

CESA Scoping Memo

Encouraging Photovoltaic System Installations in New Single-Family Market-Rate Housing

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**Prepared by Peregrine Energy Group
for the Clean Energy States Alliance**

EXECUTIVE SUMMARY

A well-targeted program encouraging PV installations in new single family market rate housing can successfully tap the interests of early adopters and demonstrate the technical viability of the technology in a residential setting. Engaging motivated builders who support green construction in active promotion of installing PV systems can be effective. Technological innovations and aesthetic improvements should be encouraged to broaden both the appeal and applicability of PV in the single-family market.

INTRODUCTION

The Clean Energy States Alliance (CESA) is interested in developing new strategies for member state clean energy funds to facilitate the use of solar photovoltaic (PV) technology in new construction of single-family market-rate housing.

To that end, CESA has engaged Peregrine Energy Inc. (Peregrine) to research and prepare this brief memo summarizing program concepts for expanding PV installations in new single family housing. The purpose of this memo is to provide a brief overview of efforts to date and to help identify issues and opportunities that will be addressed in detail in a subsequent report.¹

DATA COLLECTION

The memo is based largely on discussions with Scott Sklar, President of The Stella Group, LTD., at the recommendation of Lewis Milford of Clean Energy Group.² In addition, Peregrine conducted a brief review of existing programs that promote PV specifically targeting new construction in the

¹ The Clean Energy Group has received a grant from the Energy Foundation of America that will be used in part to further explore these issues and to recommend a set of strategies for CESA and its members to adopt.

² The Stella Group is a strategic marketing and policy firm facilitating distributed energy generation, based in Washington, DC. Its focus is applications that integrate photovoltaics, advanced batteries, other on-site generation technologies, and "smart" interconnection. Prior to establishing The Stella Group, Mr. Sklar served 14 years as Executive Director of the Solar Energy Industries Association.

single-family market to gain some perspective on the extent of current activity and what is working. One of these is the U.S. Department of Energy's Zero Energy Homes program.

OPPORTUNITIES AND ISSUES IDENTIFIED

Market Opportunities

Scott Sklar identifies four primary markets for PV in single-family new construction. While he acknowledges that each of these is a niche market, he believes that each is, in fact, large in its own right or likely to be growing.

1. Power Reliability Market

Perhaps the largest potential niche for PV installation in new construction is in those parts of the United States where power supply is frequently or periodically interrupted. This includes the entire Gulf of Mexico, which is regularly subject to storm-related outages. It also includes those parts of the country where transmission constraints and older distribution infrastructure compromise supply reliability (e.g. Chicago, Long Island, portions of California). The target market would be an upper middle class residence that includes a home business that wants to ride out these fluctuations or at least have a controlled shutdown. Sklar suggests that there may be appeal to a configuration of PV with batteries that creates a UPS-like (uninterrupted power supply) environment on dedicated circuits.

2. Green Early Adopters

Green early adopters are those individuals who are looking for and choosing to live in a new "green" home, perhaps one that meets the Energy Star guidelines. These are likely to be individuals of some means that have opted to pay the modest incremental cost associated with green design and construction because they think that it is a good thing to do and they understand the economics of life-cycle costing. For these homeowners, PV is the billboard that announces, "I am an environmentalist and a technology leader."

3. Power Quality Market

Similar to the Power Reliability Market, this group includes in-home commercial interests that could be adversely affected by power surges and fluctuations. In addition there may be wealthy individuals with other sensitive high-tech equipment. Again the solution proposed is dedicated circuits for certain equipment with PV/battery combinations that would be unaffected by power quality variations.

4. Demand Avoiders and Power Sellers

Sklar believes that the evolution to time-of-use rates and high demand charges at certain times of day will create economic opportunities for power production by homeowner distributed generators. To the extent that such a homeowner might need to use power during the day when PV production is highest, he would shave his demand. To the extent he is located in load pockets that are otherwise difficult to serve and for which a premium might be paid for local generation, he could sell all power being produced into a lucrative peak market and purchase power at a lower rate in the off-peak.

Market Issues

Scott Sklar also identifies a number of issues that continue to sap the potential of the new construction market. Many of these are tied to builders' attitudes toward PV and their perceptions, real or assumed, of what customers want.

1. ***Traditional home builders worry that the physical connections for installing PV are cumbersome to use, systems are time consuming to install, and additional permitting slows construction completion.***
 - PV systems are too variable in the connectors, etc. necessary to install them and should be more standardized.
 - Installing a small residential PV system on a pitched roof is labor intensive, and the holes that must be created in the roof membrane result in future water problems.
 - Because PV is an unfamiliar technology, it attracts a higher level of scrutiny from building inspectors for the entire project, slowing down completion and costing money.
2. ***Traditional builders believe that customers don't care about PV and are not looking for it.***
 - An alarm system or an upscale kitchen or bathroom makes a home more marketable for the same amount of money.
 - Because the public is not familiar with PV, a house that comes with a PV system is likely to result in a "what's that up on the roof?" question and concerns about potential operations and maintenance issues.
3. ***Traditional builders believe that PV does not add value to a sale, and actually detracts from a new home's "sale-ability."***
 - Given the high installed cost of PV and customer indifference, there is little or no additional margin to be gained by investing the added construction dollars in the house.
 - "In the residential market, appearance is everything, and PV is still ugly," according to Sklar. It does not integrate well in traditional single family residential design. It does not make a home more attractive, and unattractive homes do not sell. Sklar maintains that future PV integrated roofing materials will help, but we are far from that point.
 - An in-place PV system adds hesitation to a buying process that is often based on impulse and first impressions. It's a reason to move on to look at the next house.

In an effort to validate Mr. Sklar's observations, Peregrine made some additional inquiries to get the direct perspectives of builders and others actively pursuing this market.

John Livermore of Conservation Services Group (CSG), based in Massachusetts, offers another perspective. Mr. Livermore is project manager for a PV initiative funded by the Massachusetts Renewable Energy Trust (RET) whereby CSG has entered into agreements with builders around the state to install PV on new Energy Star rated homes in new, energy efficient subdivisions. Participants included a mass-market developer in eastern Massachusetts, a custom-home builder, and a condominium developer. Mr. Livermore observes that:

1. *Developers who are not really committed to PV may not actively market the technology.*

- In the end, where PV is one of many potential options available to buyers, the PV installation decision is subordinate to a developer's immediate desire to make a sales pitch that addresses the whims and interests of random potential buyers who come to shop. "PV is too new to be for everyone," says Livermore. "It's important to find a market audience that is pre-disposed."

2. *Custom Builders who are themselves "true believers" in PV technology's place in green buildings are more effective in generating PV installations.*

- Such custom house builders reach out to and design for a targeted audience who want a PV system incorporated into their new home. In CSG's experience, it is critical to find these "builder-advocates" for this approach to succeed.

3. *PV always loses out if it's an option, either to other choices or to cost over-runs.*

- CSG's condo developer placed PV on every unit as a standard appliance. It was not left to the occupants' discretion. (This could also reflect a different aesthetic standard in condominium housing vs. detached single family housing that is worth investigating further. Also, in condos, roof maintenance and PV system maintenance are the responsibility of management, not occupants.)

Another set of observations was provided by Rob Harmon of Consol, one of the DOE Zero Energy Homes team leaders. Mr. Harmon asked his zero energy home (ZEH) builders what they saw as the business benefits of zero energy home construction. They gave him three types of positive comments:

1. *ZEH builders believe these homes distinguish them from their competitors.*

- Zero Energy Homes receive free marketing and publicity in the press and media.
- In competitive home markets, these homes are a useful marketing tool for builders.

2. *ZEH builders believe these homes make permits easier to obtain.*

- Zoning and environmental permitting requests are more likely to be supported (or at least not opposed) by environmental and community groups because of the "green" aspect of the homes.
- As easily developed sites get built out and only the more difficult or complicated sites remain, this factor becomes increasingly important.

3. *ZEH builders believe these homes make good business sense: they sell and (re-sell) faster and at a higher sale (and resale) price.*

- Anecdotal evidence suggests that zero energy homes in these solar communities sell more quickly, both when first put on the market and when resold. This has not yet been confirmed by a meaningful statistical study.

CONCLUSIONS AND NEXT STEPS

Overall, Sklar wonders if it may be premature for CESA and its members to play in the new single-family residential market which he describes overall as the "hardest market niche." He suggests that a better value proposition, given the early stage maturity of the industry, would be to focus on

the commercial market, including multi-unit housing, where economies-of-scale are more attractive, where aesthetic standards are more forgiving, and where through-roof interconnection is more flexible. This is supported by CSG's experience with PV installations in the more urbanized condominium development.

That said, Sklar offers the following recommendations for strategies that CESA and its members could pursue in single family new construction.

1. *Encourage construction of PV Ready Homes.*

- CESA and its members could design an initiative to encourage homes built to be "PV ready," even when PV systems are not to be installed immediately. This includes attention to site planning and building orientation, roof pitch and construction, and installation of wiring in conduits for future PV.

2. *Standardized Design and Better Looking.*

- Small residential systems are expensive to install and are troublesome to remove when roofs need to be repaired or replaced. CESA and its members could encourage manufacturers to standardize hardware designs to facilitate panel mounting and interconnection, including improved modularity, snap systems and color-coding.
- Further, CESA and its members could continue to press for a more attractive product for residential markets.

On the other hand, Rob Harmon has a more optimistic take on opportunities in the new single-family residential market based on his experience with the DOE Zero Energy Homes program. Also, both John Livermore and Scott Sklar have identified some promising market niches.

Peregrine recommends that CESA move forward with its plan to explore these issues in greater detail. Additional research and analysis will help to determine how best to address and counter concerns of the traditional home builders (as identified by Sklar), substantiate the views of the zero energy home builders, and focus marketing efforts to identify both builders and buyers who believe that the time for PV is now.