

CESA Scoping Memo

Encouraging Photovoltaic System Installations in “Green” Affordable Multifamily Housing

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

EXECUTIVE SUMMARY

Green affordable multifamily housing presents an excellent opportunity for CESA and its members to promote and facilitate the installation of photovoltaic (PV) systems. While there are barriers to installation of PV in this market segment that must be overcome, there are also emerging market trends that favor integration of PV technology in green multifamily buildings. Further, there are numbers of specific strategies that CESA and its members can pursue which should accelerate these trends.

INTRODUCTION

As part of its efforts to expand the use of clean photovoltaic (PV) technology, the Clean Energy States Alliance (CESA) is interested in understanding the issues and opportunities associated with promoting PV installations in green¹ affordable multifamily housing. In that context, the PV would be integrated with advanced energy efficiency and other green technologies in these projects. Further, the PV electricity generated and used on-site (or sold) could help offset operating costs for occupants, generating additional benefit where these operating costs are also publicly supported; or power produced could offset costs and requirements for common area electricity use.

To that end, CESA engaged Peregrine Energy Group (Peregrine) to prepare a preliminary overview of potential barriers to and opportunities for installation of PV technology in green affordable multifamily housing. Peregrine understands that the Clean Energy Group has secured funding from the Educational Foundation of America for a more detailed, follow-on analysis of the opportunities for PV in this sector. This memo is designed as a scoping memo for that larger effort.

¹ Peregrine has focused its research on so-called "Green" multifamily developers because we think this is a good target for CESA at a time when PV installation is still in an “early adopter” stage. They represent that portion of the Affordable Housing development community that is likely to be most pre-disposed to PV because of concerns about environmental quality, and thus, will be good strategic allies for CESA. They are the developers who are building beyond code requirements and may be willing to consider PV when it is still far from mainstream.

BACKGROUND

In this memo, Peregrine draws on the perspectives of project developers, state agencies, and solar and green building advocates, broadly defined. We provide an overview of factors that limit or support inclusion of PV systems in multifamily buildings that are also incorporating advanced energy efficiency. Based on an analysis of barriers and opportunities identified, we suggest strategies that could be pursued by CESA and its members to increase the penetration of PV technology in the affordable² multifamily housing sector.

State and Local Programs

We have tried to identify any current and past public “programs” that promote PV and high energy efficiency in low-income housing. We found that most efforts in this market at the state level have been community development initiatives focused on “weatherization-level” activities. Utility demand side management programs have included low income set-asides for multifamily buildings, though the emphasis is generally on system or equipment replacement for basic infrastructure (e.g. furnaces and boilers) and building insulation or relatively quick payback items (e.g. lamps) or domestic hot water heaters. There may be “city-scale” initiatives, for instance in public housing, that promote PV and advanced efficiency. This is a worthy area for follow-up research and program design. But we found few formal state programs to promote advanced energy efficiency or PV in the low-income multifamily market.

That said, our interviews with individual projects have uncovered some state-level and private non-profit funding mechanisms for new construction and rehab in the affordable multifamily market that do encourage high efficiency and sustainable practices. For example, they award extra points to funding applicants for incorporating technologies or features that will lower life cycle operating costs for a property. California’s Low-Income Housing Tax Credit program for instance encourages “sustainability” in program design. In another instance, the not-for-profit Enterprise Foundation’s Green Communities program awards points in its funding proposal evaluation process for designs that include PV, but this is far from a primary program focus.³ Peregrine believes that potential partnering with such efforts is a ripe area for further investigation in any follow-up study. It may be that one strategy for CESA and its members to focus on is integration of their own objectives with those of other funding mechanisms.

Massachusetts’ Affordable Green Housing Initiative

A recent initiative by the Massachusetts Renewable Energy Trust (“RET”) deserves special mention and the attention of CESA and its members. RET’s new Affordable Green Housing Initiative allocates \$10,000,000 over five years to establish and implement partnerships with one or more organizations to promote the design and construction of residential housing for low and/or moderate income Massachusetts residents that incorporates energy efficiency features and renewable energy technologies. The initiative’s goal is to support the construction of 600 new units of affordable green housing and to leverage an additional \$25 million of non-MTC funds

² Affordable multifamily housing includes private, city, state, or federally funded housing developments with more than four dwellings that qualify as “affordable” under state and federal income eligibility guidelines.

³ Enterprise Foundation is promoting green construction by providing more favorable financing (e.g., lower loan interest rates and/or higher amounts of tax credit equity) than it otherwise would for projects that meet its green criteria.

for these units. Another goal of the initiative is to have affordable green housing exceed state energy code standards by 50% through a combination of energy efficiency and renewable technologies working in concert.

On March 31, 2005, the RET Board of Directors approved two partnerships under this initiative. The first was with the Massachusetts Energy Star Home program, an effort of the state's electric and gas utilities. RET will provide up to \$2.5 million over five years for outreach and incentives for developers and builders to include renewables in their affordable housing projects.

The second partnership is with the Massachusetts Housing Finance Agency ("MassHousing") to develop and implement green standards in affordable multifamily housing in Transit Oriented Development projects. MassHousing has earmarked \$22 million for new housing units, including affordable housing, located near major mass transit stations and/or along established bus routes. RET and MassHousing have had preliminary discussions regarding developing and implementing green standards at these sites. The \$22 million of MassHousing funds will leverage over \$200 million of construction. RET's participation will help fund incremental design and construction costs for applying green building practices and renewables together with energy efficiency.

According to MassHousing's Decia Goodwin, "MassHousing is interested in encouraging advanced energy efficiency because it will reduce building operating costs and increase affordability. We strongly suggest Energy Star measures be incorporated in both new construction and substantial rehab. We can increase loans to cover these measures because the resulting savings in operating costs can be used to service more debt. A partnership with MRET can bring additional grant money for renewable energy projects."

RET seeks to participate in projects that produce healthy affordable green homes that significantly "push the envelope" for energy efficiency. It has also initiated discussion with the nationally-active Enterprise Foundation to attract "new" money to the low/moderate income housing market for Massachusetts. Enterprise has just launched its Green Communities Initiative (described below) and is expected to contribute \$3 - \$5 million to these partnerships in Massachusetts. In conversations with Peregrine, the Enterprise Foundation has expressed an interest in exploring like relationships with other CESA members.

"Green" Affordable Multifamily Projects

To date, most green affordable multifamily projects appear to be one-of-a-kind initiatives or the result of a commitment by a "visionary" developer to green design. Peregrine has identified a number of these 'ad-hoc' affordable and public⁴ housing projects across the country, primarily new construction, but also substantial rehab,⁵ where advanced energy efficiency and other "Green" attributes have been designed into multifamily buildings. "Green" buildings are designed and built to meet sustainable construction and land management best practice standards. Major considerations with green building design include advanced energy efficiency and water conservation strategies and renewable energy investments. Green building requirements generally exceed minimum building code requirements and can include the use of such techniques and systems as occupant-friendly building materials, often eliminating asthma-

⁴ Public multifamily housing is owned and managed directly by individual cities and towns.

⁵ "Substantial Rehab" here refers to projects where most building systems are being upgraded or replaced.

inducing synthetic carpets, for example, in favor of wood or tile flooring. They also may include continuous ventilation in kitchens and baths as well as operating windows. Often they are co-located near public transportation and / or retail stores on vacant properties or brown field sites. Such green buildings may or may not also be certified by LEED, or other recognized green standards.

DATA COLLECTION

From these projects identified across the country, Peregrine has selected a subset of projects to investigate through interviews with project representatives. These include projects with PV installations as well as projects where PV is not installed (since these projects provide important information about barriers to PV). To maximize the relevance of this investigation to CESA members, an effort has been made to focus on projects in states that are members of CESA.

The projects we examined include:

- ***Egleston Crossing - Boston, MA***
 - New construction. Completed May2005 (projected). 64 units in a two-building, mixed-use project, including 15 units dedicated for use by homeless individuals, replacing two vacant buildings on notorious problem properties.
 - Developed by Urban Edge.
 - Contact: Noah Maslan.
 - 64 kW PV system.

- ***Maverick Gardens - Boston, MA***
 - HUD HOPE VI Redevelopment. Completed January 2005. 119 apartments in six-story mid-rise building with mixed used income eligibility.
 - Developed by Trinity East Boston Limited Partnership
 - Contact: Frank Edwards.
 - 37 kW PV system.

- ***LESPMHA 2, New York, NY***
 - New Construction. Completed Summer2005 (projected). 60 affordable units in two buildings on formerly vacant city lots.
 - Developed by the Lower East Side People's Mutual Housing Assn., Inc. (LESPMHA)
 - Contact: Mary Spink, Executive Director.
 - No PV, though one building designed and built PV-ready.

- ***Kimbark Building - Chicago, IL***
 - Substantial Rehab. Completed February 2000. 10 affordable units in formerly abandoned building.
 - Developed by Woodlawn Development Associates, a non-profit housing developer.
 - Contact: Paul Knight, DomusPLUS, Architect.
 - 2.4 kW PV system serving common areas.

- ***Crescent Park Apartments -- Richmond, CA***
 - Substantial rehab. Ongoing into 2007. 378 master-metered units in 26 bldgs. HUD Preservation property acquired in 1990's.
 - Owned and managed by Ecumenical Affordable Housing (EAH), a statewide development and property management non-profit with 5,000 plus units of housing.
 - Contact: Lynn Berard, Sr. Project Manager.
 - 450 kW PV to be installed over a two year period as individual buildings are rehabbed and receive new roofs.

- ***Betty Ann Gardens - San Jose, CA***
 - New Construction. Completed October 2003. 76 affordable units in award winning Green development.
 - Developed by First Community Housing, a non-profit housing based in San Jose.
 - Contact: Marty Keller, Director of Construction Management.
 - No PV installed.

- ***Murphy Ranch - Morgan Hill, CA***
 - New Construction. Completed Winter 2005. 100 affordable units.
 - Developed by First Community Housing, a non-profit developer based in San Jose.
 - Contact: Marty Keller, Director of Construction Management.
 - 51 kW PV installed on carports and recreational building supply power equivalent to 95% of common area electricity cost.

In addition to drawing on its own experience in this arena, Peregrine has identified other key informants familiar with efforts to build green and affordable multifamily housing, as project developers, financiers, performance contractors, technical experts, and has sought out their input into the identification of issues and barriers. These informants include:

- ***Enterprise Foundation's Green Communities Program*** (Contact: Dana Bourland). Green Communities is a five year \$550 million initiative of the Enterprise Foundation / Enterprise Social Investment Corporation in partnership with the Natural Resources Defense Council to build more than 8500 environmentally healthy home for low-income families. The initiative provides grants, financing, tax credit equity and technical assistance to developers who meet Green Communities criteria for affordable housing.

- ***Ameresco, Inc., Framingham, MA*** (Contact: Steve Morgan). Ameresco is a national energy services company with extensive activity in both the government and institutional sectors. Ameresco's multifamily housing group, led by Mr. Morgan, is a national leader in performance contracting.

- ***Strategic Energy Innovations, San Rafael, CA*** (Contact: Cyane Dandridge). SEI is a non-profit organization focused on helping communities to design and implement energy savings programs. In that regard, they have pursued opportunities to increase the quality, availability, and affordability of housing through energy improvements. Through their involvement in Rebuild America, they work with several housing-focused partnerships in California. With support from the Department of Energy and the California Energy Commission, they are assisting numerous stakeholders to develop a Multifamily Consortium

to help them identify ways to rapidly implement energy efficiency programs, by identifying and leveraging statewide resources.

- ***The Stella Group, LTD, Washington, DC*** (Contact: Scott Sklar). The Stella Group is a strategic marketing and policy firm facilitating distributed energy generation. Its focus is applications that integrate photovoltaics, advanced batteries, other on-site generation technologies, and "smart" interconnection.
- ***New Ecology, Inc, Cambridge, MA*** (Contact: Madeline Fraser Cook). Results of their study on cost effectiveness of green improvement in affordable multifamily housing were previewed at Northeast Sustainable Energy Association annual conference in March 2005 (projected publication in June 2005).

BARRIERS IDENTIFIED AND ISSUES RAISED

1. Developer mission and motivation

Developers of affordable housing identify several issues and concerns about PV in their projects, including:

a) ***Community-based developers operate with very limited resources.***

Community-based developers are in the Affordable Housing business, not in the “green building” business or the renewable power generation business. They are one of the primary drivers of new affordable housing development, working within their respective communities to identify potential projects, cobbling together funding from multiple debt and equity participants, managing construction, and selling and/or managing completed projects. The process is daunting. Therefore, the benefits of committing limited internal resources to any particular component of a project must significantly exceed the cost.

- Mary Spink, Executive Director of LESPMHA in New York City, observes that her current 60 unit, two building project has to make good financial sense. Above all, her goal is to address the seemingly limitless demand for high quality, affordable housing units. While she and other sponsors of similar projects indicate interest in incorporating advanced energy efficiency or on-site generation into projects where it is cost effective, the benefits of committing limited internal resources (manpower and financial) to advance such plans or fund technology installations must significantly exceed the cost. “We’re trying to do what makes sense,” says Spink.

b) ***Public Housing improvement focuses on future maintenance and environmental health.***

Public housing developers are motivated to incorporate green design features in buildings to increase building durability and improve indoor and outdoor environment conditions. PV technology addresses neither of these objectives.

- Green design best practices were selected for the Maverick Gardens US HUD HOPE VI construction project to help address significant building-related high levels of asthma in the old development. Green building measures included fresh air intakes for individual apartments and extensive air sealing designed to provide smoke control, pest control, and draft control. Including PV technology addresses neither of these objectives, and PV

systems are themselves potentially very vulnerable to vandalism where rooftop security can not be assured.

c) ***Developers invest in features that create significant measurable benefit.***

Affordable Housing developers are motivated to incorporate features in buildings to provide significant measurable benefits to occupants and neighborhoods. Dollars invested in increasing the energy efficiency of the building shell, the HVAC equipment and the appliances are seen as more productive than PV technology, which is perceived to be expensive today, without creating significant benefit.

- New Ecology reports that the public-sector motivation for funding and building new affordable multifamily housing incorporating advanced energy efficiency and other green attributes is to lower life cycle operating costs and guarantee superior building performance over the life of the project. Also, and perhaps no less important, they want to create and secure additional benefits such as enhanced occupant health and comfort, eliminating local environmental blight, neighborhood renewal, and increased community pride. At the same time, New Ecology finds that project developers will keep incremental first costs associated with higher efficiencies and “green” attributes as low as possible, reflecting a desire to optimize positive net cash flow from these discretionary investments.

d) ***To be successful, even green non-profit developers are driven by a bottom line mentality.***

Green affordable multifamily developers must be every bit the businessmen that any other successful real estate investor is. Developers in this market generally require financial incentives to make it “worth their while” to incorporate green features, advanced energy efficiency, and renewable energy in affordable housing. PV technology is perceived to be expensive, without creating significant benefit.

- Lynn Berard, Sr. Project Manager, with Ecumenical Affordable Housing (EAH), states that EAH has no formalized green building policy. Their business model is to hold onto and manage the properties they build. “Our investment decisions are driven by financial planning and the need to minimize operating costs.” Any decision to incorporate Green measures for their own sake are driven by funding sources that may, for instance, award additional tax credits or points in loan evaluations for improvements that support “sustainability”.
- Marty Keller of First Community Housing contrasts two of their recent green affordable projects, one with PV and the other without. In both, First Community built a pro forma covering the budgeted costs for site acquisition and for construction. They then looked at anticipated operations and maintenance costs and rents they were hoping to charge to keep the projects affordable. After calculating the cost of installing the high efficiency and green features that are their hallmark at both sites, they found that only the 100-unit Murphy Ranch project could include PV, while Betty Ann Gardens could not carry the additional cost.

2. Financial Considerations

The financial issues of including PV in affordable housing include the following:

a) ***There is never enough money to do what needs doing.***

While individual community-based developers have successfully incorporated green building best practices in projects, there are usually too many competing demands for required or mission-driven expenses to consider using capital funds for PV systems.

- PV is universally perceived to be expensive with limited relative financial benefit in most projects. Absent a compelling programmatic reason to incorporate PV, affordable housing developers are not investing their debt or equity resources in PV systems.
- First Community Housing had fully expected that it would be able to install PV in its Betty Ann Gardens development in San Jose. But unforeseen and unbudgeted expenses during the project related to moving and undergrounding power distribution lines cost in excess of \$400,000 more than what was budgeted. While most standard green features were retained in the final design, the PV system, which was viewed as discretionary, was cut.

b) ***Grants and subsidies drive PV projects in this sector.***

Significant Grant Funding will be required by projects if PV systems are to be incorporated in affordable multifamily housing.

- Affordable housing projects are interested in hosting PV systems, but those with PV report that they included the technology because it was free or heavily subsidized.
- EAH is planning a 450 kW PV system at Crescent Park in CA at a total cost of \$ 3.2 million. Rebates of \$1.5 million are anticipated. In this case, the net \$1.7 million investment by EAH in the 378-unit development is justified by the positive impact it will have on exceptionally high operating costs in the 40-year old master metered development. Perhaps more important is the additional benefits that reducing those costs will have on their ability to service and extend their overall project debt.

c) ***PV may be too expensive to be funded though Energy Saving Performance Contracts***

Energy performance contracting is a popular mechanism for securing green investment in existing affordable multifamily housing. Multifamily building owners pay for private investment in advanced energy and water efficiency improvements by pledging a portion of future guaranteed energy and water savings. But the economics of PV rarely favor its incorporation in these projects, unless its integration is a requirement or unless it is heavily subsidized. In the end, the ability to include PV will depend on the size and cost of the proposed system and the subsidies that it may qualify for. Even if PV's inclusion is desired, the total efficiency improvement savings may not be robust enough to carry it.

- Steven Morgan indicated that an energy service company will not likely bid an expensive PV system in a project proposal unless it is a programmatic requirement and all other bidders will also be proposing such systems. This is because the additional expense either eats up margins or makes a proposal non-competitive. Availability of heavy PV system subsidies can ease these problems, and increase the chances that that the PV will be installed.

d) *PV Grant Programs must be user friendly and burden-free.*

There are often institutional pressures to meet requirements for affordable housing construction quickly. If a PV grant program design or administrative requirements distracts an affordable or public housing developer from its primary mission (i.e. complete construction of as many new high quality affordable units as possible within a limited timeframe), it may not participate.

- Urban Edge had to manage the requirements of 22 separate sources of funds to develop Egleston Crossing. For most of these sources, the requirements were standardized and the administrative burden known. The requirements to secure the release of the PV grant were by far the most burdensome of all 22 funding sources. “Nit-picky and time consuming, but for us, the funds were free. However, I’m not sure a private developer would bother.”

e) *In the end, adding PV may be viewed as creating too much drag on the total project.*

Developers may be disinclined to participate in programs supporting PV installations due to potential delays in construction and project permitting, concerns about PV equipment and suppliers, and other requirements. Even with respect to efficiency features, developers look closely at the incremental cost of each added green feature to determine how it affects the bottom line and the construction timetable.

- One private project developer remarked that he would rather forgo using Energy Star appliances in rehab because of added cost and the limitations of available models, but this would put him at a disadvantage in competing for State funds since it would reduce a project’s overall point score.

f) *Green programs need to be designed to reflect their clients’ needs.*

A Green funder may provide financing for PV installations, but only as part of a pre-set bundle or package of green design features (which the grantee does not want or need).

- Mary Spink complains about a lack of flexibility on the part of green advocates. She notes that a number of potential green funding partners she approached had strictly defined program requirements for equipment certifications and combination of green features as hurdles for financial support. “I can only do what makes sense for the project and its future residents. If it makes financial sense, I’ll do it. But I don’t like green for green’s sake.” While she has been unable to get grant funding for a PV system for LESPMHA 2, the property has been designed, oriented, and wired to accommodate a future rooftop PV system if and when funding can be secured.

3. Technology Advocates

a) *Successful PV projects need effective leaders.*

Successful PV installations require an advocate or “Champion.” Often it is a CDC staff person. Sometimes, it is an advisor, such as the project architect who might seek a “Green” certification for the building design and who brings the CDC along. While a PV Champion does not guarantee PV’s incorporation in the final building, without such a Champion, it is unlikely that PV will be included.

- Noah Maslan of Urban Edge said Egleston Crossing wanted to include a renewable component in the project if possible to reflect the CDC’s environmental stewardship goals and further juxtapose the site’s reclamation and rebirth with its former status as a contaminated brown field. That said, funds for PV systems were not in the project budget. Without his successful pursuit of grant funding and his personal determination to persist with the PV vision in the face of very demanding PV grant administrative requirements, it would not have happened. “We did it in the end because it was free, but a private entity is not going to want to go through the trouble.”
- Paul Knight, the energy consultant to Chicago’s Kimbark Building project, credits Maureen Davlin, a Program Manager with the Illinois Department of Commerce and Community Affairs, for championing that project. She was looking for opportunities to demonstrate PV technology and saw this melding of solar panels and green products as a good fit for the State’s objectives.

4. Technical Issues and Support

- a) *There is generally no place for affordable housing developers to go to secure needed information and ongoing technical assistance through all stages of the project cycle.*

Most PV promotion by states seems to be reactive rather than proactive, responding to and evaluating funding applications, while leaving responsibility for outreach to installers and PV proponents. Given the special issues and complexities of the affordable multifamily sector, including the long transaction times of the public decision making process, it is unlikely to get much attention. Developers have limited access to knowledge of PV system design and construction techniques (particularly in rehab), anxiety regarding potential system failure, callbacks, security, and uncertainties about future O&M costs.

- Dan Helmes of the Boston Housing Authority (BHA) reports that technical assistance throughout the development process was essential to the incorporation of PV and other green features at Maverick Gardens in Boston, MA. The US DOE had funded a technical assistance contractor to support the BHA's Planning Department in a large-scale energy and water efficiency effort. The contractor identified the opportunity for a green building upgrade at Maverick Gardens when the HUD award was announced and championed the project from conception through construction. The contractor assisted with funds solicitations, green design development, stakeholder coordination, installation of green features, and ongoing support to the design development team. In addition, the contractor provided training and continuity in the project in the face of staff turnovers. It enabled the project to succeed.
- Lynn Berard of EAH in California indicated that they had been holding back on PV projects for their large portfolio due to a lack of knowledge and support. In particular, they were concerned about creating roof issues in their substantial rehabs of HUD preservation properties. “In the design process for our new properties, it’s easy,” she said, “but in rehabbing existing buildings, we had concerns about making new penetrations that could affect the integrity of the roof.” They hadn’t seen other such projects and did not know to whom to turn. Finally, with technical assistance provided by a local energy education cooperative, they are more comfortable with proceeding.

- Steve Morgan warns about special rooftop security issues in affordable housing and the likelihood that installed systems can be easily damaged. This a particular issue in rehab where PV might otherwise best be located on existing available roof space.

OPPORTUNITIES IN THE MULTIFAMILY HOUSING SECTOR

For CESA members committed to promoting photovoltaics, focusing on the green affordable multifamily sector offers particular opportunities.

1. Partners in Environmental Quality

Affordable housing developers are often change agents by nature, and, as such, are often environmental advocates as well as social advocates. Their commitment to environmental quality at the building level is an excellent match for the environmental quality objectives of CESA and its member funds.

2. Best Residential Sector Economics

Although the cost of PV is predicted to continue to decline, they remain high today. The affordable multifamily sector offers CESA and its members an opportunity for PV in residential buildings, but at a commercial scale with potentially significantly more attractive economics than the single-family retrofit market.

3. A Chance for PV to Look Good and Be Seen

One of the biggest obstacles that PV installations face in single family construction is that it is perceived as visually intrusive and conflicts with many peoples' image of home. On the other hand, affordable multifamily housing is often mixed-use in character and built in a more urban environment. Further, multifamily housing is often architect designed and bold in appearance. Again, this creates a "residential play" in a physical setting where looking special and high tech is tolerated and even appreciated.

4. A Good Fit With Other State and National Affordable Housing Initiatives

Increasing the numbers and quality of affordable housing is a priority nation-wide. By focusing on incorporating PV in affordable multifamily housing, CESA can position PV as a ready-to-go solution to controlling operating costs in this sector. Further, to the extent that PV is effectively integrated with other green measures that improve the environmental quality of homes and neighborhoods, it can become a standard component in future housing projects. As RET is demonstrating in its Affordable Green Housing Initiative, there is common ground to be explored and developed with state housing agencies and green advocacy organizations.

CESA STRATEGIES FOR THE AFFORDABLE MULTIFAMILY SECTOR

Peregrine understands that the Clean Energy Group has secured funding from the Educational Foundation of America for a more detailed analysis of the opportunities for PV in the affordable multifamily sector. While it is not in CESA's power to mitigate all barriers noted above, there are a number of strategies that might be pursued by CESA's members. In that context, we suggest consideration of the following strategies.

- 1. *Continue to provide financial incentives and subsidies to the extent practical to encourage PV installations in affordable housing.***
 - Identify and piggyback PV onto green design initiatives whenever possible.
 - Capitalize on the groundswell of interest in green buildings and sustainable design by partnering with green advocates.
- 2. *Meet with developers to understand their business, their drivers, and their needs***
 - Listen closely and focus on the strategic sale. If developers are not very interested in PV, there is probably a good reason.
 - Attempt to see PV systems from the developers' perspective, not from a renewable energy promoter perspective.
 - Broadly explore the benefits they value and potential benefits created by PV to find a fit.
- 3. *Investigate affordable multifamily housing funding mechanisms and processes and establish relationships with public agencies active in the affordable housing market.***
 - Listen closely to their needs to determine the best approaches to partnering.
 - Clarify a best fit for PV investments
 - Make the process as easy and seamless as possible.
- 4. *Provide education, outreach, and technical support to all potential key partners.***
 - Build a cadre of advocates in housing agencies, etc, to help promote PV systems in projects.
 - Look for and nurture PV technology Champions at CDCs, etc.
 - Provide technical training and support as needed to address concerns about equipment and system design, installation, operation, and maintenance.
- 5. *Minimize lost opportunities***
 - Assume that PV technology will go mainstream in this market. While the funds may not be available to ensure that PV is installed in a green affordable multifamily housing project at the time of commissioning, that can change over time.
 - To enable these buildings to go PV in the future, work with Green Building advocates and certification organizations to create incentives for projects to be built "PV ready".
 - Provide technical support and other resources to help optimize solar site planning.
 - Encourage developers to include architectural elements (e.g. roof pitch and design) that will support future PV panels
 - Develop initiatives that support installation of PV-ready electrical infrastructure as part of the original electrical design, when it is least expensive (if not free).

CONCLUSIONS / NEXT STEPS

Again, there appears to be significant opportunity for CESA and its members to promote and facilitate the installation of photovoltaic (PV) systems in green affordable multifamily housing.

While our observations are somewhat anecdotal, by virtue of the time and resource constraints imposed by an initial investigation's scope and the limited numbers of projects that we could contact and directly interview, we believe that they will stand up in an expanded investigation.

These observations are supported by our collective conversations with individuals and organizations that focus their attention on affordable housing markets, green buildings, and the solar industry, as well as by Peregrine Energy Group's own experience in all these areas. We have made every effort to include projects that are representative and distributed geographically, and which have relevance to CESA members.

Our focus on affordable multifamily projects that are committed to Green values has ensured that our pool of respondents are both sympathetic to the virtues of advanced energy efficiency and savvy with regards to issues of cost and performance. And perhaps as important, they also thoughtful about larger social and environmental issues that shape communities, and as such, reflect the values of the Clean Energy States.

We recommend that CESA and its member funds pursue this market. We suggest CESA should proceed with a larger investigation and a strategic planning process leading to the design and implementation of programs to facilitate PV installation in affordable multifamily housing.