Harvard Community Solar Garden (CSG) LLC

Overview

To maximize participation in Solarize Mass, Harvard's community volunteers are working to establish a Community Solar Garden (CSG), so that residents and businesses that lack a suitable site to install solar on their roof or on the ground can put their system in the CSG.

Harvard residents have responded enthusiastically to the Solarize Mass opportunity, with more than 300 registering for a site evaluation, but nearly half of those evaluated can't participate, either because of solar orientation or shade, or because of structural limitations (old house, steep roof, load-bearing capacity, etc.).

Harvard CSG LLC will be formed, to allow a resident's installation to be part of a resident-owned Community Solar Garden, with all of the benefits of resident ownership. Participation in Solarize Mass is expected to be double what it would have been with only direct business and residential installation.

The Community Solar Garden concept is available by law in Colorado, and is enabled in Massachusetts with "neighborhood net metering" provisions that are part of the 2008 Green Communities Act. Legislation was introduced in Washington last year to give share owners of community solar gardens the same tax benefits they would enjoy with ownership of a directly installed residential solar array. For a look at what is happening around the country, see Attachment E, Home Power Journal June-July 2011, Community Energy—Solar Gardens a Growing Trend.

Definitions

Host Member

A Harvard property owner that agrees to have a designated portion of land dedicated to installation of photovoltaic (PV) solar arrays on behalf of residents and businesses elsewhere in Harvard who are unable to install on their own property.

Customer Member

A Harvard resident or business that wishes to install PV solar, but lacks suitable solar exposure on his/her own property. Customer contracts with installer under exactly the same procedures as for on-site installation, except that the purchased PV solar panels and inverter(s) are installed on a host site. Installed equipment is contributed into the LLC by Customer Members, to be managed as part of the community solar garden.

Community Solar Garden (CSG) LLC

An ownership entity formed for the purpose of constructing, managing, and maintaining PV solar arrays placed in the LLC by Customer members. CSG will execute Schedule Z with National Grid to control allocation of credit for generated electricity to member meters, and will receive and distribute SREC income to Customer Members, after paying operating and maintenance expenses, maintaining a

reserve for future expenses, and after distributions to Host Member(s) for rent, as agreed in hosting agreement.
A Host Member contributes a long-term lease (or easement) to the LLC, committing to allow placement of Customer Member PV solar generating equipment for a minimum of 25 years. Lease (or easement) will allow for PV solar arrays to be installed, building(s) to be used or erected to house necessary equipment (inverters, meters), electric service to be installed or upgraded as necessary (based on total capacity to be installed), site access and security to be improved if needed (road, path, fencing, etc.). Host Member(s) shall be paid a pre-determined share of SREC income, or a fixed monthly rent as agreed, as compensation for providing the site.

Hosting qualifications, responsibilities

Site

Ideally, level or sloped to south, unshaded. 17.5'x36' for each 3.3 kW pole.
May be able to be sited on slightly north sloping terrain, with spacing greater that 36' in the north-south dimension to prevent front arrays shading back arrays. Spacing may also be adjusted slightly by increasing pole height on back arrays.

Electric service

Appropriate electric service will be provided to the site by the Installer, as part of the construction and installation process.

Customer qualifications, responsibilities

Customer must have gone through energy audit and site assessment, with a finding of site not viable (<80% of optimum solar production; setback or lot line issues, excessive site prep costs e.g. ledge, tree removal; wetland issues).
Customer contracts on the same basis as for on-site (pole mount), sized appropriately to customer usage history and/or anticipated usage, and with Commonwealth Solar II grant based on customer eligibility (value of home and/or family income). Depending on requirements of hosting site, there may be a "site prep" line item in the contract, to account for such items as tree removal, electric service upgrades, and site security. Such costs would be apportioned among Customers as part of installed cost.
Customer Member pays for all costs net of grant, takes available state and federal tax credits, and retains ownership of installed capacity via percentage ownership of LLC. Customer Member's electrical bill is credited, via National Grid's neighborhood net metering tariff, for Customer Member's share of electricity generated by CSG installed systems. Customer Member can take tax credits based on total net contract cost.
Customer receives SREC income for total generated electricity, with an amount retained by CSG LLC for rent, operating expenses, and maintenance/replacement reserve.

Harvard Community Solar Garden (CSG) LLC

Next steps

- Develop loan package for LLC.
- Develop LLC operating agreement.
- Secure financing.
- Enroll Members

Time is of the essence, as the Solarize Massachusetts program ends Sept. 30, 2011.

The Value Proposition, Source and Use of Funds (see Attachment A, CSG Cash Flows; and attachments A-1, CSG flows 100 kW; and A-2, CSG flows, 200 kW)

Financing for the CSG is very secure. The PV solar panels that will be installed have a 25 year warranty guaranteeing their rated output, and an expected useful life of 50 years. The presumed value of the generated electricity is based on state and federal forecasts of future electricity rates. Having doubled since 1990 in Massachusetts, and among the highest rates in the country, forecasts for future rates range from 3-6% annual increases for the next 20 years. Modeling customer cashflow with only 2% rate increases, and without benefit of rebates, the payback period is less than 10 years (see Attachment C, Customer Cash Flow, No rebates, low electricity rates). Federal and state tax credits are the biggest immediate benefit, contributing to the secure and attractive investment picture. A 30% federal tax credit can be taken by the customer on the full installed cost, along with a 15% state tax credit (maximum $1,000). This nearly immediate benefit brings the amount to be financed below 70%. The next biggest benefit is SRECs. Sold at auction to enable utilities to meet their obligation to produce a growing percentage of power from renewable sources, the most recent auction brought nearly four times the value of generated electricity, and will dramatically accelerate repayment of borrowed funds. Originally scheduled to decline by 10% annually, DOER is in the process of keeping the rate at its current level for two years, and lower the annual reduction thereafter to 5% (see Attachment B, MA DOER Seeks to Set Fixed SACP Schedule). This change accelerates payback by 1-2 years for all cashflow models.

SREC payments will be made to LLC, as owner of generating system. From such SREC income, allocation will be made to an operating reserve from which routine maintenance and replacements (inverters, e.g.) will be funded. Payments will be made to a CSG Rent, Maintenance, and Reserve account. To the extent site improvements have been financed from bank funds, the CSG account will be charged for interest and principal payments. When there is no site improvement borrowing to be repaid, aggregated rent payments will be made to Host Member.

The risk of the generating capacity being adversely affected by a casualty loss will be protected by insurance coverage purchased by CSG, as part of CSG operating and maintenance expense.

The risk of a Customer Member default (loss of residence, or loss of metered electricity to be offset by CSG production, or failure to make timely payments for generated electricity net metered to Customer Member meter) will be covered by

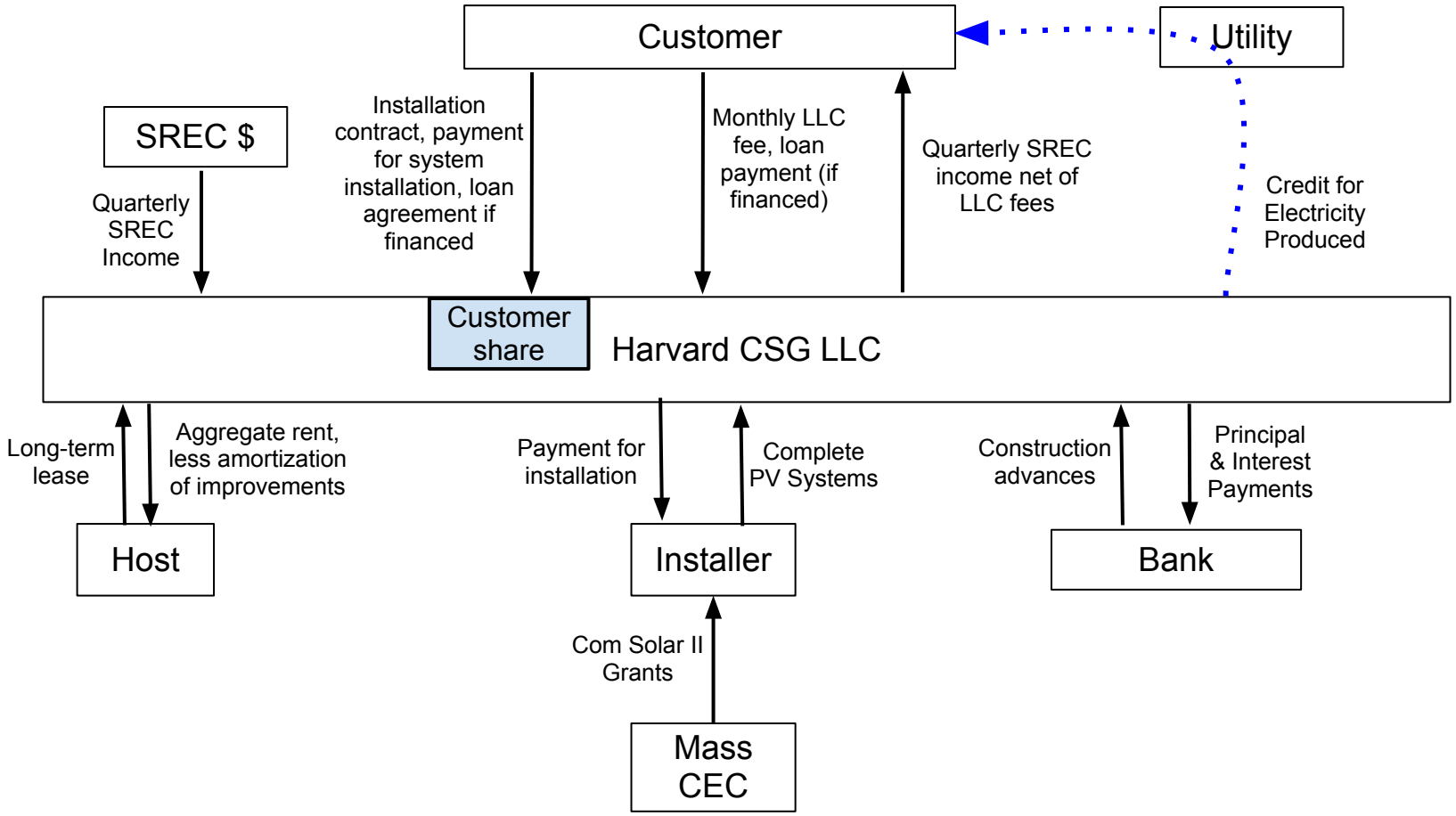
default provisions in the operating agreement. In the event of such default, with due process, ownership interest in the LLC will revert to LLC, subject to transfer/resale to another Harvard resident. It is anticipated that there will be more demand than can be met, and such ownership transfer would be easily accomplished, with minimum lost production. Alternatively, available capacity may be reallocated to existing members who may wish to increase participation. In any case, a market value of the asset to be transferred will be established, and proceeds of transfer, net of transfer costs, will be returned to defaulting member.

It is expected that the bank will take a security position in the installed equipment, as well as the payments of SREC income and the payments from financed members for their generated electricity.

Amortization of the loan for a customer with base rebates, expected electricity rates and inflation, and an assumed 6% loan rate is complete in just over 5 years (see Attachment D, Customer Cash Flow, no low income/value rebates, expected electricity rates, low interest), with nearly 60% repaid in two years.

Attachment A

Community Solar Garden Value Flows



Key Model Elements:

- Customer contracts with installer directly for system in the CSG
- Customer pays for (or finances) system, takes available tax credits
- Customers retain ownership of the solar assets via CSG membership
- Customer must have a non-viable home/business site to participate
- Harvard residents and businesses only

Harvard CSG LLC
Cash Flow, LLC and Customer Costs

	2011	Q1/2012	Q2/2012	Q3/2012	Q4/2012	2013	2014	2015
CSG LLC Costs								
Organization Costs	$ 10,000							
Infrastructure Costs	$ 30,000							
Site Costs	$ 20,000							
Reimbursed from garden adder	$ (30,000)							
Rent, Maintenance, Reserve			$ (5,000)	$ (2,500)	$ (2,500)	$ (10,000)	$ (10,000)	$ (10,000)
Loan interest		$ 450	$ 479	$ 419	$ 388	$ 1,424	$ 1,240	$ 1,044
Operating Costs, insurance		$ 1,500	$ 500			$ 3,500	$ 3,500	$ 3,500
Rent payment to Host					$ -	$ 2,000	$ 2,000	$ 2,000
LLC Loan Balance,Cumulative cashflow	$ 30,000	$ 31,950	$ 27,929	$ 25,848	$ 23,736	$ 20,660	$ 17,400	$ 13,944
Customer Costs								
Deposit at contract signing	$ 20,000							
Down Payment (to bring prepayment to 30%, equal to federal tax credit)	$ 119,500							
Balance Due (70% of purchase, after rebate), customer paid or financed by LLC	**$ 325,500**							
Federal Tax Credit								
MA Tax Credit			$ (20,000)					
Electricity Generated		$ (4,130)	$ (4,130)	(4,130)	(4,130)	(17,181)	(17,868)	(18,583)
SREC Income			$ (14,750)	(14,750)	(14,750)	(59,000)	(56,050)	(53,248)
CSG Rent			$ 5,000	2,500	2,500	10,000	10,000	10,000
Loan Interest		$ 4,883	$ 4,894	4,459	4,280	16,395	13,408	10,377
Loan Balance/ Cumulative Cash Flow	$ 325,500	$ 326,253	$ 297,266	285,345	273,245	223,459	172,949	121,496
Combined Loan Interest		$ 5,333	$ 5,373	$ 4,878	$ 4,668	$ 17,819	$ 14,647	$ 11,421
Loan Payments (from cashflow)		$ (4,130)	$ (38,880)	$ (18,880)	$ (18,880)	$ (76,181)	$ (73,918)	$ (71,830)
Combined LLC and Customer Balances, Cumulative Cashflow	$ 355,500	$ 358,203	$ 325,196	$ 311,193	$ 296,981	$ 244,119	$ 190,349	$ 135,439

6.5 year amortization, 100 kW, base rebates, $500 rent

Harvard CSG LLC
Cash Flow, LLC and Customer Costs

	2016	2017	2018	2019
CSG LLC Costs				
Organization Costs				
Infrastructure Costs				
Site Costs				
Reimbursed from garden adder				
Rent, Maintenance, Reserve	$ (10,000)	$ (10,000)	$ (10,000)	$ (10,000)
Loan interest	$ 837	$ 617	$ 384	$ 137
Operating Costs, insurance	$ 3,500	$ 3,500	$ 3,500	$ 3,500
Rent payment to Host	$ 2,000	$ 2,000	$ 2,000	$ 2,000
LLC Loan Balance,Cumulative cashflow	$ 10,280	$ 6,397	$ 2,281	$ (2,082)
Customer Costs				
Deposit at contract signing				
Down Payment (to bring prepayment to 30%, equal to federal tax credit)				
Balance Due (70% of purchase, after rebate), customer paid or financed by LLC				
Federal Tax Credit				
MA Tax Credit				
Electricity Generated	(19,326)	(20,099)	(20,903)	(21,739)
SREC Income	(50,585)	(48,056)	(45,653)	(43,370)
CSG Rent	10,000	10,000	10,000	10,000
Loan Interest	7,290	4,132	891	-
Loan Balance/ Cumulative Cash Flow	68,874	14,852	(40,813)	(95,923)
Combined Loan Interest	$ 8,126	$ 4,749	$ 1,275	$ 137
Loan Payments (from cashflow)	$ (69,911)	$ (68,155)	$ (22,524)	$ -
Combined LLC and Customer Balances, Cumulative Cashflow	$ 79,154	$ 21,249	$ (38,533)	$ (98,005)

6.5 year amortization, 100 kW, bas

Harvard CSG LLC
Cash Flow, LLC and Customer Costs

	2011	Q1/2012	Q2/2012	Q3/2012	Q4/2012	2013	2014	2015
CSG LLC Costs								
Organization Costs	$ 10,000							
Infrastructure Costs	$ 30,000							
Site Costs	$ 35,000							
Reimbursed from garden adder	$ (60,000)							
Rent, Maintenance, Reserve			$ (6,000)	$ (3,000)	$ (3,000)	$ (12,000)	$ (12,000)	$ (12,000)
Loan interest		$ 225	$ 251	$ 172	$ 130	$ 347	$ 157	$ -
Operating Costs, insurance		$ 1,500	$ 500			$ 4,500	$ 4,500	$ 4,500
Rent payment to Host					$ -	$ 4,000	$ 4,000	$ 4,000
LLC Loan Balance,Cumulative cashflow	$ 15,000	$ 16,725	$ 11,476	$ 8,648	$ 5,778	$ 2,624	$ (718)	$ (4,218)
Customer Costs								
Deposit at contract signing	$ 40,000							
Down Payment (to bring prepayment to 30%, equal to federal tax credit)	$ 290,000							
Balance Due (70% of purchase, after rebate), customer paid or financed by LLC	**$ 770,000**							
Federal Tax Credit								
MA Tax Credit			$ (40,000)					
Electricity Generated		$ (8,260)	$ (8,260)	(8,260)	(8,260)	(34,362)	(35,736)	(37,166)
SREC Income			$ (29,500)	(29,500)	(29,500)	(118,000)	(112,100)	(106,495)
CSG Rent			$ 6,000	3,000	3,000	12,000	12,000	12,000
Loan Interest		$ 11,550	$ 11,599	10,697	10,336	39,879	33,850	27,730
Loan Balance/ Cumulative Cash Flow	$ 770,000	$ 773,290	$ 713,129	689,066	664,642	564,159	462,173	358,243
Combined Loan Interest		$ 11,775	$ 11,850	$ 10,869	$ 10,466	$ 40,225	$ 34,007	$ 27,730
Loan Payments (from cashflow)		$ (8,260)	$ (77,760)	$ (37,760)	$ (37,760)	$ (152,362)	$ (147,836)	$ (143,661)
Combined LLC and Customer Balances, Cumulative Cashflow	$ 785,000	$ 790,015	$ 724,605	$ 697,714	$ 670,420	$ 566,784	$ 461,455	$ 354,024

7.5 year amortization, 200 kW, no rebates, $300 rent

Harvard CSG LLC
Cash Flow, LLC and Customer Costs

	2016	2017	2018	2019
CSG LLC Costs				
Organization Costs				
Infrastructure Costs				
Site Costs				
Reimbursed from garden adder				
Rent, Maintenance, Reserve	$ (12,000)	$ (12,000)	$ (12,000)	$ (12,000)
Loan interest	$ -	$ -	$ -	$ -
Operating Costs, insurance	$ 4,500	$ 4,500	$ 4,500	$ 4,500
Rent payment to Host	$ 4,000	$ 4,000	$ 4,000	$ 4,000
LLC Loan Balance,Cumulative cashflow	$ (7,718)	$ (11,218)	$ (14,718)	$ (18,218)
Customer Costs				
Deposit at contract signing				
Down Payment (to bring prepayment to 30%, equal to federal tax credit)				
Balance Due (70% of purchase, after rebate), customer paid or financed by LLC				
Federal Tax Credit				
MA Tax Credit				
Electricity Generated	(38,652)	(40,198)	(41,806)	(43,478)
SREC Income	(101,170)	(96,112)	(91,306)	(86,741)
CSG Rent	12,000	12,000	12,000	12,000
Loan Interest	21,495	15,115	8,563	1,810
Loan Balance/ Cumulative Cash Flow	251,915	142,720	30,171	(86,238)
Combined Loan Interest	$ 21,495	$ 15,115	$ 8,563	$ 1,810
Loan Payments (from cashflow)	$ (139,822)	$ (136,310)	$ (133,112)	$ (17,263)
Combined LLC and Customer Balances, Cumulative Cashflow	$ 244,197	$ 131,502	$ 15,452	$ (104,457)

7.5 year amortization, 200 kW, no i

Attachment B

http://www.srectrade.com/blog/srec-markets/ma-doer-seeks-to-set-fixed-sacp-schedule

MA DOER Seeks to Set Fixed SACP Schedule

On August 2, 2011, the Massachusetts Department of Energy Resources (DOER) proposed an amendment to the Solar Alternative Compliance Payment (SACP) schedule for the MA SREC program. Feedback from market participants including project developers, financing parties, and retail electricity suppliers indicated the current SACP structure creates uncertainty around future SREC valuation. Under the existing structure, the DOER has the ability to reduce the SACP on a yearly basis by up to 10% of the current value. The amended schedule seeks to provide more certainty for expected future prices while assisting project financing and negotiations for long-term SREC contracts.

The proposal establishes a 10-year schedule for the SACP that would maintain the current rate of $550/SREC through compliance year 2013, then decrease 5% each following year. The proposal also requires the schedule to be updated on a yearly basis to include a price for the 10th year of the schedule. For example, the 2022 price will be added to the schedule no later than January 31, 2012. The table below demonstrates the proposed schedule.

Compliance Year	SACP Rate per SREC
2012	$550
2013	$550
2014	$523
2015	$496
2016	$472
2017	$448
2018	$426
2019	$404
2020	$384
2021	$365
2022 and after	Added no later than January 31, 2012 (and annually thereafter) following stakeholder review.

Prior to implementation, the proposed schedule is to go through a comment process. The comment period is currently open through August 15, 2011. Once all comments are collected, the DOER will review and begin the necessary process to amend the existing Solar Carve-Out provisions.

Attachment C

Community Solar Garden
Customer cash flow

	2011	Q1/2012	Q2/2012	Q3/2012	Q4/2012	2013	2014	2015	2016	2017	2018	2019
Deposit	$ 1,000											
Down Payment	$ 7,250											
Balance Due	$ 19,250											
Federal Tax Credit												
MA Tax Credit			$ (1,000)									
Electricity Generated		$ (192)	$ (192)	$ (192)	$ (192)	$ (782)	$ (798)	$ (814)	$ (830)	$ (847)	$ (864)	$ (881)
SREC Income			$ (738)	$ (738)	$ (738)	$ (2,950)	$ (2,803)	$ (2,662)	$ (2,529)	$ (2,403)	$ (2,283)	$ (2,169)
CSG Rent			$ 150	$ 75	$ 75	$ 300	$ 300	$ 300	$ 300	$ 300	$ 300	$ 300
Mortgage Interest		$ 289	$ 290	$ 268	$ 259	$ 1,001	$ 855	$ 708	$ 560	$ 410	$ 257	$ 102
Loan Balance/ Cumulative Cash Flow	$ 19,250	$ 19,347	$ 17,858	$ 17,272	$ 16,676	$ 14,245	$ 11,799	$ 9,330	$ 6,831	$ 4,291	$ 1,702	$ (945)
ASSUMPTIONS:												
System Size, Watts	5000											
Customer Unit Cost, $/ Watt, tier price	$ 4											
CSG Adder, $/ Watt	$ 1.50											
Rebate, CEC Base incentive, $/ Watt	**0.00**											
Rebate, CEC Mass Product, $/ Watt	**0.00**											
Rebate, CEC Low income/ home value, $/ Watt	**0.00**											
Customer Cost (tier price plus adders less rebates)	$ 27,500											
Production Factor, kWh per kW rated capacity, per year	1.18											
Customer Annual production	5900											
Electricity cost inflator per yr	**2.0%**											
Electricty rates, $/kWh	**0.13**											
MA tax credit	$ 1,000											
Federal Tax Credit	30%											
SREC Price, $/kWh/yr	0.50											
SREC Escalator, per year	**-5%**											
SREC Floor Price, $/kWh/yr	0.285											
CSG rent, per year	$ 300											
Loan rate	**6%**											
7.1 year amortization, no rebate, low electricity rates/inflation												

Attachment D

Community Solar Garden
Customer cash flow

	2011	Q1/2012	Q2/2012	Q3/2012	Q4/2012	2013	2014	2015	2016	2017	2018	2019
Deposit	$ 1,000											
Down Payment	$ 5,975											
Balance Due	$ 16,275											
Federal Tax Credit												
MA Tax Credit			$ (1,000)									
Electricity Generated		$ (207)	$ (207)	$ (207)	$ (207)	$ (859)	$ (893)	$ (929)	$ (966)	$ (1,005)	$ (1,045)	$ (1,087)
SREC Income			$ (738)	$ (738)	$ (738)	$ (2,950)	$ (2,803)	$ (2,662)	$ (2,529)	$ (2,403)	$ (2,283)	$ (2,169)
CSG Rent			$ 150	$ 75	$ 75	$ 300	$ 300	$ 300	$ 300	$ 300	$ 300	$ 300
Mortgage Interest		$ 244	$ 245	$ 221	$ 212	$ 808	$ 645	$ 480	$ 312	$ 139	$ -	$ -
Loan Balance/ Cumulative Cash Flow	$ 16,275	$ 16,313	$ 14,763	$ 14,116	$ 13,459	$ 10,757	$ 8,006	$ 5,195	$ 2,312	$ (658)	$ (3,685)	$ (6,641)
ASSUMPTIONS:												
System Size, Watts	5000											
Customer Unit Cost, $/ Watt, tier price	$ 4											
CSG Adder, $/ Watt	$ 1.50											
Rebate, CEC Base incentive, $/ Watt	**0.75**											
Rebate, CEC Mass Product, $/ Watt	**0.10**											
Rebate, CEC Low income/ home value, $/ Watt	**0.00**											
Customer Cost (tier price plus adders less rebates)	$ 23,250											
Production Factor, kWh per kW rated capacity, per year	1.18											
Customer Annual production	5900											
Electricity cost inflator per yr	**4.0%**											
Electricty rates, $/kWh	**0.14**											
MA tax credit	$ 1,000											
Federal Tax Credit	30%											
SREC Price, $/kWh/yr	0.50											
SREC Escalator, per year	**-5%**											
SREC Floor Price, $/kWh/yr	0.285											
CSG rent, per year	$ 300											
Loan rate	**6%**											
5.2 year amortization, base rebates, expected electricity rates/inflation												

Attachment E

Community Energy

Solar Gardens a Growing Trend

For years, Steffen Bradley considered the idea of putting PV modules on his 1950s ranch-style home in Ellensburg, Washington. Every now and again, he'd take a lap around his yard, hoping this time he'd find a novel way to overcome shading issues posed by the many trees on his and his neighbors' lots. For urban solar systems, it's a common challenge encountered in older neighborhoods—big, beautiful trees make the community attractive but prevent good solar access on roofs.

Fortunately, alternatives are springing up in communities across the country. Steffen counts himself lucky to live in one that has embraced an innovative solution to on-site solar: community solar arrays, sometimes called community solar gardens or farms. The concept? Provide a large, centralized PV power plant, allowing individuals who are otherwise unable to put PV on their roofs to invest in and benefit from a local, clean, renewable energy source.

With help from the Bonneville Environmental Foundation and Washington State University's Northwest Solar Center, the community built one of the first solar parks in the United States. The Ellensburg Community Renewable Park has grown from 36 to 111 kW through buy-ins from local residents, who benefit from the park's energy generation. Residents can buy in as much as they'd like—up to the point of zeroing out their monthly electricity bills.

Courtesy City of Ellensburg

Ellensburg, Washington

Steffen and his wife, Carin, invested $1,000 in the second phase of the park and plan to invest more in future phases. In return, the couple receives credits on their electricity bills for a portion of the system's production over the next 20 years. They also qualify for the $0.30 per kWh state solar incentive.

No Solar Site? No Problem

Solar gardens put emphasis on small- and medium-scale distributed generation. Unlike large utility-scale solar facilities, these smaller, shared systems are closer to home, ideally on an existing, large rooftop or otherwise unusable land.

The primary push for these shared systems stems from the fact that on-site generation is not feasible for the majority of people. According to a 2008 study by the National Renewable Energy Laboratory, only 22% to 27% of residential buildings are suitable for hosting a PV system.

Most recently, the concept has gained momentum in Colorado, in part due to increasing concerns over "energy sprawl" from large-scale PV farms in the San Luis Valley. Aside from aesthetic concerns for the landscape, a point of contention among area residents was that the energy generated was not being sold locally, but rather exported to the Denver area.

"Locally produced solar is the best kind of solar. Using rooftop solar gardens instead of industrial solar farms helps protect important landscapes like Colorado's San Luis Valley," says Joy Hughes, founder of the Solar Garden Institute, a nonprofit cooperative that advocates community-based energy development. The group was instrumental in getting state lawmakers to pass the Community Solar Gardens Act last year.

The new legislation mandates that the state's investor-owned utilities provide net-metering credits to those who subscribe to solar gardens. The legislation allows groups of at least 10 subscribers to collectively own a share of a solar system in the county where they reside.

Ways To Grow Solar

Other utilities have followed Ellensburg's example and set up similar programs (see map on

Courtesy City of St. George

pages 16–17). At least a half dozen other entities and citizen groups are developing community-shared systems. That number is expected to rise as regulatory hurdles come down and models evolve.

Barriers to third-party power purchase agreements present a significant obstacle for community solar arrays, says Laurel Varnado, a policy analyst for the North Carolina Solar Center.

"If the state doesn't have a vehicle for third-party power purchase agreements (PPAs)," she says, "then the group is forced to resort to cumbersome contractual agreements with their local utility to sell power to the utility."

A variety of economic structures, each with unique advantages and disadvantages, has been used to bring these systems on-line. Leases and PPAs are most common, but in some cases, subscribers form an organization such as a limited liability corporation, a co-op, or a nonprofit.

Many programs utilize some form of virtual net-metering, which allows multiple individuals to receive credits on their electricity bills for a portion of one PV system's output—though specific rules vary.

Currently, only nine states have laws in place that allow community or shared-system net-metering. Each has taken a different approach, adopting unique policies for dealing with joint ownership and billing, utility involvement, and meter aggregation, according to Varnado. For example, the parameters for participants' geographic dispersal and incentives eligibility vary from state to state.

Other states, including Maryland and Connecticut, are considering changing their net-metering laws to address metering issues related to community solar, Varnado says. At the federal level, the Solar Uniting Neighborhoods Act, sponsored by Senator Mark Udall (D-Colo.), aims to extend the existing 30% federal renewable energy tax credit to group-owned solar installations.

Breaking Down the Barriers

A roadblock for grassroots efforts is that subscriptions to solar gardens are, by definition, financial securities and subject to federal and state regulations, says David Brosch, a founding member of the University Park Community Solar project in Maryland.

Brosch and his neighbors in University Park have done what few others have, creating a community solar garden that is independently run and funded. The project—a 24 kW array on the south-facing roof of a local church—took more than two years to bring to fruition. Their inspiration came from the fact that many of their homes did not have suitable solar access due the area's expansive canopy of trees.

"We were a bit naïve going into the process. Securities regulations are rather complex, and each state is different," Brosch says. "We quickly learned that it is very difficult for the small folks to do what the big companies do all the time."

The group—University Park Community Solar (UPCS)—started from scratch, working through all the issues of insurance, utility connections, and accounting. Attorneys and advisors helped them explore the pros and cons of how different businesses handle tax structure, ability to pass through profits, and eligibility for available incentives.

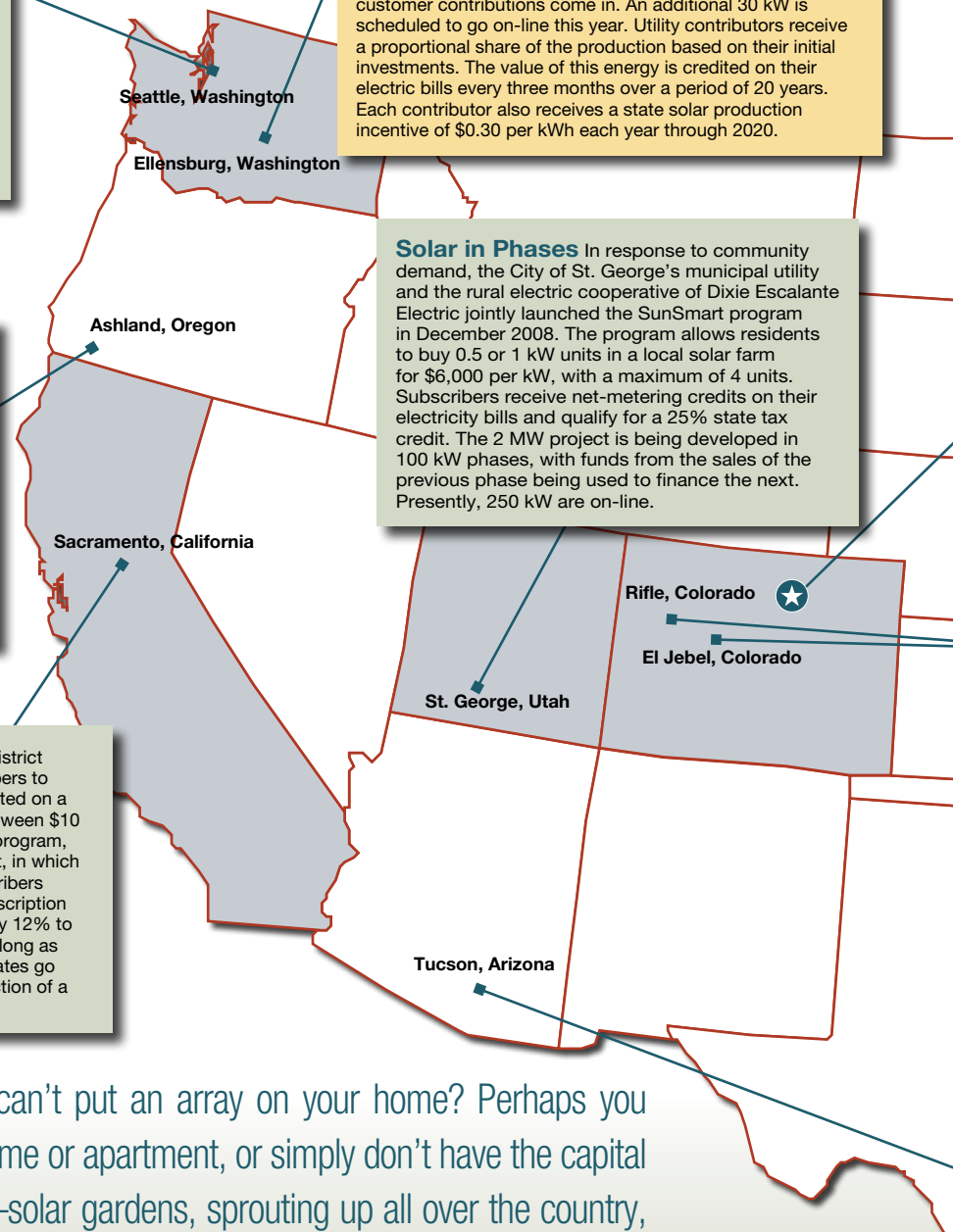
Ultimately, UPCS formed a limited liability corporation and took on 35 investors, at levels ranging from $2,000 to $15,000, to fund the $130,000 installation. The group set up a PPA, in which the church buys the generation from the system for 20 years, at a rate slightly lower than the utility rate. They also played a hand in helping change the state's net-metering law so that the utility pays the group for any excess generation fed back to the grid (see map).

To comply with state securities regulations, UPCS could not have more than 35 investors and had to steer clear of certain phrases in advertising and other marketing materials, Bosch says. The group circumvented federal security regulations by accepting only in-state investors.

(continued on page 18)

Gardens in the Park This summer, Seattle City Light will launch its pilot community solar program with a 24 kW PV array. In partnership with Seattle Parks and Recreation, the municipal utility is building three picnic shelters in Jefferson Park and equipping each roof with PV modules. Subscribers can purchase the output from a maximum of two "units" for an up-front cost of $600 per unit. Each unit is estimated to produce roughly 48 kWh per month. Through 2020, subscribers will receive credits on their electricity bills and qualify for a $1.08 per kWh production incentive through the state. This initial project is expected to sell out fast, and additional arrays are in development.

A Shining Example The concept originated in 2004, but it wasn't until 2006 that the City of Ellensburg's municipal utility installed the first 36 kW phase of the Ellensburg Community Renewable Park. The system—prominently located along a highway for maximum exposure—has since grown to 111 kW. The project continues to grow as utility customer contributions come in. An additional 30 kW is scheduled to go on-line this year. Utility contributors receive a proportional share of the production based on their initial investments. The value of this energy is credited on their electric bills every three months over a period of 20 years. Each contributor also receives a state solar production incentive of $0.30 per kWh each year through 2020.



An Energized Community In the city of Ashland, where a thick tree canopy prevents good solar access for many homes, the Solar Pioneer Program allows residents and businesses to purchase the output from a 64 kW roof-mounted PV system located on the City's service center. The charge for one module is $743, with the cost stepping down yearly and no maximum purchase restrictions. For the life of the 20-year program, subscribers receive a yearly credit on their electric bills based on current net-metering rates, and own the renewable energy certificates associated with the modules. The project came on-line in 2009, and so far, about half of the array is under contract.

Solar in Phases In response to community demand, the City of St. George's municipal utility and the rural electric cooperative of Dixie Escalante Electric jointly launched the SunSmart program in December 2008. The program allows residents to buy 0.5 or 1 kW units in a local solar farm for $6,000 per kW, with a maximum of 4 units. Subscribers receive net-metering credits on their electricity bills and qualify for a 25% state tax credit. The 2 MW project is being developed in 100 kW phases, with funds from the sales of the previous phase being used to finance the next. Presently, 250 kW are on-line.

A Balancing Act In 2007, Sacramento Municipal Utility District launched a program called SolarShares, which allows subscribers to source up to 40% of their energy from a 1 MW solar array located on a local turkey farm. Subscribers pay a monthly fee—typically between $10 and $127—to subscribe to "shares" in the array. Through the program, subscribers essentially enter into a power purchase agreement, in which the utility buys the output from the subscribers' shares. Subscribers receive net-metering credits on their monthly bills, but the subscription fee typically cancels out any credits. The program adds roughly 12% to a subscriber's bill. Subscribers are able to lock in a rate for as long as they are SMUD customers and will save money as electricity rates go up. Shares in the first array are currently sold out, but construction of a second 1 MW array is expected early next year.

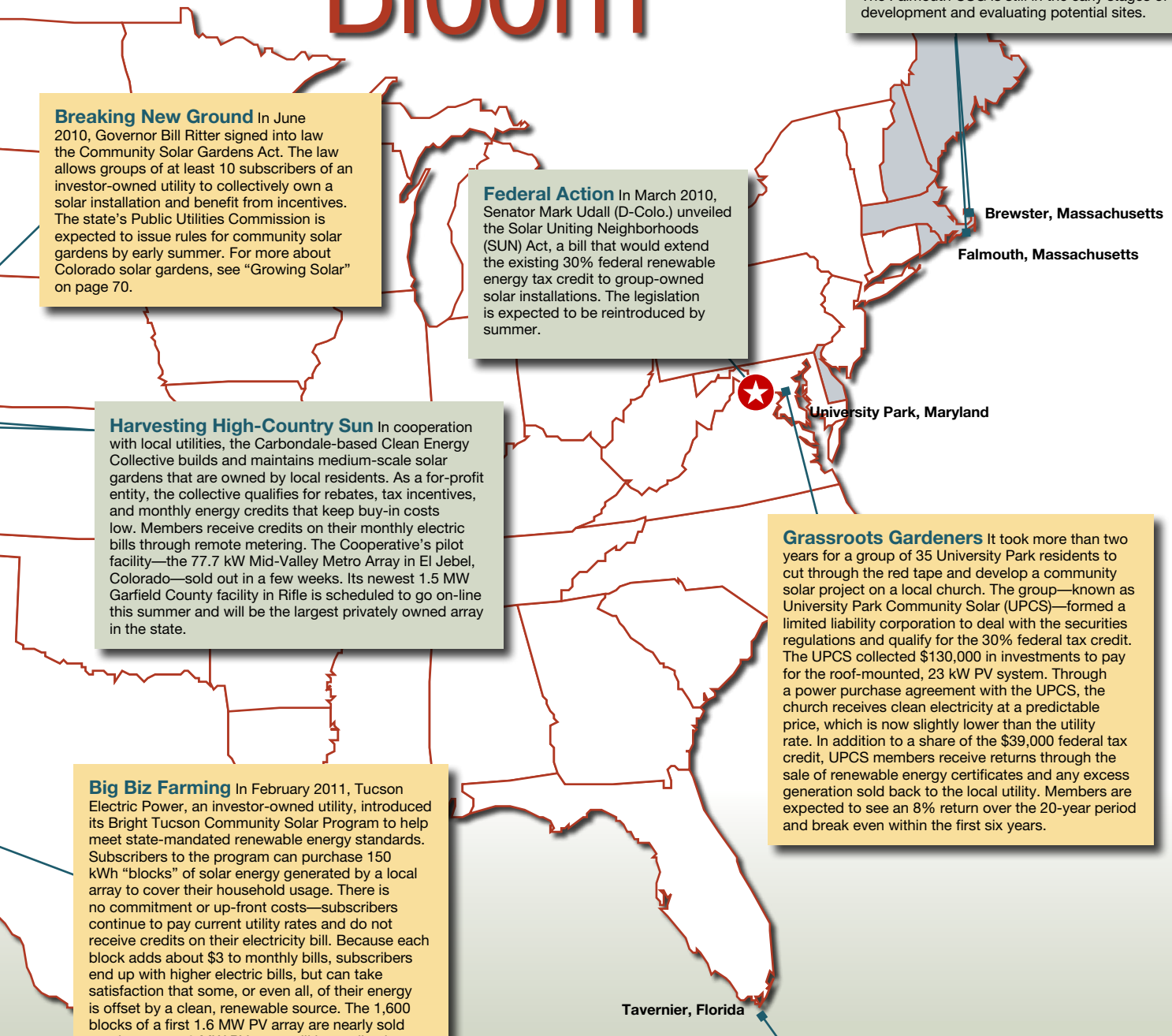
Interested in solar electricity but can't put an array on your home? Perhaps you have a shaded property, rent a home or apartment, or simply don't have the capital for an entire system. No matter—solar gardens, sprouting up all over the country, allow customers to use renewable energy without having a rooftop system at their residences. Also known as solar farms, this strategy is a viable alternative, giving individuals the opportunity to purchase a portion of an off-site array and benefit from its clean energy generation. Organizers, big and small, are breaking new ground across the country, cultivating a variety of models and financial structures. The movement is young but blossoming fast, with nurturing from newly enacted energy policies at the local, state, and federal levels.

Solar Gardens Bloom

Planting Solar Seeds Cape Cod residents formed limited liability corporations in Brewster and Falmouth with the hope of developing community solar gardens under the Massachusetts Green Communities Act of 2008. Both groups are working with My Generation Energy of South Dennis—a for-profit entity pioneering an innovative community solar garden (CSG) model in the region. The Brewster CSG won support from the town council and should be on line by the year's end. The Falmouth CSG is still in the early stages of development and evaluating potential sites.

Breaking New Ground In June 2010, Governor Bill Ritter signed into law the Community Solar Gardens Act. The law allows groups of at least 10 subscribers of an investor-owned utility to collectively own a solar installation and benefit from incentives. The state's Public Utilities Commission is expected to issue rules for community solar gardens by early summer. For more about Colorado solar gardens, see "Growing Solar" on page 70.

Federal Action In March 2010, Senator Mark Udall (D-Colo.) unveiled the Solar Uniting Neighborhoods (SUN) Act, a bill that would extend the existing 30% federal renewable energy tax credit to group-owned solar installations. The legislation is expected to be reintroduced by summer.



Harvesting High-Country Sun In cooperation with local utilities, the Carbondale-based Clean Energy Collective builds and maintains medium-scale solar gardens that are owned by local residents. As a for-profit entity, the collective qualifies for rebates, tax incentives, and monthly energy credits that keep buy-in costs low. Members receive credits on their monthly electric bills through remote metering. The Cooperative's pilot facility—the 77.7 kW Mid-Valley Metro Array in El Jebel, Colorado—sold out in a few weeks. Its newest 1.5 MW Garfield County facility in Rifle is scheduled to go on-line this summer and will be the largest privately owned array in the state.

Grassroots Gardeners It took more than two years for a group of 35 University Park residents to cut through the red tape and develop a community solar project on a local church. The group—known as University Park Community Solar (UPCS)—formed a limited liability corporation to deal with the securities regulations and qualify for the 30% federal tax credit. The UPCS collected $130,000 in investments to pay for the roof-mounted, 23 kW PV system. Through a power purchase agreement with the UPCS, the church receives clean electricity at a predictable price, which is now slightly lower than the utility rate. In addition to a share of the $39,000 federal tax credit, UPCS members receive returns through the sale of renewable energy certificates and any excess generation sold back to the local utility. Members are expected to see an 8% return over the 20-year period and break even within the first six years.

Big Biz Farming In February 2011, Tucson Electric Power, an investor-owned utility, introduced its Bright Tucson Community Solar Program to help meet state-mandated renewable energy standards. Subscribers to the program can purchase 150 kWh "blocks" of solar energy generated by a local array to cover their household usage. There is no commitment or up-front costs—subscribers continue to pay current utility rates and do not receive credits on their electricity bill. Because each block adds about $3 to monthly bills, subscribers end up with higher electric bills, but can take satisfaction that some, or even all, of their energy is offset by a clean, renewable source. The 1,600 blocks of a first 1.6 MW PV array are nearly sold out, but a new 2 MW PV array will be on-line by early summer, and more arrays are in the works.

The Sunshine State Through its Simple Solar program, Florida Keys Electric Cooperative allows customers to lease PV modules at the cooperative's solar farm in Marathon. In return for leasing one or more modules for $999 each over 25 years, members receive monthly credits on their bill for the full retail value of the electricity generated by their leased modules. The program rolled out in early 2010 and was off to a slow start, only attracting 10 subscribers as of early spring 2011.

States allowing community or shared-system net-metering

Now, the group has plans for a larger community array and hopes to receive an exception through the state securities commission that will allow the project to take on as many as 125 investors.

Pioneers & Pros

While Luke Hinkle admires the persistence of the UPCS, he recommends that people leave the nuances to professionals. "It is an extremely complicated process. There's no need for small groups to reinvent the wheel over and over again," says Hinkle, who is credited with coining the term "solar garden."

Under the umbrella of his company—My Generation Energy, a solar energy installation and development company in South Dennis, Massachusetts—Hinkle intends to establish a solar garden consulting service to help groups implement a unique solar garden model he developed. The pilot program is expected to launch in Brewster later this year.

Other companies are breaking into the market as well. Seattle-based Tangerine Solar is working with groups, large and small, to develop community solar arrays through its SolarSlice model. The Clean Energy Collective LLC, of Carbondale, Colorado, is pioneering a unique model for medium-scale systems that uses a proprietary remote metering system (see "Green Power for your Home" in this issue).

To help streamline the process for utility companies, the RE policy organization Interstate Renewable Energy Council has developed model program rules that can be adapted to each group's circumstances and the policy preferences within their respective states.

The Finer Details

While there are many benefits to shared systems—lower up-front costs and a hedge against rising electricity rates—there are tradeoffs. In most cases, the controlling entity retains ownership of the renewable energy certificates associated with the system. This means subscribers cannot legally claim to use "clean" energy.

In addition, the rate of return on solar gardens tends to be lower than with on-site residential systems. Subscribers may see a modest reduction in their electricity bills, but fees and buy-in costs often cancel out any savings. On the upside, subscribers are not responsible for the system's maintenance and operations costs.

For Joan and Myron Porter, the City of St. George's SunSmart program ended up being a perfect fit. The retired couple first subscribed to the program while living in a townhouse community where PV systems were prohibited. They've since moved to a new home in town and were able to transfer their shares with ease. "We get a small credit on our bill each month," Joan says. "We're not getting rich, but we're doing what we think is right."

—Kelly Davidson

Courtesy Pam Rutter