.S. Bureau of the Census; the U.S. Department of Labor; the Internal Revenue Service; the State of Arizona; the Arizona Tax Research Association; and the U.S. Consumer Expenditure Survey. Elliott D. Pollack & Company has relied upon the estimates of operating revenues outlined in this study.

Fiscal impacts are categorized by type in this study, similar to economic impact analysis. The major sources of revenue generation for governmental entities are calculated based on ongoing operations. Employees would spend part of their salaries on local goods and services and pay taxes on the homes they occupy. This spending would contribute to revenues collected by the State that are ultimately shared with local governments.

The project would be exempt from prime contracting transaction privilege tax (under ARS 42-5075(b)(7) and ARS 42-5061). However, there is still substantial value from solar equipment that would increase the personal property revenues for the County. Revenues would also be generated from secondary sources of employee generated revenue. The following is a description of the applicable revenue sources that would be considered for this analysis.

Primary Taxes Generated by Project

- Personal Property Tax

  Renewable energy projects are centrally assessed by the Arizona Department of Revenue. The total original cost is used to calculate the full cash value. The depreciation schedule is then based on straight-line depreciation over the useful life (currently 30 years capped at 90% of taxable original cost per ARS 42-14155). The full cash value factor for renewable energy is 20% and the assessment ratio of 15% is applied for a total taxable value each year.

Secondary Taxes Generated by Employees

The following tax rates are applied to the spending of direct, indirect and induced employees.

- Transaction Privilege Tax

  The State, counties, and local cities in Arizona charge sales tax on retail goods and utility usage. The sales tax rate for the State is 5.6%. Portions of this tax are redistributed through revenue sharing to counties and cities throughout Arizona based on population. The weighted average tax rate for local governments is 2.83%. Based on data from the U.S. Consumer Expenditure Survey, the projected extent of retail spending and resulting sales tax receipts was calculated.

- Property Tax

  Given that the location of the example project is unknown, the value of the land was not estimated and, thus, real property taxes for the land are not calculated in this report. However, the employees would be subject to residential property tax in Arizona with an assessment ratio of 10%. In order to estimate property taxes, the assessed full cash value of the occupied space along with the projected value of a typical housing unit has been calculated.

- State Shared Revenues

  Each municipality in Arizona receives a portion of State revenues from four different sources - State sales tax (see description above), State income tax, vehicle license tax and highway user tax. The formulas for allocating these revenues are primarily based on population. Counties also share in the revenue sources of the State, with the exception of income tax.

  State Income Tax

  The State of Arizona collects taxes on personal income. The tax rate used in the analysis averages about 1.6% for earnings. These percentages are based on the most recently available income tax data from the State and the projected wage levels of jobs created by the construction and operations impact. This tax is applied to the wages and earnings of direct and indirect employment. Portions of this tax are redistributed through revenue sharing to cities throughout Arizona based on population.

  HURF Taxes

  The State of Arizona collects specific taxes for the Highway User Revenue Fund (HURF). Both the registration fees and the motor vehicle fuel tax (gas tax) are considered in this analysis. The motor vehicle fuel tax is $0.18 per gallon and is calculated based on a vehicle traveling the Arizona statewide average of 12,000

miles per year at 16.6 miles per gallon. Registration fees average $65 per employee in the State of Arizona. These factors are applied to the projected direct and indirect employee count. Portions of these taxes are distributed to cities and counties throughout Arizona based on a formula that includes population and the origin of gasoline sales.

Vehicle License Tax

The vehicle license tax is a personal property tax placed on vehicles at the time of annual registration. This factor is applied to the projected direct, indirect and induced employee count. The average tax used in this analysis is $343 and portions of the total collections are distributed to the Highway User Revenue Fund. The remaining funds are shared between cities and counties in accordance with population-based formulas.

The above tax categories represent the largest sources of revenues that would be generated to the various jurisdictions. The revenue impacts do not include certain revenue sources such as corporate income taxes. All tax collections represented in this analysis are gross collections and do not take into consideration any incentives or development agreements that may occur.

APPENDIX 1: Annual Personal Property Tax Estimates by Jurisdiction

Personal Property Tax Impact from Operations
Yavapai County Solar Project
(2024 dollars)

	Construction	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13
Total taxable value	$15,840,000	$14,991,000	$14,142,000	$13,293,000	$12,444,000	$12,423,000	$11,518,800	$10,614,600	$9,710,400	$8,806,200	$9,144,000	$8,157,000	$7,170,000	$6,183,000
Yavapai County	$271,624	$257,066	$242,507	$227,948	$213,390	$213,030	$197,524	$182,019	$166,514	$151,009	$156,801	$139,876	$122,951	$106,026
Fire District Assistance Tax	$13,084	$12,383	$11,681	$10,980	$10,279	$10,261	$9,515	$8,768	$8,021	$7,274	$7,553	$6,738	$5,922	$5,107
County Flood	$27,720	$26,234	$24,749	$23,263	$21,777	$21,740	$20,158	$18,576	$16,993	$15,411	$16,002	$14,275	$12,548	$10,820
County Library	$22,239	$21,047	$19,855	$18,663	$17,471	$17,442	$16,172	$14,903	$13,633	$12,364	$12,838	$11,452	$10,067	$8,681
Community College	$238,931	$226,124	$213,318	$200,512	$187,705	$187,389	$173,750	$160,111	$146,472	$132,833	$137,928	$123,040	$108,152	$93,264
VIT	$7,920	$7,496	$7,071	$6,647	$6,222	$6,212	$5,759	$5,307	$4,855	$4,403	$4,572	$4,079	$3,585	$3,092
Yavapai County	**$581,518**	**$550,350**	**$519,181**	**$488,013**	**$456,844**	**$456,073**	**$422,878**	**$389,683**	**$356,488**	**$323,293**	**$335,695**	**$299,460**	**$263,225**	**$226,990**
Local School Districts	$548,390	$518,997	$489,604	$460,212	$430,819	$430,092	$398,788	$367,484	$336,180	$304,876	$316,571	$282,400	$248,230	$214,059
Grand Total	**$1,129,908**	**$1,069,347**	**$1,008,786**	**$948,224**	**$887,663**	**$886,165**	**$821,666**	**$757,167**	**$692,668**	**$628,169**	**$652,265**	**$581,860**	**$511,455**	**$441,049**

	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Year 21	Year 22	Year 23	Year 24	Year 25	Year 26	Year 27
Total taxable value	$5,517,000	$6,414,000	$5,986,200	$5,558,400	$5,130,600	$4,730,400	$4,357,800	$1,863,000	$1,656,000	$1,449,000	$1,242,000	$1,035,000	$828,000	$621,000
Yavapai County	$94,606	$109,987	$102,651	$95,315	$87,980	$81,117	$74,728	$31,947	$28,397	$24,847	$21,298	$17,748	$14,199	$10,649
Fire District Assistance Tax	$4,557	$5,298	$4,945	$4,591	$4,238	$3,907	$3,600	$1,539	$1,368	$1,197	$1,026	$855	$684	$513
County Flood	$9,655	$11,225	$10,476	$9,727	$8,979	$8,278	$7,626	$3,260	$2,898	$2,536	$2,174	$1,811	$1,449	$1,087
County Library	$7,746	$9,005	$8,405	$7,804	$7,203	$6,641	$6,118	$2,616	$2,325	$2,034	$1,744	$1,453	$1,163	$872
Community College	$83,218	$96,749	$90,296	$83,843	$77,390	$71,353	$65,733	$28,101	$24,979	$21,857	$18,734	$15,612	$12,490	$9,367
VIT	$2,759	$3,207	$2,993	$2,779	$2,565	$2,365	$2,179	$932	$828	$725	$621	$518	$414	$311
Yavapai County	**$202,540**	**$235,471**	**$219,765**	**$204,060**	**$188,355**	**$173,662**	**$159,984**	**$68,394**	**$60,795**	**$53,196**	**$45,596**	**$37,997**	**$30,398**	**$22,798**
Local School Districts	$191,002	$222,056	$207,246	$192,435	$177,624	$163,769	$150,870	$64,498	$57,332	$50,165	$42,999	$35,832	$28,666	$21,499
Grand Total	**$393,542**	**$457,527**	**$427,011**	**$396,495**	**$365,979**	**$337,432**	**$310,853**	**$132,893**	**$118,127**	**$103,361**	**$88,595**	**$73,829**	**$59,063**	**$44,298**

	Year 28	Year 29	Year 30	Year 31	Year 32	Year 33	Year 34	Year 35	Year 36	Year 37	Year 38	Year 39	Total
Total taxable value	$621,000	$621,000	$621,000	$621,000	$621,000	$621,000	$621,000	$621,000	$621,000	$621,000	$621,000	$621,000	
Yavapai County	$10,649	$10,649	$10,649	$10,649	$10,649	$10,649	$10,649	$10,649	$10,649	$10,649	$10,649	$10,649	$3,571,500
Fire District Assistance Tax	$513	$513	$513	$513	$513	$513	$513	$513	$513	$513	$513	$513	$172,000
County Flood	$1,087	$1,087	$1,087	$1,087	$1,087	$1,087	$1,087	$1,087	$1,087	$1,087	$1,087	$1,087	$364,500
County Library	$872	$872	$872	$872	$872	$872	$872	$872	$872	$872	$872	$872	$292,400
Community College	$9,367	$9,367	$9,367	$9,367	$9,367	$9,367	$9,367	$9,367	$9,367	$9,367	$9,367	$9,367	$3,141,700
VIT	$311	$311	$311	$311	$311	$311	$311	$311	$311	$311	$311	$311	$104,100
Yavapai County	**$22,798**	**$22,798**	**$22,798**	**$22,798**	**$22,798**	**$22,798**	**$22,798**	**$22,798**	**$22,798**	**$22,798**	**$22,798**	**$22,798**	**$7,646,300**
Local School Districts	$21,499	$21,499	$21,499	$21,499	$21,499	$21,499	$21,499	$21,499	$21,499	$21,499	$21,499	$21,499	**$7,210,700**
Grand Total	**$44,298**	**$44,298**	**$44,298**	**$44,298**	**$44,298**	**$44,298**	**$44,298**	**$44,298**	**$44,298**	**$44,298**	**$44,298**	**$44,298**	**$14,857,000**

NOTES

1 Depreciation used to value "renewable energy equipment" is based on "straight-line depreciation over the useful life, as adopted by the department" per ARS 42-14155.
2 Depreciation uses a 30 year straight line depreciation for solar and 15 year for battery storage in this analysis as advised by the Arizona Department of Revenue.
3 Through 12/31/40 the full cash value of "renewable energy equipment" is 20% of the depreciated cost of the equipment per ARS 42-14155. This report assumes the statute will be extended to cover the life of the project.
4 The total may not equal the sum of the impacts due to rounding. All dollar figures are in constant dollars. Inflation has not been included in these figures.
5 The figures for the County as a whole are based on the current tax rates and assume the Project would not impact these rates.
6 The forecasts are subject to uncertainty and variation. Accordingly, we do not represent them as results that will be achieved. Changes in rates would alter the findings of this analysis.

Source: Elliott D. Pollack & Company; IMPLAN; Arizona Department of Revenue; Arizona Tax Research Association; AriSEA

ATTACHMENT B

Columbia Law School | Columbia Climate School
Sabin Center for Climate Change Law

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

APRIL 2024

(Updated June 2024)

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PART A: FALSE CLAIMS ABOUT SOLAR ENERGY (#1–#14)

False Claim #2: Toxic heavy metals, such as lead and cadmium, leach out from solar panels and pose a threat to human health.

> *"Studies have shown the heavy metals in solar panels namely lead and cadmium, can leach out of the cells and get into groundwater, as well as affect plants."*[38]

Roughly 40% of new solar panels in the United States and 5% of new solar panels in the world contain cadmium,[39] but this cadmium is in the form of cadmium telluride, which is non-volatile, non-soluble in water, and has 1/100th the toxicity of free cadmium.[40] Most solar panels, like many electronics, contain small amounts of lead.[41] However, the Massachusetts Department of Energy Resources (DER) has assessed that "because PV panel materials are enclosed, and don't mix with water or vaporize into the air, there is little, if any, risk of chemical releases to the environment during normal use."[42] The Massachusetts DER has further assessed that, even in the unlikely event of panel breakage, releases of chemicals used in solar panels are "not a concern."[43]

All materials in a solar panel are "insoluble and non-volatile at ambient conditions," and "don't mix with water or vaporize into air."[44] Moreover, they are encased in tempered glass that not only withstands high temperatures, but is also strong enough to pass hail tests and is regularly installed in Arctic and Antarctic conditions.[45] It is theoretically possible that, when exposed to extremely high heat exceeding that of a typical residential fire, panels "could emit vapors and particulates from PV panel components to the air." But that risk is limited by the fact that "the silicon and other chemicals that comprise the solar panel would likely bind to the glass that covers the PV cells and be retained there."[46] When a cadmium telluride panel is exposed to fire of an intensity sufficient to melt the glass on the panel, "over 99.9% of the cadmium [is encapsulated in] the molten glass."[47] Furthermore, a 2013 analysis found that, even in the worst-case scenarios of earthquakes, fires, and floods, "it is unlikely that the [cadmium] concentrations in air and sea water will exceed the environmental regulation values."[48]

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[38] Emily Chantiri, *The Dark Side of Renewable Technology: Fossil Fuels Are Used to Produce Solar Panels*, AUSTRALIAN COMPUTER SOCIETY (Feb. 2, 2023), https://ia.acs.org.au/article/2023/the-dark-side-of-renewable-technology.html.
[39] *Polycrystalline Thin-Film Research: Cadmium Telluride*, NAT'L RENEWABLE ENERGY LABORATORY, May 2022, https://www.nrel.gov/docs/fy21osti/76975.pdf; *Taking Cadmium Telluride Technology to the Next Level,* US-MAC, https://www.usa-cdte.org/ (last visited March 25, 2024).
[40] *Health and Safety Impacts of Solar Photovoltaics* at 7*,* NC CLEAN ENERGY TECHNOLOGY CENTER, May 2017, https://content.ces.ncsu.edu/health-and-safety-impacts-of-solar-photovoltaics.
[41] Mark Hutchins, *The weekend read: A lead-free future for solar PV*, PV MAGAZINE, Oct. 26, 2019, https://www.pv-magazine.com/2019/10/26/the-weekend-read-a-lead-free-future-for-solar-pv/.
[42] Massachusetts Department of Energy Resources et al., *supra* note 33 at 5.
[43] *Id.*
[44] *Id.*
[45] *Id.*
[46] *Id.*
[47] NC CLEAN ENERGY TECHNOLOGY CENTER, *supra* note 40 at 7.
[48] Yasunari Matsuno, *Environmental risk assessment of CdTe PV systems to be considered under catastrophic events in Japan*, FIRST SOLAR, Dec. 1, 2013, https://www.firstsolar.com/-/media/First-Solar/Sustainability-Documents/Sustainability-Peer-Reviews/Japan_Peer-Review_Matsuno_CdTe-PV-Tsunami.ashx.

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

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

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

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

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

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

ATTACHMENT C

Claims vs. Facts

Energy Storage Leading on Safety


Photo credit: Fluence

Utility-scale battery energy storage is safe and highly regulated, growing safer as technology advances and as regulations adopt the most up-to-date safety standards.

Background

Energy storage systems (ESS) are critical to a clean and efficient electric grid, storing clean energy and enabling its use when it is needed. Installation is accelerating rapidly—as of Q3 2023, there was seven times more utility-scale energy storage capacity operating than at the end of 2020. This growth is driving job creation, investment in American manufacturing, and is improving grid resilience and energy security.

However, because energy storage technologies are generally newer than most other types of grid infrastructure like substations and transformers, there are questions and claims related to the safety of a common battery energy storage technology, lithium-ion (Li-ion) batteries. All of these questions and claims can be addressed with facts. The industry continues to address these concerns to ensure community confidence in this increasingly essential electric grid infrastructure.

CLAIM: The incidence of battery fires is increasing.

FACTS: Energy storage battery fires are decreasing as a percentage of deployments.

- Between 2017 and 2022, U.S. energy storage deployments increased by more than 18 times, from 645 MWh to 12,191 MWh[1], while worldwide safety events over the same period increased by a much smaller number, from two to 12[2].
- During this time, codes and standards regulating energy storage systems have rapidly evolved to better address safety concerns.


Photo credit: Fluence

CLAIM: Today's larger battery systems use tens of thousands of cells, so fires are inevitable.

FACTS: Cell failure rates are extremely low, and safety features in today's designs further reduce the probability of fires.

- One estimate from 2012 quotes a failure rate ranging from 1 in 10 million to 1 in 40 million cells[3], and there are undoubtedly improvements from these levels.
- Lithium-ion batteries experience extremely low failure rates, as shown by electric vehicle data.
  - Tesla alone sold nearly 900,000 vehicles in the first half of 2023[4]. These sales of new vehicles represent around three-quarters of a billion cells, but safety events involving all EVs on the road globally, from all manufacturers, amounted to just a few dozen fires.
- Today's energy storage systems (ESSs) predominantly use safer lithium-iron phosphate (LFP) chemistry, compared with the nickel-manganese-cobalt (NMC) technology found in EVs.
  - LFP cell failure results in less energy release and a lower probability of fire.
- ESS designs incorporate features to avoid propagation of cell failure within the battery, contributing to improved safety.

1 US Energy Storage Monitor, Q1 2023 full report and 2022 Year in Review, Wood Mackenzie Power & Renewables/American Clean Power Association, https://www.woodmac.com/industry/power-and-renewables/us-energy-storage-monitor/

2 Electric Power Research Institute, BESS Failure Event Database, https://storagewiki.epri.com/index.php/BESS_Failure_Event_Database

3 D. Doughty, Vehicle Battery Safety Roadmap Guidance, National Renewable Energy Laboratory, October 2012, https://doi.org/10.2172/1055366.

4 EV sales: Hyundai overtakes GM, but Tesla's U.S. dominance continues

CLAIM: E-bike and e-scooter fires have resulted in deaths—so large batteries for energy storage may be even more deadly.

FACTS: No deaths have resulted from energy storage facilities in the United States. Battery energy storage facilities are very different from consumer electronics, with secure, highly regulated electric infrastructure that use robust codes and standards to guide and maintain safety.

- E-mobility devices have been lightly regulated in the past, and some products have used poor-quality battery cells and ineffective safety systems.
  - They are also charged inside homes, sometimes along egress routes, creating a high level of risk.
- Like EV batteries, ESS battery systems are highly regulated and subject to stringent certification and testing requirements.
  - The difference in regulation is evident in vehicle statistics. Worldwide, for the first half of 2023, EV FireSafe cites 500+ light electric vehicle (E-bike and E-scooter) battery fires, but only 44 passenger EV fires[5].
  - Additionally, utility-scale energy storage systems are located within secure facilities with site plans explicitly designed around maximizing safety of those operating the facilities and their neighbors.
- The ESS industry meets with and shares best practices with first responders and communities.
  - Lessons learned from earlier ESS incidents have been reflected in the evolution of codes and standards. Often, companies go beyond mandatory testing to test more extreme failure scenarios.
- Altogether, like other electric grid infrastructure, energy storage systems are highly regulated and there are established safety designs, features, and practices proven to eliminate risks to operators, firefighters, and the broader community.
- The industry is committed to meeting these standards, such as NFPA 855, which are regularly updated to reflect the latest evidence-based best practices.

Photo credit: AES

CLAIM: Battery fires emit toxic fumes and pose a risk to the community

FACTS: Past incidents demonstrate that fires are contained within the facility, and air quality in neighboring areas remains at safe levels.

- Laboratory testing of emissions from Li-ion cells in thermal runaway shows that emissions are similar to those found in plastics fires[6].
- During an ESS battery fire, only trace amounts of chemicals are detected in sampling around the event, and overall air quality remains at safe levels.
- During a fire at a Tesla Megapack at Moss Landing in California, air-quality testing showed no hazards to human health[7].

CLAIM: Fire suppression systems should be mandatory for all lithium-ion battery systems.

FACTS: Regulations that aren't vetted by organizations like the National Fire Protection Association or are inconsistent with the International Fire Code may make projects less safe.

- Established national and international codes and standards already require BESS to incorporate the appropriate safety features to contain any potential fires or thermal events.
- Successful suppression of a fire does not guarantee that the underlying thermal runaway event has been terminated, so containing a fire is the best way to protect first responders and communities.
- The energy storage industry is working to avoid events such as the explosion at an installation in McMicken, Arizona, in which four firefighters were injured[8]. Prior to this event, the industry was focused on extinguishing fires as quickly possible, but McMicken showed that explosion can be a greater hazard and fire containment is a better strategy.
- The accepted best practice for the rare ESS fires that do occur is to contain them, managing the burn of the limited affected unit in a controlled manner while protecting nearby structures and equipment. This strategy eliminates any explosion hazard, avoids issues with stranded energy and reignition, and minimizes contaminated runoff of firefighting water.
- Codes and standards are changing to reflect this practice, placing an emphasis on explosion prevention. One proposal for the 2026 edition of NFPA 855, *Standard for the Installation of Stationary Energy Storage Systems*, would forbid installation of traditional clean-agent or aerosol fire suppression systems unless testing demonstrates that use of such systems does not create an explosion risk.

5 EV FireSafe, All Electrified Transport LIB Fire Incidents, Global, 1st January to 30th June 2023, https://www.evfiresafe.com/ev-battery-fire-overview.
6 DNV-GL, Considerations for ESS Fire Safety, Report for Consolidated Edison and NYSERDA, 2017
7 Air quality testing showed no hazards to human health amid battery fire in Moss Landing
8 Arizona ESS Explosion Investigation and Line of Duty Injury Reports Now Available