TO: Joint Standing Committee on Energy, Utilities and Technology

FROM: Cora Stryker, Cofounder, BrightSaver.org

DATE: 1.6.2026

RE: Testimony in Support of **LD 1730 — *An Act Regarding the Beneficial Electrification Policy of the State***

Dear Chair Melanie F. Sachs, Ranking Member Steven D. Foster, and Members of the Joint Standing Committee on Energy, Utilities and Technology. My name is Cora Stryker, cofounder of BrightSaver.org. We are building a movement to make solar ownership affordable and accessible to everyone. I am writing today to encourage the Committee to ensure that plug-in solar is clearly supported as part of LD 1730, and that the bill not include unnecessary non-export or zero-export requirements that would undermine affordability and access without improving grid safety.

Executive Summary

70% of households in the U.S. cannot access rooftop solar due to upfront costs, roof constraints, and or rental status. Plug-in solar—small, self-install systems that connect to a standard outlet—offers a market-driven alternative requiring no subsidies, tax credits, or public funds – but only if zero-export requirements are absent from legislation. Non-export or zero-exportrequirements effectively double the cost to the consumer and require professional installation.

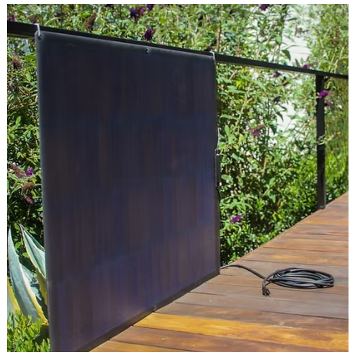
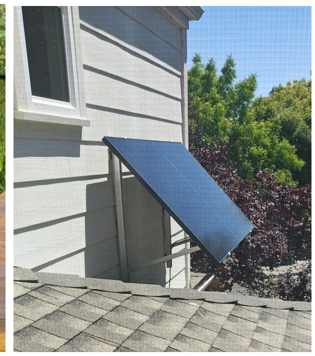
Already adopted by as many as 4 million households across Europe and Utah, these systems, if zero-export requirements are absent, are 80–97% cheaper than average U.S. rooftop systems and can pair with batteries for outage resilience. In 2025, Utah enacted H.B. 340, a bipartisan, budget-neutral deregulatory reform that exempts ≤1,200-W systems from one-size-fits-all interconnection rules designed for much larger arrays. If Maine adopted similar reforms, the average Mainer would save $442.87 annually with a 1.2kW system, resulting in a 4.06 year payback period.

However, if zero-export or non-export requirements are mandated in law, this payback period could be expected to double since the cost of the system would be roughly twice the cost of a system without non-export hardware.

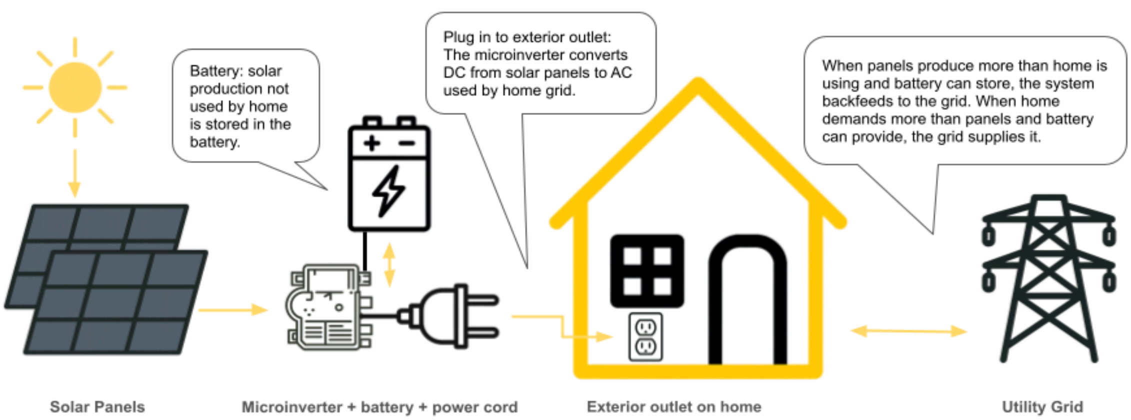
What Is Balcony Solar?

An estimated 4 million households in Germany have them – small compact systems that plug into a standard outlet, require no rooftop construction, and can be self-installed almost anywhere (ground, balcony, deck, the side of a building etc). Without no-export requirements, they are low cost ($600-$5,000) and they work for renters, apartments, and homes with unsuitable roofs. Non-export requirements effectively double the cost to the consumer and require professional installation.



Here's how it works



The "Without Export" Requirement and Engineering Evidence

The substitute version of LD 1730 conditions access to plug-in solar on systems operating "without export" to the utility grid. While this requirement is well-intentioned and reflects concern for grid stability, it is not supported by engineering evidence and risks effectively doubling system costs while limiting access for the very households the legislation is intended to benefit. Evaluating the appropriateness of this requirement requires careful consideration of empirical grid-impact data produced by recognized experts in electrical safety and distributed energy systems.

The most comprehensive analysis of the grid impacts of plug-in solar systems has been conducted by **Brooks Engineering**, led by **Bill Brooks, P.E.**, one of the most respected authorities in solar safety, electrical codes, and grid interconnection in the United States. Mr. Brooks brings more than forty years of experience in photovoltaic systems, energy storage, and electrical code development. He has served as Secretary of National Electrical Code (NEC) Code-Making Panel 4, which governs photovoltaic systems nationwide; as Chair of the UL 1741 Standards Technical Panel, the primary UL standard for solar inverter and interconnection safety; and as a Technical Advisor to the U.S. Department of Energy. He is also the author of national interconnection guidelines for the Solar America Board for Codes and Standards, an advisor to national laboratories including the National Renewable Energy Laboratory and Sandia National Laboratories, and has trained more than 15,000 electricians, inspectors, and engineers worldwide. This background situates his analysis firmly within the mainstream of U.S. electrical safety and regulatory practice.

Under Mr. Brooks' direction, the Brooks Engineering study modeled 1.2-kilowatt plug-in solar systems across multiple regions of the United States, including the Northeast, using real hourly household electricity consumption data and conservative system performance assumptions. The analysis was designed to quantify both individual household export and aggregate residential sector impacts under realistic and optimistic adoption scenarios.

The results demonstrate that plug-in solar systems do not export electricity at levels that pose a material risk to utility distribution infrastructure. The maximum export from an individual home was found to be less than 0.76 kilowatt-hours per day and occurred only on a small number of mild spring or fall days when household electricity consumption is unusually low. Even under an optimistic scenario in which 25 percent of households adopt plug-in solar, Mr. Brooks's modeling shows that the residential sector produces zero net hourly export. Aggregate export did not occur until market penetration approached approximately 40 percent, a level far beyond any realistic forecast for market adoption.

These findings indicate that plug-in solar systems function in practice more like energy efficiency measures than like generation resources. Rather than stressing grid infrastructure or creating line-worker safety concerns, they reduce midday electricity demand and modestly lower overall utility load. In this context, a blanket "without export" requirement imposes technical and financial constraints that are not justified by modeled grid impacts and may undermine the affordability and accessibility goals of LD 1730.

Proposed Amendment: Protecting Safe, Affordable Plug-In Solar at 391 Watts

Bright Saver strongly urges the inclusion of the following language to ensure that plug-in solar remains truly accessible, affordable, and practical for renters and residents of multifamily housing:

> "A plug-in solar energy system that has a maximum power output to the receptacle outlet of **391 watts or less** is exempt from product listing provisions that would require alterations to the building's premises wiring or electrical panels. Landlords, homeowners' associations, common interest community associations, and condominium unit owners' associations shall not adopt, enforce, or attempt to enforce any restriction, covenant, bylaw, regulation, lease stipulation, or other rule that directly or indirectly restricts, prohibits, or imposes unreasonable conditions on the installation, use, or operation of a plug-in solar energy system. Any such restriction is void and unenforceable as a matter of public policy, and no landlord or association may impose fees, insurance requirements, or procedural conditions that function as a prohibition."

This language is essential because, without it, statutory authorization alone is not enough. In practice, private rules imposed by landlords or associations can—and often do—block adoption entirely, particularly in rental and condominium housing. The proposed language ensures that the lowest-risk plug-in solar systems can actually be used by the households that need them most.

Importantly, this approach is already proven safe. Germany has allowed comparable plug-in "balcony" solar systems to be self-installed for more than ten years, across approximately four million households. During that time, these systems have operated under clear size limits and basic safeguards, without any major safety incidents affecting homes, residents, utility workers, or the electric grid. The 391-watt threshold reflects the same electrical load on U.S. household wiring as Germany's long-standing standard and fits comfortably within the capacity of typical residential circuits.

By pairing this modest wattage limit with protections against private prohibitions, the proposed language establishes a clear, safe, and affordable pathway to participation. It allows plug-in solar to function as an entry point to beneficial electrification rather than a privilege limited to property owners, while maintaining confidence in household safety and grid integrity.

Appendix

Below, we are pasting the analysis from Brooks Engineering showing that even with 25% adoption rate, there would be no net export on an hourly basis in any region on the U.S.

Plug-In Solar Utility Impact in the United States: a Survey of Regional Issues based on Widespread Market Acceptance

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December 3, 2025

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1 Executive Summary

To quantify the impact of broad adoption of plug-in solar across the United States, a series of simulations were performed using the performance of a 1.2 kW plug-in solar system in distinct geographical locations. Hourly data from these sites were compared with hourly consumption data for different types of homes in the region. An optimistic market penetration rate of at least 25% was used throughout these regions. The maximum electrical energy exported from a single home was calculated. Additionally, the average utility impact of a single home was averaged into the consumption of the whole sector to show the actual impact on the utility grid.

The simulations showed that the maximum export energy produced by a 1.2 kW plug-in solar system was 0.76 kWh per day in Boston, Massachusetts. These maximum export days occurred in the spring and fall when home consumption is lowest. However, when averaged into the overall consumption of each home type at a 40% penetration level, the amount of energy exported on a hour-by-hour basis from the home type sector was 0 kWh per day. This is true even in the spring and fall because the minimum load of ten homes is greater than the maximum output of four homes each with a 1.2 kW solar system (40% of market).

In summary, regardless of the region in the United States, if 1.2 kW plug-in solar systems were to enjoy a 40% market share across all housing sectors, these systems would never produce any net export energy to the grid on an hourly basis. All energy produced by these plug-in systems would be consumed by the energy consumption of the respective housing sectors. Therefore, it can be reasonably deduced by this fact alone that the impact of plug-in solar is simply to reduce the utility electricity consumption of the sector while not negatively impacting the infrastructure of the electrical distribution system. The impact of plug-in solar on the utility grid is exactly the same as energy conservation measures that reduce electricity consumption in the middle of the day. Plug-in solar systems limited to 1.2 kW will not require any infrastructural changes to the utility distribution system regardless of the location in the United States.

2 Utility Grid Impact of Plug-In Solar on a Regional Basis

2.1 Regional and Home Type Issues

The impact of a high penetration of plug-in solar systems is best evaluated on a regional basis. The impact of plug-in solar on a region is a function of many variables. The predominant variables are solar resource and regional residential sector energy consumption. The U.S. Energy Information Administration (EIA) keeps statistics on many relevant metrics to evaluate these impacts. The EIA breaks the United States into four distinct regions: (1) Northeast; (2) South; (3) Midwest; and (4) West. While these regions do not cover every relevant region in the United States, it is a widely respected model that has been used effectively for decades. The data in Figure 1 is several years old, but it is still useful for understanding how much energy homes use based on region and home type. What is consistent is that homes in the south use more energy on average than homes in other parts of the country. The simple reason for this fact is that homes in the south require more dehumidification which requires more energy to run air conditioners to remove the moisture from the air in the summer months.

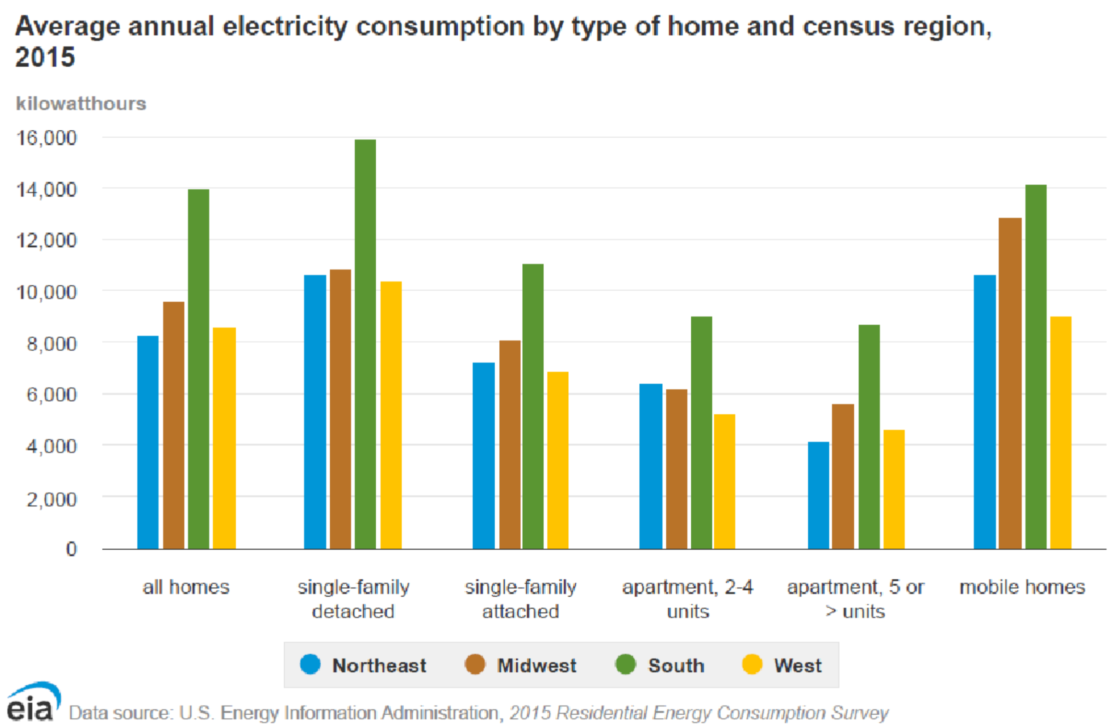

Figure 1: Average Home Energy Consumption Based on Type and Region

While it is clear that regional differences exist with home energy consumption, the type of home is also relevant. In the European market, a high percentage of plug-in solar users live in apartments. This does not mean that only apartment dwellers use plug-in solar, but it is a target market for the United States and is likely to be a reasonable percentage of the users of these plug-in products. Apartments and other multi-family buildings tend to have lower consumption per unit, but much higher consumption density based upon the land these units cover. High rise apartment complexes would be an example of the very highest energy consumption density since so many units are located on a relatively small footprint of land.

The reason these regional and home type designations matter is that the issue of utility impact is based on the utility circuits that supply these different types of homes. Some large suburban areas could have utility circuits with large percentages of single-family homes. Urban area utility circuits often have many sectors of electricity usage including multi-family, high rise apartments, commercial, and even some industrial uses. A broader group of users often results in a lower overall impact of residential energy consumption on the impacts to the utility distribution circuits.

Another key issue with home types is that of access to solar energy. Larger, multi-family residential buildings typically provide best access to the sun on only 2 or 3 sides. This means that easily 25% of these residents have little access to the sun. Those units with better solar access, will have that access for shorter periods than other types of homes and will have that access during different times of the day (east side-morning; south side-midday; west side-afternoon; and, north side-low to none). This is highly relevant to the analysis. Even if a region were to experience an extremely high adoption of plug-in solar, there would be no impact on the utility circuits due to the density of energy consumption in these buildings and the reduced access to solar energy these buildings have.

2.2 Impact of Market Penetration of Plug-In Solar on Utility Grid

It is difficult to predict with certainty what the potential market for plug-in solar is based on regions and home types on a national basis. We do have very good data on a few regional markets in the rooftop solar single-family detached home market. The most prominent market is that of California. The high cost of electricity, good solar resource, and relatively favorable utility regulatory framework has made this a high penetration market for rooftop solar. While the California market is not saturated, the growth has slowed as the regulatory framework has tightened. With all these factors, California enjoys a 20% penetration of rooftop solar in the single-family market. This corresponds to over a million homes with at least some solar installed. An average system size in California has grown over the years with the lowering cost of solar and higher electricity rates with the average now of about 7.6 kW per system. While there are a few single-family home subdivisions with solar on every house, those subdivisions have typically smaller average system size (3.6 kW) since those examples were built to meet recent new home subdivision mandates or small solar systems were used to attract homebuyers.

The 20% penetration of rooftop solar in a very favorable market like California is likely an upper bound on penetration on a national basis. This example shows that even in the best of cases it is inappropriate to assume market adoption at much higher levels. The plug-in solar market has a much larger population in the market since it includes customers far beyond single-family homes. Given the wide variety of factors that impact the whole residential market, it is safe to assume that it is unlikely that the market penetration of plug-in solar will exceed 25% in any market. That being said, a 25%

market penetration in the United States represents over 20,000,000 homes.

2.3 Regionally Specific Issues

2.3.1 Northeast Region

The Northeast region encompasses New England (Maine, Vermont, New Hampshire, Massachusetts, Rhode Island, and Connecticut), New York, New Jersey, Pennsylvania, Maryland, and Delaware. It is generally characterized by warm temperate summers and cold winters with considerable variation from Maine to Maryland. Boston is often used as a location of typical climate for the region. Modern houses in this region include central air conditioning whereas few homes more than 40 years old included this convenience. Heating is the dominant home energy consumption item with a variety of energy sources used including natural gas, heating oil, and heat pumps in the more southerly parts of the Northeast. Overall, the Northeast has the lowest electricity consumption per home, when averaged across all home types, than any other region due to the diversified use of other energy sources for heating and hot water.

2.3.2 South Region

The South region includes Virginia, North and South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, Tennessee, and Arkansas. It is generally characterized by warm humid summers and more mild winters. Nearly all homes have air conditioning to address the humid summers which is why the South consistently has the highest home energy consumption across all home types (see Figure 1). The South also has the highest adoption of heat pumps which further increases electricity consumption in the winter.

2.3.3 Midwest Region

The Midwest region includes Ohio, Kentucky, Indiana, Illinois, Missouri, Wisconsin, Minnesota, Iowa, and Nebraska. The Midwest can have equally cold or colder winters than the northeast and hotter summers. Both factors contribute to higher electricity consumption across most home types in the Midwest than in the Northeast. As with other regions, the variations in climates in the region can be large from Minnesota to Kentucky.

2.3.4 West Region

The West region includes the remaining contiguous 48 states. Climate varies considerably from Montana to Texas, but electricity consumption tends to be lower than other regions due to lower humidity and some areas that require much less air conditioning than other parts of the country (West Coast and Northwest). On average, the energy consumption is similar to the Northeast with the exception of the mobile home market which has less consumption in the West (see Figure 1).

2.3.5 Alaska and Hawaii

Alaska and Hawaii are extremely distinct markets for solar energy. Residential electricity consumption in both markets is below the national average and the electricity costs are much higher than the national average. Hawaii boasts the highest electricity rates in the United States while Alaska's rates are subsidized by oil proceeds so their costs are in the upper half of states. Alaska has the highest heating requirements, but very little heating is done with electricity. Lighting is needed more in the winter in Alaska due to the very long nights. Hawaii has similar annual electricity consumption in the residential sector as Alaska because of the mild tropical climate. Newer homes in Hawaii have air conditioning to help reduce humidity.

2.3.6 Cities Chosen to Represent Each Region

To simplify the analysis of utility impact by region, a representative city was chosen in each region and two cities for the large West region. For the Northeast, Boston; for the South, Atlanta; for the Midwest, Chicago; and for the West, Phoenix, and Sacramento. Anchorage was chosen for Alaska and Honolulu for Hawaii. Specific cities must be used so that detailed hourly data can simulate how solar energy and home loads interact with one another.

3 Simulation of Utility Impact

3.1 Simulation parameters

The maximum system size used for the analysis for a plug-in solar system is based on the Utah legislation that chose 1.2 kilowatts (kW) as the maximum size. Additionally, plug-in solar devices are often sold in units of 300-400 watts per unit. A typical large system would include 3 or 4 separate units to make up the full 1.2 kW system. It is also assumed that the plug-in system is tilted at an angle of 30 degrees from horizontal, facing south with no shading. These assumptions provide the maximum solar energy production and thus maximum utility impact.

The market penetration for each home type is optimistically estimated at 25% of the available homes. The analysis was done on a per home basis to show the maximum export that one home could contribute based on region and type. Taking the worst case one home impact, that impact was then extrapolated to all the homes of that type in the region. This second part of simulation uses the load of the 3 out of 4 homes that do not use plug-in solar to determine the actual utility grid impact of a 25% penetration of 1.2 kW plug-in solar systems.

3.2 Simulation Data

The simulation data for the export of electrical energy for each region is provided below. A summary of the simulation is provided below to explain the maximum nationwide impact of a 25% penetration of 1.2 kW plug-in solar systems. Of the five geographically diverse locations chosen for the simulations, Boston was found to have the highest occurrence of export energy from individual homes. Boston had a maximum export of less than 0.75 kWh/day from an individual home (see Figure 2). It would take approximately a 40% market penetration to have any export of energy from the residential sector (see Figure 5).

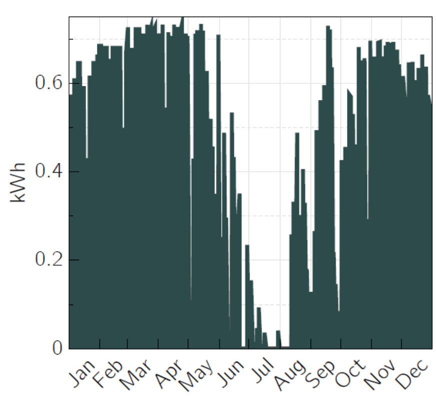

Figure 2: Boston Annual Data for Daily Export Energy of Individual Home

Figure 3 shows that the maximum export of solar energy at 75% market penetration in Boston, is less than 0.5 kWh/day from the residential sector. Sacramento comes in at less than 0.25 kWh/day at 75% penetration. Other regions, such as Chicago, Atlanta, and Phoenix are less than 0.1 kWh/day at 75% penetration. A 75% market penetration for plug-in solar is far beyond the reasonable penetration levels for these markets and should be considered well beyond the actual market. At 50% market penetration, the Boston market is down to below 0.15 kWh/day export from the residential sector (see Figure 4) and all other markets are at zero export energy (no utility impact). The point at which Boston reaches zero export energy from the residential sector is if 40% of the entire residential sector installed a plug-in solar system. This is still well above a reasonable market penetration estimates for anywhere in the United States.

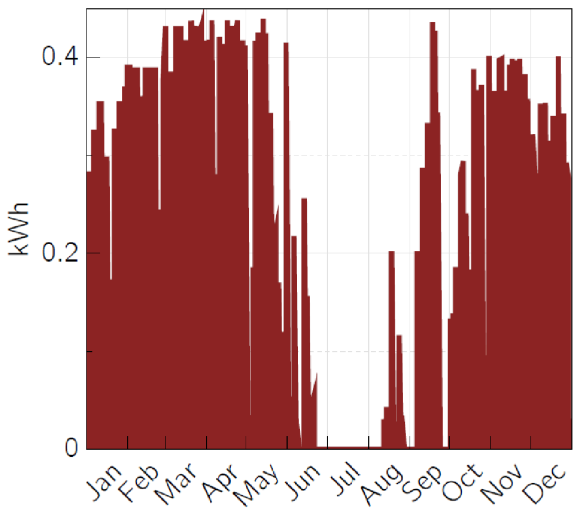

Figure 3: Boston Export Data for 75% Penetration Level of Plug-In Solar

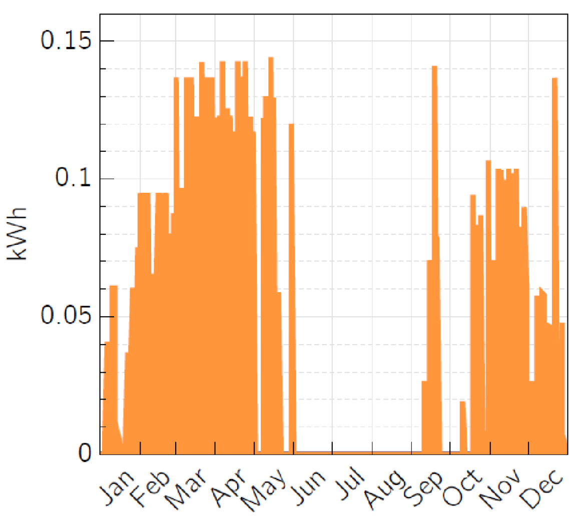

Figure 4: Boston Export Data for 50% Penetration Level of Plug-In Solar

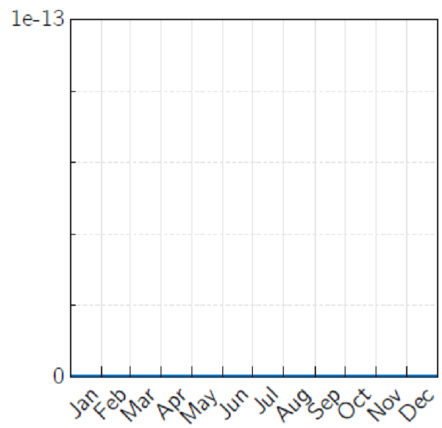

Figure 5: Export Energy Data for all Markets at 40% Penetration of Plug-In Solar

Atlanta had a significantly lower export of energy than Boston with a maximum export of 0.37 kWh/day from an individual home (see Figure 6). It would take approximately 70% market penetration for plug-in solar to have any export from the residential sector. The Chicago results were similar to Atlanta's with the same maximum export of 0.37 kWh/day from an individual home and the same market penetration of 70% to have any export from the residential sector (see Figure 7). Phoenix was even less with 0.25 kWh/day of maximum export with a market penetration of over 80% necessary to have any export from the residential sector (see Figure 8). Lastly, Sacramento showed a maximum export of 0.53 kWh/day and a market penetration of over 50% to have any export from the residential sector (see Figure 9).

Alaska has an export level that is a similar maximum export level as Boston. This is partially because the residential electricity consumption in Alaska is so low. Alaska would still need a 40% market penetration of plug-in solar to see any export from the residential sector. Because of the low annual solar resource and the subsidized electricity costs, the market for plug-in solar is unlikely to exceed the 25% threshold assumed in this analysis. In contrast, Hawaii has the highest per capita penetration of solar in the residential market. Because of the good solar resource and high electricity prices, Hawaii will likely see a higher than average market acceptance of plug-in solar. Hawaii has the highest maximum export level from a single residence due to the fact that residential electricity consumption is the lowest in the United States. However, it would still take an unattainable 40% market penetration in the residential sector before plug-in solar would export power in Hawaii.

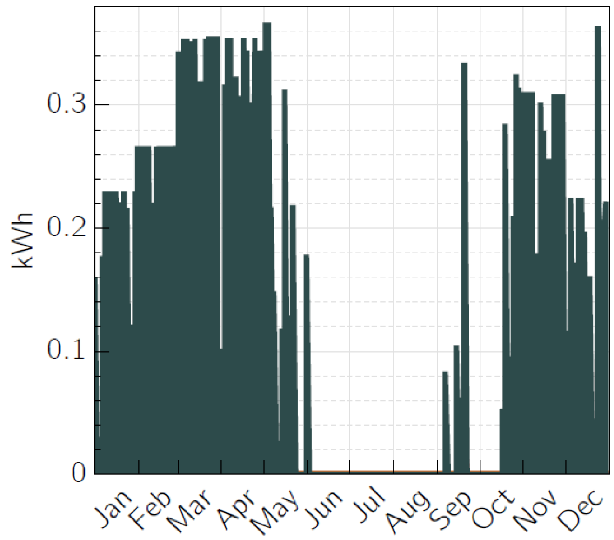

Figure 6: Atlanta Annual Data of Individual Home

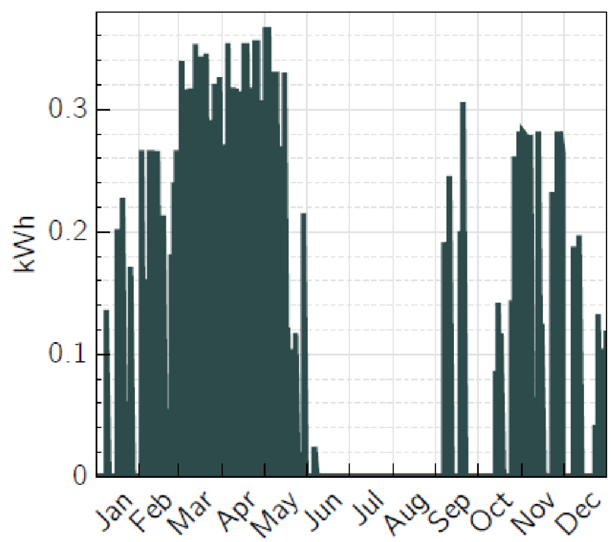

Figure 7: Chicago Annual Data of Individual Home

The simulations show that regardless of the region, the maximum daily export of energy from a residence is around 0.75 kWh/day and requires greater than a 40% penetration of plug-in solar before the residential sector would have any export impact on the utility grid (see Figure 5). It follows that it is impossible for the utility industry to claim any significant impact on their distribution system including such things as settings of voltage regulators in substations.

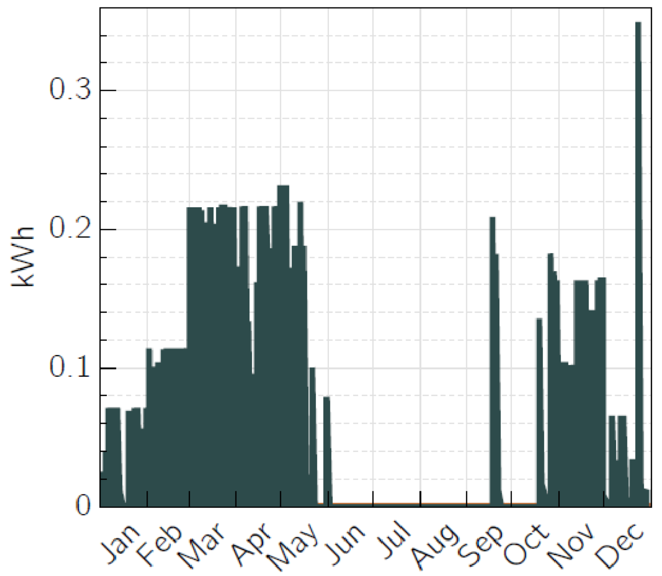

Figure 8: Phoenix Annual Data of Individual Home

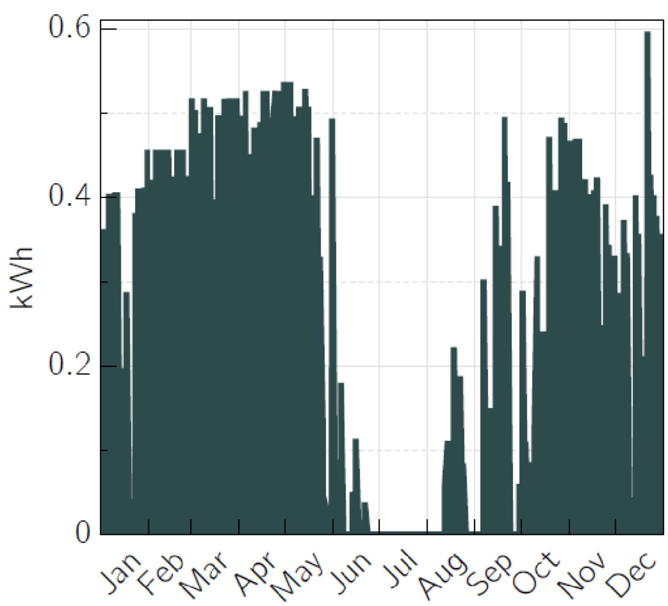

Figure 9: Sacramento Annual Data of Individual Home

4 Utility Issues Other Than Grid Impact

It is difficult, if not impossible, to claim that plug-in solar systems up to 1.2 kW in size can have a measurable negative impact on the utility distribution system regardless of region. This does not mean that utility companies will not bring up other issues.

4.1 Utility Lineworker Safety

A common concern of utility companies over the past 40 years has been that generators of any size connected to the utility grid might be a hazard. Much work and study was performed to develop standards and testing to eliminate this legitimate concern. Now, 40 years later and millions of systems later, the conclusive results are that systems that are certified to the required interconnection standards do not pose a threat to utility lineworkers.

4.2 Metering and Tariff Issues

One issue that is clear is that on an individual home, there will be some incidental export energy that will occur from time to time. This will typically happen in the spring and fall. Standard utility meters will run in both directions quite accurately without any special calibration. However, many utilities have different tariff rates for purchasing electricity versus generating electricity. These systems would need to be exempt from those tariffs based on the extremely small amount of export energy. It would essentially be a net metering allowance up to a maximum system size of 1.2 kW.

For a variety of reasons, utility companies have invested in meters that can measure and record energy that is purchase separately from energy that is produced. Some meters may be non-reversing so that they only record energy in one direction. Other meters may record energy flow in either direction as energy consumed. While all these examples present complications that may be used by utilities to question viability of plug-in solar, these issues can generally be dismissed as too small to have any real impact.

Allowing a net metering exception would produce a negligible cost impact for the utility. For example, if a utility charges $0.20/kWh to residential customers and only pays $0.05/kWh for excess energy from a solar system, the plug-in customer would receive a $0.15/kWh "subsidy" for excess energy. At best, a 1.2 kWh system will produce about 70 kWh of excess energy on an annual basis for an annual "subsidy" of $10.50. The administration of such a small amount of energy is worth allowing the exemption. For utilities that record produced energy as consumed energy, the customer is losing $14 per year. That loss will likely cause customers in those locations to install smaller plug-in systems or use a battery to store excess energy since their incentive to save money is negatively impacted by the tariff metering situation.

5 Conclusions:

Plug-in Solar and Battery Storage devices are on the market and currently being sold in the United States. A single 1.2 kW plug-in solar system can only generate an excess of 0.76 kWh on the days when the home is at its lowest consumption time of year (spring and fall). With a massive 40% market share in all types of homes, this same 1.2 kW system cannot export any energy on average throughout the entire residential sector, regardless of location. The 40% market penetration necessary to have any export from this sector is well above the most favorable forecasts of 25% market penetration. Given this evaluation showing no export from a sizable market penetration of 1.2 kW plug-in solar systems, it is safe to conclude that these systems will have no negative impact on the utility distribution infrastructure.

Safety concerns have been addressed with millions of systems now operating safely connected to the utility grid. Any metering and cost allocation concerns with the small amount of energy that makes it to the grid in the spring and fall is small enough that regardless of the metering arrangement, the costs are negligible. Tariff allowances may be necessary to allow for incidental export of power from homes with a plug-in solar system. Whether the customer is compensated for the export of electrical energy is not likely to be a major factor in customer acceptance, but that subject is beyond the scope of this report.