WORLD RESOURCES INSTITUTE

Joint Venture SILICON VALLEY NETWORK

OPTONY Solar for Life™

PURCHASING POWER

Best Practices Guide to Collaborative Solar Procurement

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CAROLINE JUDY

IN COLLABORATION WITH

ALEX PERERA

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A joint publication of the World Resources Institute and Joint Venture: Silicon Valley Network

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Other Resources

The following additional resources are available on our project web site (www.wri.org/buying-solar):

1. Supplementary information relating to the SV-REP and TCSP case studies
2. Sample documents from the two initiatives studied
3. Solicitation documents and PPAs from other successful public-sector procurements of renewable energy
4. Links to online resources (research studies, solar purchasing guides, financing options, incentive programs, etc.)

Foreword

Moving renewable energy into the mainstream will require innovative strategies to deliver it at scale. This is arguably as important for the solar energy industry as Henry Ford's assembly line was for the rapid commercialization of the Model T. Although solar photovoltaic (PV) electricity generation is a tried and tested technology, creative approaches from vendors and customers alike are necessary to reach broad market competitiveness. One of the key market drivers for solar PV systems in the past five years has been the introduction of the Power Purchase Agreement (PPA), a third-party financing model where customers pay for generated power rather than purchasing a system outright. The popularity of PPA financing illustrates how better delivery models can rapidly expand solar markets and contribute, alongside technological progress, to accelerating deployment and working toward grid parity.

Along with innovative approaches to financing, collaboration among solar market participants also has an important role to play, and is the subject of this guide. Group procurement of solar electricity can reduce transaction costs, enable economies of scale, and bridge information gaps that prevent efficiency. In doing so, it can be both a catalyst for organizations to embark on solar projects and a key factor in making those projects viable. Additionally, a successful regional collaborative purchase can benefit not only the participants, but also the region as a whole by supporting local economic development.

The World Resources Institute and Joint Venture: Silicon Valley Network have each piloted ground-breaking collaborative purchasing projects for solar PV in California with the aim of developing models to scale deployment of clean, renewable energy. WRI and Joint Venture launched similar pilot projects based upon their respective organizational goals: Joint Venture as a public-private partnership that brings together leaders from all parts of the community to work on collaborative solutions to issues facing Silicon Valley; and WRI as an environmental think tank that goes beyond research to implement solutions that protect the earth and improve people's lives.

Having both found through practical experience that the collaborative model has tremendous value, we co-wrote this 12-step guide to help other organizations leverage their aggregate buying power to make solar more economically feasible across the United States. The best practices provided here are informed by our experiences as well as by additional research and expert consultation. They serve as a plan of action from which to model collaborative purchasing initiatives in other regions, and can be adjusted to serve unique needs and circumstances. The U.S. Environmental Protection Agency's Green Power Partnership has already launched an initiative in the metropolitan Washington, D.C. area using these best practices, and a similar initiative is being launched in Contra Costa County, California. Additionally, several other major metropolitan areas across the country are investigating the collaborative solar purchasing model for potential use in 2011.

We hope that this guide will serve as a trusted resource to enable public and private sector organizations, and their regions, to benefit from investments in solar energy. Given the urgent need to address climate change, a monumental shift to renewable energy resources is crucial. This publication offers a pragmatic approach for consumers and regional organizations looking to go beyond the standard modes of energy procurement to create sustainable energy industries in their communities.

Jonathan Lash
President
World Resources Institute

Russell Hancock
President & Chief Executive Officer
Joint Venture: Silicon Valley Network

A Note from the U.S. Environmental Protection Agency:

This guide to collaborative solar purchasing represents a nationally significant approach to drive broad adoption of cost-effective renewable energy. The U.S. Environmental Protection Agency's Green Power Partnership believes that effective application of the principles included in this guide will help protect public health by reducing greenhouse gas emissions, while also helping to expand the U.S. clean energy portfolio.

The authors, their respective organizations, and the groups participating in the examples featured here are developing and championing new ideas to reduce costs while accelerating green power deployment. Their leadership is critical and lessons from this valuable resource should be factored into all future regional solar initiatives.

The Green Power Partnership is actively promoting these lessons and strategies in its own efforts to increase U.S. clean energy supply.

Blaine Collison
Director, Green Power Partnership
US Environmental Protection Agency

www.epa.gov/greenpower

Executive Summary

Background

Solar photovoltaics (PV) is a commercially proven technology and, in markets with incentives, can compete with traditional fossil fuel-based power. Wider adoption and decreases in manufacturing costs are driving down the cost of solar electricity. As the industry grows and matures, it will optimize and standardize its practices to further reduce costs and make solar energy accessible to a mainstream market. The crucial role of policy in accelerating this industry growth and maturation cannot be understated. Today, however, several barriers remain to bringing solar PV to scale:

- Transaction costs can be high. Because the industry is fragmented and installation processes are not standardized around the country, each developer has different procedures and negotiated contracts. Allocating internal staff resources to research solar power and to negotiate fair contracts for each potential site can be expensive.
- Learning takes time and effort. Potential buyers have to learn on their own about the solar market, financing, and technology, while building internal consensus for moving forward.
- Demand is fragmented with many individual sites being developed opportunistically. The current patchwork approach of designing, permitting, contracting, and installing systems for one facility at a time is inefficient.

These barriers help explain the slow pace of solar PV adoption among commercial and government consumers. However, collaborative purchasing can help overcome these barriers and scale up solar PV deployment. By organizing interested consumers (and their potential installation sites) into groups, collaborative purchasing can reduce transaction costs, educate potential buyers, and aggregate demand so that solar panels can be installed at lower-than-average costs.

Box 1
Types of Solar Aggregation

Aggregating solar installation sites is one method of collaborative solar purchasing, and is the subject of this guide. By putting a group of potential sites out for bid together, the aggregated purchase can attract higher competition, accomplish community goals faster, and reduce transaction costs. This is especially useful for rooftop and on-site (as opposed to large utility-scale) solar installations. Other methods of collaborative solar purchasing look to jointly install one large solar array on an open piece of land. This approach is not addressed within this guide, although some recommendations may be applicable.

Purpose

This Best Practices Guide is intended to assist commercial and government entities in the process of organizing and executing a collaborative solar purchase. A measure of success will be the number of readers who use this guide in purchasing solar power to meet their electricity needs more sustainably and at an affordable price. The guide outlines a list of best practices, which together constitute a 12-step process to capture the economic and practical benefits of a joint purchase. The starting point for participating in such an effort is simply an interest in purchasing solar electricity. The best practices are intended as a resource for project planning and decision making. They provide specific actions in chronological order, with milestones to indicate when to move from one step to the next. The end goal is that regional groups of participants will have solar PV installed on their facilities at competitive prices.

Experts in the solar energy field, including those specializing in regional collaboration, helped to develop the best practices presented here. They are based on extensive research and real-world experiences, and are supported by case studies (one a private sector collaborative and one with public-sector participants). These two cases were unique models of regional collaboration, among the first in the country at this scale. Like all new approaches to a problem, both efforts encountered challenges along the way. Throughout the guide, we illustrate the lessons learned from these challenges, point out pitfalls to avoid, and highlight ways to streamline the process. We also provide resources, such as solicitation and procurement documents, participant questionnaires, and evaluation criteria.

By promoting the use of this guide and sample documents, we hope to encourage the use of these models for regional collaborative efforts. Successful collaboration can lead to lower costs, increased competition and vendor performance, and better projects with higher visibility.

Acknowledgments

This report benefited enormously from a thorough peer-review process. We would like to thank the following colleagues and external experts who provided valuable comments on drafts of this paper: Lionel Bony, Siva Darbhamulla, Tim Herzog, Tom McCalmont, Kelly McCarthy, Eliot Metzger, Jennifer Morgan, Sam Newman, Bobby Ram, Jigar Shah, Brad Vance, and Lutz Weischer. The views expressed in this report are the authors', and reviewers bear no responsibility for its content.

For editing, design, and production support, we thank Hyacinth Billings, Casey Freeman, Polly Ghazi, Charles Kent, Ashleigh Rich, and Caroline Taylor.

Finally, this report would not have been possible without the generous financial support of the U.S. Environmental Protection Agency.

About this Guide

The coauthors of this guide, the World Resources Institute (WRI) and Joint Venture: Silicon Valley Network (Joint Venture), have each piloted on-the-ground collaborative solar purchasing initiatives. Sections 5 and 6 include detailed case study descriptions of these two efforts: Joint Venture's Silicon Valley Collaborative Renewable Energy Procurement Project (a public-sector initiative) and WRI's Collaborative Solar Project (a private-sector initiative).

The processes used by both organizations to find partners, convert interests into actions, and seek competitive proposals were similar. We believe that our model of collaboration is replicable and that, through use of this guide, other organizers can experience results similar or better than those we achieved. Specifically, we believe that through collaboration and use of this guide, project partners can reduce transactional, design, and installation costs; reduce risks; increase the potential for favorable terms and conditions; and achieve faster deployment of solar or other renewable energy technologies. This guide provides a road map for success in purchasing solar power collaboratively through strategically aggregating individual sites into larger-scale "bundles", even if the partners involved are not experienced with the technology.

Who Should Use This Guide

This guide is intended to be a user-friendly resource for commercial and government entities interested in organizing or participating in a collaborative purchase of solar power.

A variety of regional leaders could organize such an effort, including nonprofit organizations, regional or national government agencies, industry associations, and economic development or environmental groups. Potential solar purchasers may be public- or private-sector organizations, whose considerations are much different from those of residential customers. Some examples include—

Public Sector: Agencies and branches of local, regional, and federal government, particularly if they face a greenhouse gas reduction or renewable energy purchasing mandate. Properties suitable for solar installations may include office buildings, community facilities, schools, military bases, laboratories, and staff residences. Key personnel for this effort include procurement officers, facilities managers, energy managers, sustainability staff, and executive officers.

Private Sector: Candidates include companies owning or occupying property such as warehouses, data centers, office buildings, manufacturing facilities, shopping centers, and sports facilities. Additionally, commercial property owners that rent to tenants have found that installing solar PV can provide a competitive advantage and deliver long-term energy savings.[1] Key personnel for this effort include energy, facilities, and property managers; chief sustainability officers (CSO's); chief financial officers (CFO's), and public relations staff.

How To Use This Guide

This guide can be used to educate organizations' internal stakeholders, whose support is required for launching and sustaining a collaborative solar purchasing initiative. The detailed descriptions of the sequence of actions and milestones that constitute best practice can also form the basis of a work plan for initiatives in both the public and private sectors. Those readers who have already launched collaborative solar purchasing initiatives may choose to refer directly to the next milestone directly relevant to their situation.

Best Practices: A Summary

This guide suggests best practices for organizing and executing a collaborative procurement of solar power. The 12 steps outlined below describe the process of building a collaborative initiative, finding and aggregating suitable sites, navigating the procurement process, and installing an effective solar system that meets the needs of all stakeholders. Indicators of success include timely transitions from one step to the next, active communication and education of participants, competitive bids, attractive pricing due to scale, and a high success rate of participants that negotiate contracts and complete installations.

It is important to note that, although this guide features case studies of two projects that used power purchase agreement (PPA) financing, the collaborative purchasing model can also be applied to direct purchase, lease, or other financing models.

Twelve Steps for Collaborative Solar Purchasing

1. Early regional recruitment (Page 23)
2. Initial participant questionnaire (Page 24)
3. Solar project workshop (Page 24)
4. Consolidated analysis of sites (Page 26)
5. Internal decision maker consultation (Page 28)
6. Design of procurement process and documents (Page 29)
7. Request for proposals (Page 31)
8. Proposal evaluation (Page 32)
9. Negotiations and award (Page 33)
10. Installation project management (Page 35)
11. Commissioning and operations (Page 35)
12. Celebrate success (Page 36)

Case Studies: A Summary

The case studies included in this guide, and from which the best practices are drawn, are descriptions of two separate collaborative efforts: Joint Venture's Silicon Valley Collaborative Renewable Energy Procurement Project (public sector) and The Collaborative Solar Project (WRI's private-sector initiative), as summarized in Table 1. Included are detailed descriptions of the project background, players, sites, strategies, and information about the procurement processes. The Silicon Valley Collaborative expects to begin installations in 2011. Although WRI's Collaborative Solar Project stalled due to real estate issues and the 2008 recession, valuable lessons were learned that inform the best practices in this guide.

Table 1
Summary Information for Case Studies

	Private sector	Public sector
LEADERSHIP AND PARTICIPANTS		
Name	The Collaborative Solar Project (TCSP)	Silicon Valley Collaborative Renewable Energy Procurement (SV-REP) Project
Vision of Success	Companies group facilities with rooftop solar potential and request bids for larger bulk purchase in order to purchase solar photovoltaic electricity cost-effectively.	Public agencies achieve greenhouse gas reduction targets, lower energy costs, and spur local economic development through collaborative procurement of solar power.
Timeframe	February 2008-October 2009	July 2007-March 2011
Convener	World Resources Institute	Joint Venture: Silicon Valley Network
Lead Organization	World Resources Institute	County of Santa Clara, California
Participants	Major national companies with facilities in California, including (but not limited to:): • Hewlett Packard • Intel • Staples • Walmart	Silicon Valley government agencies: • City of Cupertino • City of Milpitas • City of Morgan Hill • City of Mountain View • City of Pacifica • County of Santa Clara • Santa Clara County Transportation Authority • South Bayside Waste Management Authority • Town of Los Gatos
Technical Advisor	None	Optony Inc.
SITE INFORMATION		
Sites	19	70
System Type(s)	Rooftop	Rooftop, ground mount, carport
Square Footage	1.2 million	> 4 million
Total MW Capacity	6.2-8.0 MW	14.4 MW
Utility Territory	Pacific Gas & Electric	Pacific Gas & Electric

Table 1
Summary Information for Case Studies (Continued)

POWER PURCHASE AGREEMENT		
PPA Term	Pricing requested for 10 and 15 years	20 years
Buy-Out Option	Not negotiated.	After 7-10 years at fair market value
Price Range - Power	$0.09-$0.24 per kWh (pricing offered ranged by bid)	$0.13-$0.19 per kWh (based on site size and rebate levels)
Price Range - Renewable Energy Credits (RECs)	$0.003-$0.025 per kWh	$0.01-$0.015 per kWh
Escalation Rate	3.0-4.0%	2.0-4.0%
AVAILABLE SAMPLE DOCUMENTS		
Participant Questionnaires	✓	✓
Request for Proposals	✓	✓
Power Purchase Agreement		✓

Source: Joint Venture, Optony, and WRI

Chapter 1

The Benefits of Collaboration

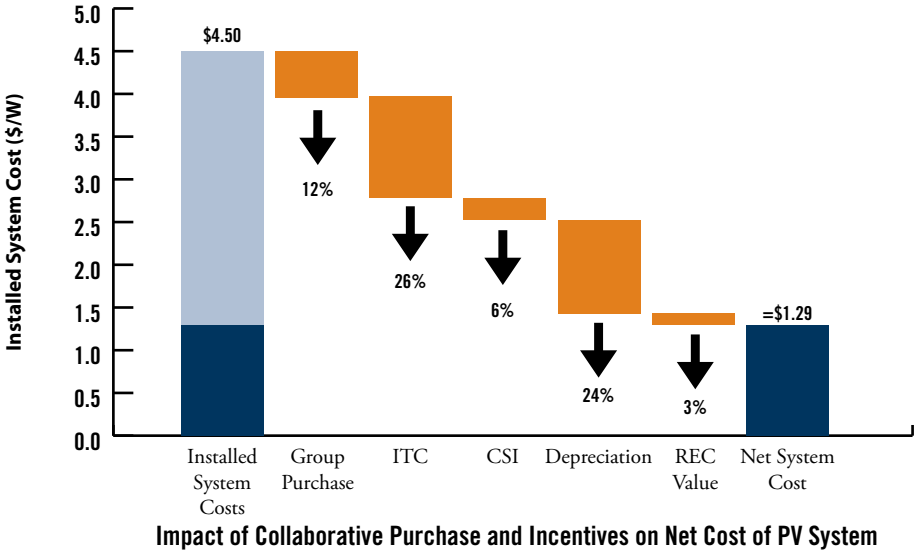
The two initiatives profiled (TCSP and SV-REP) were designed to capture the benefits of increased scale, lead to rapid deployment of solar power and achieve lower costs for purchasers. These initiatives confirmed and provided a practical elaboration of the potential economies of scale in solar pricing, as previously described in technical literature.[2] Known benefits of collaboration include savings due to site aggregation, administrative cost savings, and favorable contract terms with their associated reduced risks. These benefits have been quantified to include the following results:

- an incremental 10 to 15 percent reduction of energy cost, compared to individual projects;
- transaction and administrative time reduced by 75 percent for collaborative participants; and
- highly competitive contract terms (buyout options, performance guarantees, termination options, etc.), compared to similar projects.[3]

Given that the two main barriers to deployment are high costs (both capital and transactional) and lack of experience with the industry, collaboration is an excellent solution to address both issues and achieve regional goals for solar installations. One additional benefit of collaborative purchasing is that it provides the organizations' internal champions (those who are first to raise the idea of solar purchasing and who often drive the initiatives forward) with a deeper pool of resources with which to make their case to internal decision makers.

Most prospective solar buyers are aware of the financial importance of solar incentives but are not familiar with the relative importance of collaborative purchasing. Figure 1 is an illustrative example describing the cost structure for a hypothetical solar PV system in California. Although costs for PV are expected to drop, $4.50 per watt is within the observed range of commercial prices for individual solar PV systems today, assuming roughly $1.70 for the actual panel cost and $2.80 for the other equipment, installation, and development costs.[4] The value of the investment tax credit (ITC), a federal tax credit for 30 percent of the up-front cost and federally allowed depreciation are crucial to making solar affordable with today's technology costs. Figure 1 also illustrates the collaborative purchasing discounts from strategically bundled sites.[5] The value of the California Solar Initiative (CSI) rebate is shown solely for comparison since, as of January 2011, the CSI funds had been exhausted and it is no longer available. The chart illustrates, however, that the CSI, when active, was less significant than the collaborative purchase benefit. Similarly, renewable energy credit (REC) values are uncertain because the markets where they are traded are immature at this time. However, in some areas (notably New Jersey and other states with mandatory Renewable Portfolio Standards) the REC value is much larger than the amount shown. The figure demonstrates that collaborative purchasing, while not as monetarily significant as the federal tax incentives, can help reduce solar PV costs to an affordable level. There are also numerous transaction costs for purchasing solar PV that do not appear in the $4.50/watt figure because they are borne by the potential purchaser. These include, for example, staff time and legal fees. Collaborative purchasing can reduce such costs as well as overall project risks for buyers and investors.

Figure 1
Impact of Collaborative Purchase and Incentives on Net Cost of PV System



Source: World Resources Institute and Optony based on 2010 data in Northern California

Chapter 2

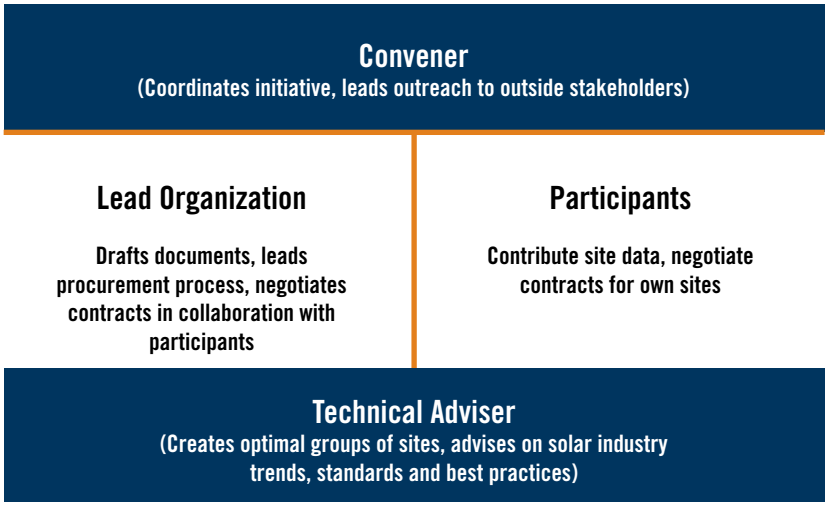
Overview of Best Practices

Assembling a Team: Roles and Responsibilities

Four unique roles are required to execute a successful collaborative purchase. Figure 2 illustrates the suggested responsibilities associated with these roles. However, every initiative is different and some of the responsibilities recommended for each role below could be performed by another organization, while others are mutually exclusive. For example, the technical adviser should be independent of the participants and lead organization so that it can provide objective counsel about maximizing benefits to the overall initiative. Identifying a convener is especially important in the early stages of a project to assist with recruitment and coordination. Thus, even if the collaborative purchase is initiated by a participant or lead organization, this guide recommends that they also identify a convening organization with which to partner.

Figure 2

Roles and Responsibilities in Collaborative Procurement



Convener: The convener should be a local organization with an interest in promoting renewable energy and/or economic development, with no direct financial interest in the initiative. Its responsibilities include education and outreach, sharing technical resources with participants, scheduling and coordinating stakeholders, and establishing a steering committee. The organization chosen needs to be credible and well-respected, and could be either a local government or nonprofit entity. It is important that the convener have a mission aligned with the goals of a collaborative solar purchase, and the time/resources to dedicate to its responsibilities throughout the duration of the effort. Good candidates can be sought in the following areas:

1. economic development and/or planning agencies and nongovernmental organizations;
2. environmental organizations with local presence and/or partners;
3. service organizations (e.g., AmeriCorps);
4. government agencies dealing with energy or the environment;
5. local chambers of commerce or industry associations;
6. academic or research institutions.

To raise the profile of the initiative in the region and tap resources from a larger support base, the convener should establish a **steering committee**. This local leadership team helps maintain the regional perspective and ties to additional participants and resources that will ensure success. Individuals who make up the leadership team can come from the potential participant pool, other regional organizations, or organizations that have prior experience with renewable energy procurement or regional collaboration.

Lead Organization: This organization is one of the purchasers, but also leads the procurement and negotiation process. The lead organization should have a strong commitment to purchasing solar energy and be driven to accomplish this mission with or without the collaborative group. The lead organization is willing to take the lead role because it understands the benefits of collaboration as having a positive impact on its own bottom line—including volume pricing, more favorable contract terms, project risk reduction, and faster deployment. The lead organization will issue the solicitation documents, access technical resources, engage with the convener, and act as the main point of contact

between the other participants and the vendors. In most cases, the convener will need to identify the lead organization during its early recruitment efforts.[6]

Participants: These are the members of the collaborative group with facilities and have an interest in purchasing solar power, but may or may not be committed to buying solar power at the outset. Due to time or resource constraints, participants might not be able to procure solar power on their own. As such, they are not candidates for lead organization, but their participation in the collaborative is crucial to achieving scale.

Technical Adviser: It is important to have an independent technical expert with resources and experience to support both the process and participants throughout the project. The technical adviser may be engaged by the convener, the lead organization, and/or the participants. The function of this role depends somewhat on the complexity and number of sites, financing options, and aggregation strategy. The technical adviser advises the participants, incorporates solar vendor input into the bidding process and timeline, performs feasibility assessments, supports the procurement and evaluation processes, technically evaluates optimal groups of sites to bid out together, and provides expertise across the life cycle of solar purchasing to maximize PV deployment and the initiative's impact. Therefore, the technical adviser must be independent of any purchasing party, potential bidders, or industry representatives.

The technical adviser should have as many of the following capabilities as possible:

- in-depth experience with solar technologies and market drivers
- a solar design and project management team
- trong expertise in solar optimization for technical and economic results
- successful solar technology procurement with financing, especially via public solicitation
- experience working within the participant pool (e.g., with the public or private sectors)
- prior experience with portfolio/group assessments and purchases.

Chapter 3

The 12-Step Process: Best Practices Summary

This set of best practices is intended to be a resource for project planning and decision making for potential conveners, participants, lead organizations, and technical advisers. They provide specific actions in chronological order, with milestones to indicate when to move from one step to the next. The end goal is that, by the end of the process outlined in Figure 3, participants in a regional group will have solar PV installed on their facilities at an affordable price.

Figure 3

Overview of Best Practices

1 Early regional recruiting

Convener identifies potential participant pool. Organizes and presents concept and potential benefits and previews process/timeline. Creates "call to action" for potential participants. Gauges interest among participants via questionnaire.

Participants indicate their level of interest via questionnaire. They agree to begin identifying sites. Participants can assist convener with outreach by inviting others in their networks to engage in the process.

RESULTS
Initial participants indicate interest and agree to proceed with site identification and assessment in next stage.

2 Initial participant questionnaire

Convener distributes Step 2 Survey with initial questions about potential sites and level of interest. Screens sites for technical, legal and organizational deal-breakers, constraints and opportunities. Begins recruiting "lead organization" to drive procurement effort.

Participants complete survey with basic information on prospective sites. Identify key decisionmakers within their respective organizations.

RESULTS
List of potential participating organizations with site opportunities and considerations documented.

Figure 3

Overview of Best Practices (continued)

Figure 3
Overview of Best Practices (continued)

Chapter 4

Step-by-Step Guidance: Detailed Best Practices

This section describes the recommended best practices in detail, including the specific actions of each participant at each step and the milestones indicating that the step is complete. The section also includes "keys to success" that derive from experiences with the two pilot projects described in sections 5 and 6. The recommended actions form part of a 12 step process that is tailored, where appropriate, to participants from the public sector versus the private sector, taking into account their (sometimes significant) differences.

- **Common** actions are recommended for any type of initiative, whether involving the public-sector or private-sector. These sections describe the main activities of each step as they apply to all types of initiatives.
- **Public-sector-specific and Private-sector-specific** actions and considerations follow to better describe how the approach might differ, given the nature and composition of participants in the initiative. Mixing participants from the public and private sector is not recommended, due to differences in rules governing procurement and preferred pricing terms.

Box 2
Reader's Guide

✹ The specific actions that make up the **best practices** are indicated by role and are marked with a sun.
🗝 Additional recommendations that will accelerate the process and/or reduce risks but that are not core to the process are denoted as **Keys to Success** and marked with a key.
💻 Our **online resources** are a useful and crucial complement to this guide. The computer icon informs the reader where a specific resource is available online at www.wri.org/buying-solar.

Technical Appendices

💻 Due to space limitations, Technical Appendices are provided online at www.wri.org/buying-solar.

Please refer to the Web site to find a wealth of additional resources:
Appendix 1. Case studies of SV-REP and TCSP initiatives
Appendix 2. Step 1 Questionnaire
Appendix 3. Step 2 Survey
Appendix 4: Feasibility Criteria for Solar Sites
Appendix 5: Step 4 Site Inventory for Inclusion in RFP
Appendix 6: Sample Power Purchase Agreement
Appendix 7: Joint Venture Request for Proposals
Appendix 8: WRI Request for Proposals

- Links to financial modeling tools to assess solar project economics
- Links to solar resource organizations and other collaborative purchasing initiatives

Box 3
Solar Financing – Basic Terminology

Three common options for financing on-site solar PV systems are described here. Variations on each model exist, sometimes specific to public entities because of their tax-exempt status.

Power Purchase Agreement (PPA): The site host agrees to buy all of the electricity produced by the system according to a pricing schedule for the duration of the PPA. The PV system is owned and maintained by a third party. It may or may not be sold to the site host at the end of the agreed term (as specified in the PPA).

Lease: A leasing company owns the PV system and leases to the host (lessee) for the lease term. During this time, the host is responsible for operations and maintenance and is entitled to use all of the power. The system may or may not be sold to the site host at the end of the lease term (as specified in the lease).

Tax-Exempt Lease: This lease structure is particularly useful for public-sector agencies that do not pay taxes and thus cannot benefit from tax credits.

Direct Purchase: The site host purchases the PV system on its own balance sheet from its internal sources of funds. Some project-specific debt can be used if arranged with a lender or through state and federal programs as Qualified Energy Conservation Bonds.

For more detailed information on solar financing see M. Bolinger, 2009.

Step 1:
Early Regional Recruitment

The early recruitment outreach for a collaborative purchase is intended to be a call to action and a (real or virtual) "show of hands" for those interested in participating. Outreach can begin through the convener's existing networks and those of participants as they are added. In addition to providing informational materials about the initiative (concept and process), a brief questionnaire is distributed in person or electronically to identify interested parties and potential installation sites. A template Step 1 Questionnaire can be found in the technical appendices online.

Result: Initial participants indicate their interest and agree to proceed with site identification and assessment.

Common Recommendations:

- The **convener** makes a presentation of materials that answer the following questions:
  - What is a solar electricity system?
  - What types of technologies are available?
  - How can solar PV be a cost-effective investment?
  - How are solar PV installations sized?
  - What are the benefits of site aggregation?
  - What are the possible solar financing methods (PPA, lease, direct purchase)?
- The **convener** targets outreach through regional development agencies, government organizations and/or environmental contacts to generate interest in the project and recruit participants.
- The **convener** can target areas better suited to solar installation by researching and gaining familiarity with the local and utility-level incentives, interconnection requirements, and net metering provisions for PV.[7]
- As part of its "due diligence" on the region, the **convener** researches the availability of a reasonable pool of developers and installers in the region to see whether the bidding can be competitive. This is also important in enabling installations to proceed quickly and not be delayed due to a lack of qualified vendors.
- Locating all installations within one utility district is preferable to facilitate interconnection studies and discussions with the utility, thereby reducing transaction costs. Therefore, potential solar sites should be grouped into one contiguous utility district.
- The **convener** can leverage the solar research and any feasibility studies that participants (might) have already done for their asset portfolios. The Convener can gather that information, as available, to "map" the most suitable areas of the state/region in order to target efforts most effectively.
- In assessing incentives, it is important to take a close look at any maximum cap on total rebate/incentive value to any one PV installation, as that can limit the use of incentives on a large project. Also, be aware of any impending cutoff dates for incentives or rebates.
- The **convener** may reach out to potential participants electronically. However, it should ideally present information in person to develop the participants' understanding of project benefits, explore common goals, and build a common desire to procure and install renewable energy generation systems.
- It is important to watch for information overload and to keep presentations basic so as to avoid providing too much detail too early in the process.
- Providing background and educational materials to building permit and planning staff can help build awareness and support early on in the project.

Private-sector Recommendations:

- Involving one or two leading commercial brands as **participants** will increase vendor interest and increase the likelihood of multiple competitive bids.
- **Companies** perform a basic scan of the states they occupy for solar viability (including net metering, prevailing utility rates, attractive financial incentives, and solar potential). This could help identify where to initiate a collaborative purchase. This is not required for their participation in a regional collaborative solar project, but it is a valuable practice for energy purchasing by any large energy user.
- **Companies** can recruit other companies, especially in the identified region. The **convener** can identify leading companies to speak at recruitment meetings, which is especially useful if they already have solar purchasing experience.

Step 2:
Initial Participant Questionnaire

Step 2 is an information-gathering step where interested participants identify their potential sites for installation. The more detailed Step 2 Survey (available on the Web site) collects data that help the convener gauge the number of eligible sites as well as screen them for potential deal-breakers. At this stage, participants identify the decision maker in their organizations who will eventually need to approve any solar purchase (perhaps a director of procurement or a CFO).

Additionally, the convener begins to recruit the lead organization if it has not yet been identified.

Result: List of potential participating organizations with data on site locations and basic characteristics.

Common Recommendations:

- The **convener** develops and distributes the Step 2 Survey to respondents of the Step 1 Questionnaire, with questions relating to size and type of roof, site access restrictions, any requirements for environmental assessments, ownership, expected term of occupancy, shading, and the organization's ability to enter into a long-term contract.
- **Participants** complete the Step 2 survey. Among other information gathering, this requires that they identify key decision makers in their organizations who will eventually approve participation, agreements, and final contracts.
- The **convener** begins to recruit a lead organization by identifying the most enthusiastic and prepared participant, keeping in mind the characteristics of an ideal lead organization.
- **Participants** should look for facilities that exhibit the characteristics shown in Appendix 4 ("Feasibility Criteria for Solar Sites") and submit information about them in the Step 2 Survey.
- To reduce the risk of sites dropping out of the process later on, the **convener** and/or **participants** perform(s) an early triage of the sites submitted in Step 2 surveys to remove sites that are too small or that require structural/roof upgrades.
- The process of gathering information from various sites can be iterative. If participants are not familiar with solar, they may need to come back to the convener with questions. Step 2 is designed simply to identify the number and types of sites, and determine if opportunities exist to aggregate them.
- In-construction facilities can be submitted in this step if their commissioning date is firm, or they can be reserved for future initiatives. In general, solar technology options should be considered for new facilities when planned or in construction. Building solar-ready new facilities allows for the option of cost-effective solar PV in the future at low cost.

Step 3:
Solar Project Workshop

This is an opportunity for all potential participants to learn about solar purchasing in more detail, as well as the collaborative. The workshop brings participants together to learn about applicable technologies, solar financing, and the installation process from industry experts. The workshop provides a prime opportunity for participants to invite their decision makers or other internal stakeholders to attend in order to educate them and cultivate their buy-in. Alternatively, the new information can be disseminated internally afterwards. Examples of these stakeholders include purchasing directors, heads of energy management, treasury department staff, and public relations staff.

Results: All participants share a common understanding about the basics of collaborative solar purchasing, key metrics to evaluate proposed solar projects, the timeline, and expectations for their participation. The lead organization has been identified.

Common Recommendations:

✹ The **convener** tailors the workshop content based on the Step 2 survey data, paying attention to types of sites and potentially applicable technology. Industry speakers are invited to present basic information about their technology and services. The convener allocates time without industry representatives present to discuss pros and cons of each in a neutral environment. After processing the site data collected in the Step 2 survey to understand participants' goals, the convener determines which industry representatives to target: large or small vendors, specialty technologies or experience with unique applications.

✹ The **convener** hosts the workshop, inviting industry representatives with the relevant project experience to explain solar site development and how it differs under the collaborative model. The following topics should be included:

- types of sites suitable for solar;
- technology applicable to each type of site;
- system design processes and options;
- financing options;
- bundling sites into an aggregate bid; and
- collaborative model in more detail, including the proposed timeline.

✹ The **convener** uses the workshop to explain the best-practice process of collaborative solar, with a process map and projected timeline for that specific initiative. The workshop reinforces the economic benefits of collaborative procurement (and can draw on Joint Venture and WRI data to do so).

✹ **Participants** attend to learn about applicable technologies, financing, and the procurement process. They identify and invite other internal stakeholders and leverage the information gained to educate key decision makers in each organization.

✹ The **lead organization** agrees to fulfill the role of leading the procurement process.

🗝 When designing and presenting the timeline, the **convener** emphasizes any near-term events that could affect project success, such as changes to available public incentives.[8]

🗝 The **convener** can reference contacts for solar organizations listed on the Go Solar California Web site[9] and by the Solar Electric Industries Association (SEIA)[10] to find suitable vendors to invite into the process.

Public-sector Recommendations:

✹ The **convener** encourages participants to expand internal teams by involving procurement and legal representatives and tailors informational session(s) during the workshop to those interests.

🗝 The solar project workshop assists in building shared understanding of the initiative and solicitation. Because multiple disciplines are involved in renewable energy project financing it is important to obtain as broad participation as possible from agency staff in legal, procurement, energy, public affairs, sustainability, facilities and public works management, and the planning department. Early involvement will familiarize all participants with the technology and system designs and help to develop overall project goals.

🗝 The **convener** watches for competing or confusing priorities of key decision makers that may divert the focus of the project and develops these as opportunities to make the business case internally.

🗝 The **convener** watches for hazards of working with vendors whose participation may bias future procurement processes.

Private-sector Recommendations:

🗝 **Participants** invite internal stakeholders, especially PR staff, relevant finance staff who will approve long-term solar purchase contracts, and sustainability staff.

🗝 After the workshop, **participants** internally review the project timeline with key sensitive dates to anticipate any conflicts. The timeline is cross-referenced to internal planning and approval processes to ensure that milestones are realistic before going forward.

Step 4:
Consolidated Analysis of Sites

This is the step in the process where the individual identified sites are "bundled" into groups of sites that are bid on together. Bundles are determined mainly based on size, types of facilities (e.g., roofs vs. carports), and financing method in order to attract optimal pricing and a high number of bids (because competition and volume drive down price). This step involves performing feasibility studies before bundling occurs and gathering detailed site data into an initiative-wide site inventory. Different initiatives will vary in the number and size of their bundles. Groups of sites that are very homogenous may need only one bundle, but many initiatives will attract better bids with some measure of differentiation, especially if each bundle alone is still more than 3 MW.[11] A technical adviser will generally be contracted at this phase to assist with feasibility studies and site bundling.

Result: The technical adviser provides a compelling technical overview of the total purchase size and individual bundles, based on feasibility studies and a consolidation analysis. This is presented to the convener and/or lead organization, who use it to create an information packet with talking points for participants to use in Step 5 when they approach decision makers to gain approval to proceed.

Common Recommendations:

- The **lead organization or convener** contracts with a technical adviser (see description in Roles and Responsibilities), sharing costs with participants and/or using external sources of funding.
- The **convener or lead organization** distributes the Step 4 Site Inventory form and organizes data in a spreadsheet or database. Site inventories include a one-page overview of each site that helps the convener, lead organization, and technical adviser to visualize the overall size and nature of the aggregate purchase. This is useful in recruiting additional participants and for the lead organization to demonstrate internally that its efforts are resulting in a larger scale initiative.
- **Participants** collect site data prior to feasibility study via the Step 4 Site Inventory form. The form gathers a preliminary description of each site detailing information about roof size, age, type of construction, availability of power at site, site access, and electricity bills. It also requests the buildings' "as-built" drawings.
- The **technical adviser** either performs a feasibility study or specifies the standard to which the study should be performed so that all sites are similarly vetted and standard information can be provided in the procurement document. Each study should go beyond the technical feasibility to include economic feasibility based on the characteristics of each site relative to the overall financing options, solar incentives, and electricity rate schedules and policies.
- **Participants** contract for feasibility studies and provide the resulting study findings to the convener and lead organization.
- The **technical adviser** reviews consolidated information and begins the strategic bundling process.
- The **convener or lead organization** enforces the rule that all participating entities should have investment-grade credit or offer some type of equivalent credit enhancement, if needed, for their project financing. The site inventory solicits information about the credit rating of participants so that any wide disparities can be identified before bundling. If one participant has significantly lower credit than the other participants and cannot be bundled with other participants with similar credit, it is best to exclude that participant prior to feasibility studies.
- For solar PV installations on large rooftops, a total portfolio size of 5 MW or greater is ideal. More specific analyses for other applications like carports, waste treatment, and other facility types need to be performed by the technical adviser.
- Beyond certain critical mass "tipping points" for bundles, there are marginal returns from trying to add more participants, especially if a group already has momentum. For example, greater than 10 MW awarded to one solar developer could be unmanageable and result in slow implementation for participants.

Box 4
Bundling Strategy

To create an effective bundle of sites, multiple criteria must be evaluated. Effective bundling will both streamline the evaluation process and create interest from the vendor community. The minimum size for a bundle of medium or large facilities is approximately 3 MW, and pricing should improve for bundles above that size. The criteria for grouping sites together, in order of relevance, include—

1. Financing – based on which financing method(s) are considered viable for participants.
    - Includes separating groups of participants with large discrepancies in credit strength that would otherwise increase pricing for the bundle.
2. Procurement norms – common procurement and contracting processes can be consolidated.
3. Characteristics – system design constraints and requirements should be grouped.
4. Size - individual sites can be grouped in many ways, one example is—
    - Over 500kW
    - 100 to 500kW
    - Under 100 kW
5. Number of sites – generally, there should be fewer than 15 individual sites per bundle.

- The **convener** may solicit a single vendor to perform site surveys for all participants' sites (providing consistency in reporting and a bulk-discounted price).
- A completed Step 4 Inventory for all sites will reduce uncertainties and expense in deciding which facilities to include in feasibility studies. The **technical adviser** is best positioned to advise on solar site viability, but the **convener** or **lead organization** may also advise based on their own research and discussions with industry. (Also see Appendix 4 on the Web site– Feasibility Criteria for Solar Sites).

Public-sector Recommendations:

- Consider agency and jurisdictional requirements in the consolidated bundling analysis, such as local building codes, public facility access restrictions, and additional safety requirements from oversight organizations commonly found for schools, hospitals, and jails.
- Establish logical contracting groups for site analysis and site bundling, given jurisdictional considerations (e.g., a county will have sites in various cities that may be better grouped with city sites).

Private-sector Recommendations:

- If **participants** differ in their time horizons for purchasing (i.e., the length of time they would be willing to sign a lease or PPA), they can be put into separate bundles at this stage because the length of the contract will affect pricing.
- **Participants** sometimes have different approved contractors or labor/wage restrictions. These need to be vetted at this stage in the Step 4 Site Inventory and may be cause for separate bundling.

Step 5:
Internal Decision Maker Consultation

It is critical to build support and get buy-in early in the process from the ultimate decision makers in the participants' organizations. In Step 5, the participants build awareness internally with these decision makers, who are formally updated on the progress and prospects of the initiative. Building awareness will better prepare decision makers to discuss detailed terms later in Step 6. At this point, the convener, lead organization, and technical adviser will have provided talking points for these internal discussions.

Result: Participants obtain buy-in from key decision makers to transition into the phase of drafting procurement documents.[12] This does not mean that they approve the purchase, but they agree that it is beneficial to solicit and evaluate bids.

Common Recommendations:

- The **lead organization** reviews the business case and agrees to take the lead role in the procurement and contracting process with participants.
- **Participants** present the project status and benefits, based on the talking points developed in Step 4. Talking points allow them to review the business case and timeline with internal decision makers. At this stage, it is helpful to compare expected terms from vendors to standard industry benchmark data in order to demonstrate benefits.
- **Participants** find respected, highly credible internal allies to help pitch the concept and develop organizational support.
- **Participants** provide feedback to the convener and lead organization that is incorporated into the terms of the RFP. If a participant organization does not approve moving into procurement, then the convener, lead organization, and/or technical adviser work to address outstanding issues and concerns, if possible.

Public-sector Recommendations:

- If not previously engaged in the process, staff from the finance department, general services, or public works should be contacted to ensure that contracts and site assessments will be able to move forward. As with all groups, education on the latest industry best practices, financing, technology, system design, and long-term maintenance requirements and costs will be key to buy-in from decision makers.
- Agency executive staff will need to have a solid understanding of the project and its benefits from the beginning with updates throughout the process to obtain full support and approval to move forward.

Private-sector Recommendations:

- **Participants** review the talking points with finance department, with careful attention to the proposed timeline provided by the convener and/or lead organization. The timeline denotes milestones that the decision makers should be aware of and take into consideration in case they pose any challenges or conflicts, given normal company procedures.
- **Participants** should bring the PR department into the discussion with the CFO. Incorporating customer-related talking points into building the business case can effectively capture the overall project value.

Step 6:
Design of Procurement Process and RFP Documents

At this stage, the **participants** have gained internal approval to use joint procurement for contracting with a vendor if the terms are in line with (or better than) the estimates given in the consolidated analysis. The convener updates and expands the timeline presented at the solar workshop. All partners must agree to adhere to the timeline for the process, as it is an important part of the request for bids. Step 6 moves the initiative from planning into the solicitation process. The request for proposals (RFP) is written in this stage.

The RFP specifies the scope of work for bidders and includes the sample contract agreement (PPA, lease, or other purchase contract). It is crucial to ensure that RFP documents are adapted to the specific type of financing requested and to the bundle characteristics so that responses can be accurately compared and evaluated. Boilerplate contracts should also be provided with the RFP to familiarize the bidders with required terms and conditions.

💻 Sample RFPs are provided in Appendix 7 and Appendix 8 online and can be modified for specific initiatives.

Result: All participants agree to the procurement process and approve the boilerplate contracts. They agree to proceed with an understanding of likely terms in the expected bids, as well as risks and opportunities.

Common Recommendations:

- The **lead organization** and **technical adviser** draft the RFP process and documents.
- The **convener** provides guidance on document design, facilitates agreement on terms among participants, and incorporates participant feedback.
- The **lead organization** and **participants** approve collaborative contract terms, process, and documents, acknowledging formal ratification of documents through a memorandum of understanding.
- The **technical adviser** finalizes bundle aggregation, edits to boilerplate documents for specific needs of participants, and the financing approach and provides estimates of total bundled project size and impact on participants.
- The **convener** should examine the timeline developed in Step 3 to see if it might need updating especially with respect to time-sensitive federal, state, or local incentive applications. The RFP timeline reflects any changes.

🗝 At this stage, if the total pool of sites has changed (i.e., participants have been added or have left), the technical adviser needs to reassess and possibly adjust the bundles. Ideally, attrition will be minimal, but it may be possible to recruit additional participants at this stage if necessary.

🗝 Pricing should be requested at both the facility level and across the total bundle. The developer should be informed to assume that both pricing methods are only binding if the entire package is contracted for, but this allows for analysis of the returns to scale (the discounted price due to bulk purchasing).

Box 5
Request for Proposals

An RFP is an invitation for detailed technical proposals and pricing on the described terms of work.[13] It often includes a request for private companies to submit their qualifications to carry out the plan of work. These qualifications should be used to filter bids before price is even considered, since the vendor must meet minimum defined qualifications to be a credible bidder. Best practice in this case is to include a qualifying stage within the RFP and then allow qualified bidders to submit final proposals.

🗝 The contract documents should clearly describe which party (site owner or solar system developers) will have responsibility for applying for relevant federal, state, or local incentives and whether the contract terms are dependent on securing those incentives. The contract document should also state whether the failure to secure incentives is justification for contract renegotiation or termination. If possible, the information requested in response to the RFP gathers all of the information required to make the initial application for relevant incentives so that the responsible party need not delay.

🗝 The RFP and bid sheet format must ensure that developers work up pricing under uniform assumptions and present it in the same format. This includes asking for pricing—

- with and without participant ownership of the RECs (this will allow participants to see the value of RECs clearly and make the decision about keeping them at that point);
- with a performance guarantee and maintenance contract provided by the bidders;
- specifying which party bears the cost of system insurance;
- specifying a current level for solar project-related incentives that can be reasonably anticipated to be available, rather than allowing developers to assess individually.
- detailing the costs over the entire planned lifetime of the system.

🗝 The RFP addresses key issues including the vendors' anticipated timeline for implementation, site insurance requirements, treatment of RECs, technical warranty requirements of buyers, the vendors' anticipated subcontractors, and provisions for early buyout of the system. Describing these key issues in the RFP will help avoid lengthy negotiations later.

🗝 If specific sites require unique construction requirements, these should be clearly described in the scope of work. For example, certain sites may want to ensure minimal impact on staff and visitors.

Public-sector Recommendations:

🗝 Agency-specific document formats and proposal evaluation processes must be taken into consideration in advance. If the proposals can be evaluated on "best value" rather than "lowest cost," then the RFP will generally result in a better outcome, but the specific requirements and evaluation criteria must be adapted to match the constraints of participants.

Private-sector Recommendations:

🗝 Commercial entities will be especially sensitive to the cost-competitiveness of the bids submitted, but it will not be the only criteria for selecting the winning bid(s).

🗝 The procurement documents need to specify the criteria and metrics for bid evaluation (see online resources for example RFPs). **Participants** can suggest criteria that the **lead organization** or **convener** would collect in a matrix. **Participants** can also input the weights (indicating importance) that they ascribe to each criterion, and votes on weighting can be averaged as an equitable way to agree on the weighting of each criterion in the final evaluation framework.

Step 7:
Request for Proposals

This step includes the solicitation process itself, starting from the public issuance of the procurement document (RFP), through the acceptance of bids. This will typically include RFP Issuance, a preproposal conference, qualification of bidders, question period(s), and the deadline for proposal submission. The RFP includes a stage to prequalify vendors in which they submit qualifications and are informed of their status after their responses are reviewed. Only qualified vendors are asked to submit detailed bids in response to the RFP.

Results: RFP issued with compelling bids received from potential vendors. Ideally, multiple bids are received for each bundle.

Common Recommendations:

- The **lead organization** issues the approved RFP, responds to questions, provides site access for developers to visit sites, ensures that milestones are met, identifies an evaluation panel, and updates participants.
- The **convener** conducts industry outreach to publicize the RFP and updates participants and stakeholders on project and progress at each RFP milestone.
- Vendor qualifications are investigated and references checked.
- **Participants** follow the initiative's progress, prepare for the evaluation and negotiation phases.
- The **technical adviser** provides guidance and support services for the RFP process by responding to participant questions, assisting the lead organization in responding to vendor questions, and completing the supporting documentation for system specifications and aggregated site data that go into the RFP. The **technical adviser** provides the most current solar market metrics to establish benchmarks for judging the evaluation criteria for technology, systems, and vendors.

- **Lead organization** should issue the RFP widely and publicize it through national organizations such as the Green RFP Network, the NCPV Hotline, and BidSync to generate interest. It should be distributed to industry organizations such as SEIA and SolarTech with an introduction to encourage responses and participation (see online resources for Web links).
- Provide site specific information via a password-protected Web site so that the bidders will be able to develop their proposals faster and with less uncertainty. The information provided should include details from the feasibility studies, utility usage data from at least the past 12 months, site "as-built" drawings, and any participant-specific issues or opportunities for solar construction.
- Keep internal stakeholders and key decision makers updated regularly during this process.
- During the bidding phase the **convener, lead organization** and **technical adviser** conduct an initial vendor meeting to describe the project, answer questions, and assess market interest.
- Allowing the bidders to do a site visit at all prospective facilities will assist in improving bid accuracy. Some sites may require permission for special access, and the time required to obtain this should be taken into consideration in advance. A schedule of available times can be included in the RFP.
- **Participants** with access to solar market data and information can help by sharing intelligence with the group. An up-to-date understanding of current market conditions is especially important when solicitation documents are being written.

Step 8:
Proposal Evaluation

After the RFP deadline passes, there will be a scheduled period for the evaluation committee to score bids based on the preagreed criteria and weighting specified in the RFP. Vendor interviews will generally be conducted to fully explore responses and vendor capabilities. The resulting selection of winning bidder(s) (multiple awards may be made based on the number of bundles) should be made to the proposer(s), offering the best combination of price and quality ("best-value") by a vendor capable of delivering the product to specifications. Multiple criteria should be used to evaluate the proposals, including organizational capabilities, performance, experience, and lifetime costs.

Result: The winning bidder is selected for each bundle through a competitive process that ensures best-value vendor selection.

Common Recommendations:

- The **lead organization** facilitates the evaluation and scoring of proposals. This requires identifying a cross-functional team to evaluate results and ensuring that all evaluators are trained in how to rate or rank the responses in a consistent way.
- The **lead organization** determines the winning bidder(s) with the evaluation team and updates the participants.
- **Participants** who are on the evaluation team review the proposals and provide input on awards. All **participants** begin planning for implementation.
- The **technical adviser** responds to questions from the evaluation team, creates a detailed analysis of technical performance and pricing from vendors, and provides recommendations and a rationale and guidance on contract negotiations.
- The **lead organization** prepares a memo that explains how the selected bid best satisfies the evaluation criteria, and **participants** should include this in the information that they provide to key internal decision makers for their approval of the contract.
- Provide evaluation panelists with a software template, such as a spreadsheet, with all predefined criteria and the eligible scoring to make the process easier and more consistent.
- Fully evaluate references against minimum qualifications to select quality providers and only then evaluate pricing in the form of the levelized cost of electricity (LCOE)[14] against external benchmarks, such as the prevailing utility bills. This step will dramatically improve the outcome by avoiding the common pitfall of focusing on the lowest cost of installation rather than looking at lifetime performance and total cost of ownership.
- Part of the evaluation criteria should be adherence to the terms and conditions that participants agreed to in Step 5 (such as price, annual escalator, and performance guarantees). This will aid in contract approval later because key decision makers have already approved the terms under which contracting would be acceptable.

Public-sector Recommendations:

- Lead organization and convener should avoid potential and perceived conflicts of interest and ensure that the process will stand up under public scrutiny to prevent potential issues during the final award phase. Having a well-designed review process with a broad team of experts will not only result in a better decision but also build support and buy-in from key decision makers in the participating agencies.

Private-sector Recommendations:

- Private organizations generally have a wider range of procurement and negotiations options available to them, as compared to public agencies, and can therefore ask for and evaluate bid alternatives during the process.

Step 9:
Negotiations and Award

In this phase, the winning bidder(s) has/have been selected, and the participants can collectively complete the negotiation process with an end goal of individual approval and signature of contracts. Although the procurement documents include boilerplate contract language, there is some room for negotiation at this point. In their proposal documents, vendors should indicate the specific contract terms to which they object. Examples include incremental costs for specific architectural requirements/design features and construction or design constraints.

Result: Negotiations are complete with successful award and signed contracts with a qualified vendor for each bundle, within the agreed upon timeline.

Common Recommendations:

- The **lead organization** enters into negotiations with the winning bidder(s), keeps participants informed of progress and key concerns raised in negotiations, develops award documents to be used for organizational approval, and provides them to participants for their internal use.
- **Participants** refine contract documents for any specific requirements (e.g., local building codes), review the documents with decision makers, and approve the final contracts.
- The **technical adviser** reviews contract terms and conditions, pricing and production estimates, system designs, and other technical documents to ensure that the final agreement is aligned with original intent and that the latest best practices and favorable pricing have been captured.
- The **lead organization** and **technical adviser** maintain vigilance and attention to detail during the negotiation phase to avoid problems with changes in scope, cost, and specifications. Also, assignment of valuable attributes such as (RECs, deposits, and rebates) should be reviewed to ensure that they are consistent with the original plan and goals of the initiative.
- The internal decision makers must be updated by **participants** regularly during negotiations. Both the economic case and environmental benefits should be quantified and widely communicated.
- The **lead organization**, **technical adviser**, and **participants** perform a thorough review of the contract terms and conditions, but balance realistic risks and costs during the negotiation to avoid overpaying for low-risk scenarios. Include with the final contract the site-specific designs, performance forecasts with guarantees, pricing with escalators, and definitive ownership for RECs (see online resources for sample PPAs).

Public-sector Recommendations:

- Participating agencies and their staff must begin to allocate resources for the construction phase and should include building or planning department staff during negotiations when site designs are provided by vendors.

Private-sector Recommendations:

- Maintaining support from internal champions, such as sustainability and marketing staff, can be helpful in raising the profile and priority of the negotiations in management's eyes. It will be important to manage to the timelines laid out for the process in the RFP.

Step 10:
Installation Project Management

Implementation can begin once contracts have been finalized, and will usually proceed with a staged schedule (certain sites before others). At the beginning of this process, there should be a full technical review of the project plan and system designs. Facilities management staff will be required to allocate time to support the effort and help manage on-site operations. Any qualifying incentives or rebates are generally requested through an application process, and the local utility provider is notified of the planned system interconnection activity. The start of construction is a good time for press events, such as ground-breaking and ribbon-cutting ceremonies. These demonstrate leadership by the lead organization and participants and highlight the project's positive environmental and economic impacts.

Result: Solar PV systems are properly built to meet or exceed specifications and safety standards.

Common Recommendations:

- The **lead organization** and **participants** actively manage the installations at their sites and may engage the technical adviser as needed.
- The **convener** engages local and regional building and planning departments to leverage installation project management and permitting resources while building regional support and shares resources with participants. Streamlining the permitting process will increase the speed of project completion and resources for education can be found at www.solartech.org.
- The **technical adviser** provides external expertise to participants and regional building departments throughout the construction phase, as engaged by the lead organization and/or participants. The technical adviser ensures project coordination and vendor compliance with solar construction best practices and provides training and resources to facilities management staff.
- **Participants** convene working group meetings with facilities managers, the system integrator, and local building permit officials to review site plans, timelines, system designs, components, and interconnection. These meetings should include a review of latest standards and best practices for design and construction of solar PV systems.[15] The working groups review in detail the approach, documents, plans, and specifications to build comfort of all stakeholders in this phase of the project. By bringing together these groups early in the process, the overall construction phase will be shortened, thereby reducing costs and risks for both the system integrator and all participants.

Public-sector Recommendations:

- Many public agencies self-permit their own systems and may lack a comprehensive set of current "as-built" facility drawings, which can complicate the engineering and construction phase. Getting the local permitting and facilities team on board with the effort, technical details, and timeline as soon as possible will reduce the risks that the project will get stuck later in the process. For the initial sites, external resources and expertise may be required to assist deployment of best practices across all aspects of the system construction process.

Private-sector Recommendations:

- If sites are not owned by the participant itself, it is necessary to include property managers and building owners at the final design and engineering stage of the construction process in order to address any site-specific concerns for both the short term (during construction) and the long term (operations and maintenance).

Step 11:
Commissioning and Operations

This step includes final interconnection, inspection, and site commissioning activities to ensure that all aspects of the solar PV installation meet safety guidelines as required by local codes and that performance expectations will be met per the contract terms and conditions. Commissioning is done by an independent entity. It marks the end of site construction and the transfer of responsibility for the system to operations staff. In the case of a PPA, most operations and maintenance costs are covered within the contract and are not billed separately to the customer. Providing access to rooftop systems may incur some staff time, but this is generally not a material cost. With a direct purchase or lease, operations will most often be the responsibility of facility staff or subcontractors. The expected system lifetime of a solar PV system today is at least 25 years, so getting started on the right track is essential to realizing expected benefits.

Result: Successful solar installations achieve energy production and cost savings as planned for 25 years or more.

Common Recommendations:

- In addition to the independent site commissioning entity, the **lead organization** and **participants** conduct their own site commissioning activities and ensure proper transition to operational staff for long-term system monitoring and maintenance.
- To ensure smooth transition to operational mode, the developer provides the host with the proper monitoring systems with performance benchmarks, training for facilities staff, and process guidance for accounting support to properly capture incentives, rebates, and planned savings.
- **Participants** may use a PPA, lease, or direct ownership model that includes a design-build contract with the system integrator-developer. All financing models will require proper system monitoring, and facilities staff must understand and plan for annual maintenance activities.
- Each **participant's** standard commissioning procedures may be slightly different. The winning vendor for each bundle should meet with all participants ahead of the first installation commissioning to explain normal commissioning procedure so that participants can plan accordingly.

Step 12:
Celebration of Success

Celebrating success is a best practice for any kind of project, and the completion of a collaborative solar purchase is no different. Implementing a collaborative purchase of solar power is not a simple task. Not only should all the contributors celebrate within their organizations, they should also inform the local community of the project's success by engaging the local media. The convener and/or lead organization may receive positive feedback on the project that they can share with the participants so they can pass it along to their key decision makers. This may also be a good time to start thinking, if appropriate, about how to expand the project to benefit more potential participants, communities, and the environment.

Result: Participants' internal and external stakeholders and the regional community are aware of the project's positive impact and support future efforts.

Common Recommendations:

- **Participants** evaluate the financial and environmental impact to the organization, collaborative, and regional economy resulting from this effort. **Participants** compile talking points about the impact of the project on their organization and its stakeholders and clients, and incorporate these into internal and external communications and events.
- The **convener** expands regional and national awareness of the project through appropriate forums, using metrics for environmental and economic impact. The **convener** also compiles and provides summary data, charts, a case study, and talking points to **participants** about the impact of their collaborative efforts.
- **Participants** provide this information in external and internal communications, events, and forums to build awareness and support for this initiative and future replication. Ongoing positive environmental impacts should also be incorporated into green initiatives, Web sites, and published materials to demonstrate continued commitment and build recognition of the project and organization.
- The entire team holds a commemorative event at which it recognizes team members. Nominating the project for regional or national awards that further recognize the benefits and leadership of the project and organization should also be considered.

Public-sector Recommendations:

- Public agencies can generally convene stakeholders across the region—including private organizations, the green industry, other public agencies, and the community—to discuss progress, impact, and plans for future activities. Having well-organized information for these discussions will encourage future participation and broad-based support.
- Because large-scale projects can have a significant impact on climate action plans and mandatory renewable energy requirements, results should be incorporated into progress reporting.

Private-sector Recommendations:

- Private organizations should focus their attention on their corporate sustainability goals, along with the positive impact on customer perception and actual reductions in fossil fuel energy and carbon consumed in their products and services. Online visualizations of the system and its performance will enhance the visibility of, and benefits from, the organization's investments and commitment.

Chapter 5

Public-Sector Case Study:
Silicon Valley Collaborative Renewable Energy Procurement Project

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Introduction

This case study describes the Silicon Valley Collaborative Renewable Energy Procurement (SV-REP) Project, a large-scale initiative intended to serve as a replicable, scalable model of regional collaboration. Due to the vision and leadership of the participating organizations and individuals in Silicon Valley, the SV-REP Project is the largest multi-agency procurement of renewable power in the country (as of January 2011) and serves as an example of how collaboration can significantly reduce costs associated with the procurement of solar power by public agencies.

The history of the project to date also demonstrates how the inherent difficulties of trying to facilitate and manage collaborative projects can be overcome by launching the effort with the right partners and following the best practices synthesized in this guide.

Project Summary

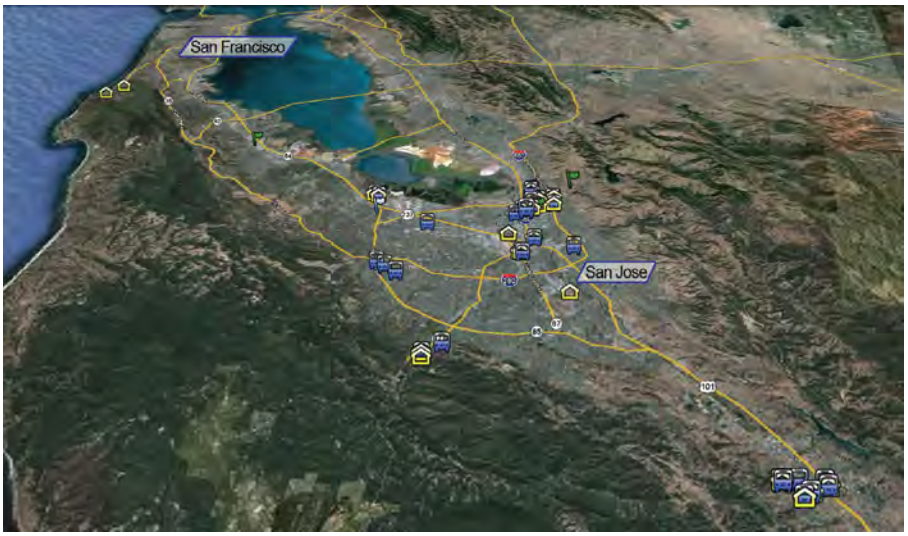
The SV-REP project included the following collaborators:

- Convener – Joint Venture: Silicon Valley Network (Joint Venture)
- Lead Organization – The County of Santa Clara, California (County)
- Technical Adviser – Optony Inc.
- Participants – County of Santa Clara; the cities of Milpitas, Cupertino, Morgan Hill, Pacifica, and Mountain View; the town of Los Gatos; the Santa Clara Valley Transportation Authority (VTA); and the South Bayside Waste Management Authority (SBWMA).

The nine participating public agencies were drawn from the members of Joint Venture's Public Sector Climate Task Force (Task Force). They represent a total of 70 solar installation sites spread across more than 40 locations, with the potential to generate more than 14 MW of power at peak capacity. This is the environmental equivalent of planting approximately 2,800 acres of trees and can provide enough power for 2,700 average California homes. In total, these sites will more than double the entire solar installed capacity for nonresidential systems across the County. Collectively, the SV-REP project installations are expected to generate approximately $70 million in local economic activity and more than 300 jobs.

Figure 4

Map of Silicon Valley Showing Locations of the SV-REP Installation Sites



Source: SV-REP with the use of Google Maps

Installations include rooftop, carport, and ground-mounted solar PV systems, located at community centers, city halls, fire stations, police stations, office buildings, senior centers, libraries, clinics, and other publicly owned facilities. Some examples include South Bayside Waste Management Authority's recycling and waste transfer facility in San Carlos, Los Gatos corporate yard, and Santa Clara Valley Transit Authority's bus maintenance facility.

The installation sites were strategically grouped into four bid "bundles." The selected vendors include SunPower Corporation for the large-sized system bundle, Borrego Solar for the medium-sized system bundle, and EcoPlexus for the small combined and small rooftop bundles. At the time of writing this case study, contracts had been awarded with site installations in progress. Contract negotiations were conducted by bundle to streamline and unify the process. The County led the contract negotiations with selected vendors for each bundle, and Optony was engaged to provide technical consulting services throughout the solicitation process.

By leveraging resource investments from the County and capturing economies of scale, all participants benefited by reducing their renewable energy costs as well as costs associated with the procurement process. Savings occurred in four areas:

1. The benefit of site aggregation was calculated to be 12 percent below standard vendor pricing.[16]
2. Average electricity cost savings per participant over the 20-year Power PPA term is expected to be 8 percent (with a range of 2 to 19 percent) below Pacific Gas & Electric pricing. For an average-sized commercial installation site (300 kW solar system) this could amount to approximately $125,000 in electricity cost savings.
3. Participating agencies saved 75 to 90 percent in administrative costs and time compared to an individual (non-collaborative) procurement. The lead organization spent approximately the same amount as would be expected had it not led the effort but received additional benefits from site aggregation and favorable contract terms.[17]
4. Savings resulted from favorable contract terms and associated reduction in risks. With the County leading negotiations with the high-ranked bidder for each bundle and by including representatives from each participating agency with projects within the bundle, all participants were able to achieve more favorable contract terms than they would have otherwise.

For more information and resources see www.jointventure.org/renewableenergyprocurement

Background

The SV-REP project was launched in 2008 by Joint Venture: Silicon Valley Network's Public Sector Climate Task Force in partnership with the County.

Formed in 2007, the Task Force includes representatives from nearly 50 Silicon Valley cities, towns, and counties, plus several special districts and other public agencies. The goal of the Task Force is to develop effective, collaborative solutions for the reduction of greenhouse gas emissions from public agency operations and to learn from each other about climate protection programs. The SV-REP project fit well within this overarching goal, facilitating regional collaboration in a way that assists each participating agency with achieving its renewable energy and/or greenhouse gas reduction goals while promoting cost savings.

Objectives and Expected Outcomes

The SV-REP project was created to address the following three major challenges regarding public-sector adoption of renewable energy in an era of diminished financial resources: high up-front costs associated with the purchase and installation of these technologies, the considerable transaction costs involved in conducting competitive bid processes and developing agreements, and the general lack of understanding of financing options and available incentives. The goal of the SV-REP project was to address these challenges via a regional collaborative effort using a standardized PPA financing model, lease agreements, and procurement process.

A regional PPA provided an opportunity to break down both the up-front capital barriers to direct ownership and the transaction costs associated with third-party financing. Additionally, by doing an aggregated procurement rather than individual ones for each agency, the costs of developing the agreement were reduced significantly for the parties involved. Through a collaborative and transparent process, the SV-REP project addressed the informational barriers and limited resource capacity that are impediments to adoption of renewable energy and nontraditional financing approaches. This method not only conserved funds, but also accelerated the financing process and deployment of renewable energy technologies to achieve climate protection goals while supporting local economic development.

With an emphasis on economic development (also in line with the organizational goals of Joint Venture), the County developed a solicitation meant to enable broad market participation from small and large firms, new market entrants, and older, more established firms and allow for those participating jurisdictions who were interested in innovative technologies to post exploratory projects. Preference for local firms was included, and projects were segregated into bundles that could be bid on separately, thereby allowing for the possibility of selecting more than one firm.

Project Success Factors

The project success factors included well-defined roles and responsibilities, an effective leadership and organizational structure, and strategic bundling of sites.

Roles and Responsibilities:

Joint Venture: Silicon Valley Network (Convener). Joint Venture worked to facilitate the multijurisdictional effort in collaboration with the County. Joint Venture's Task Force structure provided the framework for close collaboration necessary for a project with such a large regional scope. Joint Venture encouraged the participation of member agencies by providing a communication platform as well as encouraging information sharing using a Web portal and through structured educational opportunities for renewable energy, financing, and other topics related to the initiative. Joint Venture staff facilitated the project through project planning, convening meetings and events, providing sample documentation, collecting and aggregating information, organizing group purchases of technical consulting services, and providing publicity for the project.

The County of Santa Clara, California (Lead Organization). The County initiated this project by scoping collaboration and doing a significant amount of research and information sharing on solar power. The County accepted the responsibility of lead organization based on its staff's belief that reduced transaction costs and economies of scale in the procurement would result in significantly lower pricing than could otherwise be negotiated with an independent procurement. The County developed standardized documents

Box 6
Expected Outcomes

- Conservation of government funds for capital investment
- Volume discounts and decreased electricity prices
- Reduced transaction costs
- Reduction of greenhouse gas emissions from local government operations
- Stimulation of the local economy
- Increased public-sector adoption and installation of solar systems throughout Silicon Valley
- Standardized PPA and procurement documents for public-sector use
- Providing smaller cities access to third-party financing and technical expertise
- Stabilization of electricity costs over the PPA term (hedge against rising and volatile electricity rates)
- Reduction in vendor costs through economies of scale and standardization of purchasing methods
- Creation of a case study to share with other regions looking to do similar collaborative projects

and solicitation proposals, including the request for information (RFI), request for qualifications, and RFP, which included components of economic development and a sample PPA. The County released and managed these solicitation proposals and provided guidance to participating agencies through negotiation of PPA terms and conditions.

Optony Inc. (Technical Adviser). Optony, an energy research and consulting services firm, served as the project's technical adviser. Optony was engaged by the County and the participants to provide independent technical expertise in solar project evaluation, procurement, and project management. The efforts from the Optony team were initially focused on vetting sites, gathering required information, and strategically bundling the sites for the RFP to create high levels of interest by the solar industry. During the RFP development process Optony developed standardized evaluation criteria to ensure best-value awards with low implementation risks. As the bids were received for more than 40 locations across four bundles and nine agencies, Optony assisted in analyzing technical aspects of the bid proposals.

Participating Public Agencies (Participants). There were a total of eight participating agencies (listed in the project summary) in addition to the lead organization. These participants ranged from small towns to large county-wide special districts. The participants were responsible for attending informational sessions, gathering preliminary site information and conducting analyses, reviewing RFP template documents, and participating in contract negotiations. In addition, participants obtained internal approval for their project sites to proceed with the solicitation and award.

Leadership and Organizational Structure:

As a trusted convener of local government agencies, Joint Venture was able to effectively bring together the SV-REP project participants. By leveraging the framework of an existing Joint Venture initiative, the Public Sector Climate Task Force, the project began with a common level of understanding and already developed channels of communication.

Box 7
SV-REP Project Leadership Team

Rachel Massaro
(SV-REP Project Director)
Associate Director of Climate Initiatives
Joint Venture: Silicon Valley Network

Siva Darbhamulla
Chief of Design Services
County of Santa Clara

Ben Foster
Vice President, Operations
Optony

Caroline Judy
Assistant Director, General Services Agency
County of Alameda
(Formerly the Manager of Intragovernmental Support Services and SV-REP Project Manager)

Jerry Lahr
Power Program Manager
Association of Bay Area Governments

Kara Gross
Vice President
Joint Venture: Silicon Valley Network

Steve Mitra
County of Santa Clara
County Counsel

Lin Ortega
County of Santa Clara
Utilities Engineer/Program Manager

Chris Schroeder
Purchasing Agent
City of Milpitas

Mary Tucker
Energy Program Manager
City of San Jose

Shortly after the launch of the project, Joint Venture assembled a steering committee, the SV-REP Project Leadership Team, in order to keep the regional perspective in mind throughout the process. The team met regularly to strategize and guide each phase, engage the participants, and shape the overall collaborative effort. Members were self-selected and reflected those participants of the Task Force who had a particularly strong interest in collaborative procurement models. As the project progressed, Joint Venture added several others to the team to provide advice on technical and legal issues. This team represented members from the participant pool as well as others who had experience with municipal solar purchasing or an interest in promoting the adoption of renewable energy technologies by public agencies. With these members, the Leadership Team was able to keep in mind the goals of the project while also focusing on benefits to the region as a whole.

County staff provided leadership by conducting significant research into different methods of financing renewable energy systems and concluded that, given tight budgets and the desire to avoid debt financing, using a PPA financing model was optimal for the project. This belief was tested in a series of informational interviews with private-sector participants in several renewable energy sectors, solar financiers, and public-sector PPA early adopters. The interviews led to further research that guided the creation of early goals and objectives for the project, such as the goal of generating a standardized PPA document with mutually acceptable terms and a standardized lease template, as neither of these standards existed for public-sector projects.

Figure 5

Members of the Leadership Team

Members of the SV-REP Leadership Team with the co-chairs of Joint Venture: Silicon Valley Network's Board of Directors. From left: Lin Ortega (County of Santa Clara), Benjamin Foster (Optony), Mayor Chuck Reed (City of San Jose), Siva Darbhamulla (County of Santa Clara), Caroline Judy (County of Alameda), Chris Schroeder (City of Milpitas), Chris DiGiorgio (Accenture), and Rachel Massaro (Joint Venture: Silicon Valley Network).

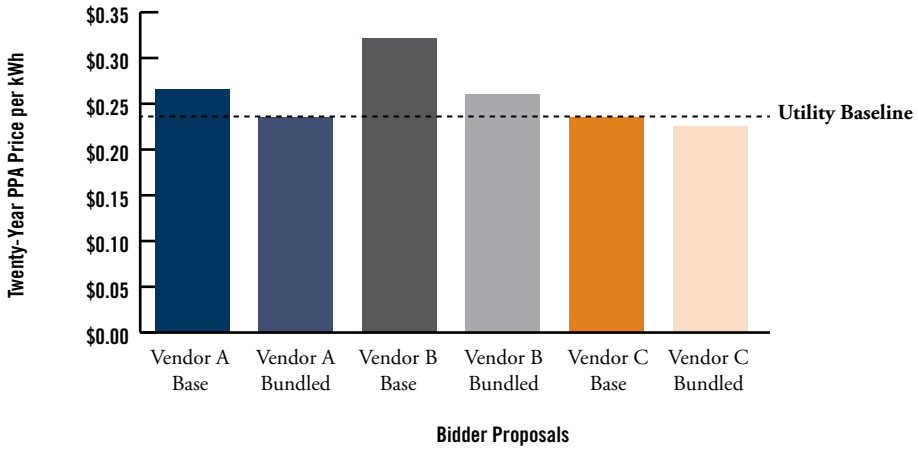
Strategic Bundling of Sites:

Strategic "bundling" (aggregation and grouping) of sites was essential in generating vendor interest, competition, and volume pricing and therefore was crucial to the success of the initiative. Optony led this effort with the County, using site characteristics, size, location, and type of installation to group sites into bundles of 6 to 15 locations each. The bundle of small individual sites was about 700 kW in size, while the bundle of large sites was over 8 MW. Bundling encouraged active local vendor participation on the smaller bundles while driving national-level players to bid on the larger bundles. Ensuring that each bundle did not contain too many sites but allowing vendors to bid on multiple bundles encouraged participation by avoiding the risks inherent in an all-or-nothing process.

Another key feature of the approach to maximizing the benefits from collaboration and bundling was to conduct proposal evaluations and contract negotiations by bundle (rather than separately for each participant). For evaluations, the benefits of bundling were clearly demonstrated by enabling accurate comparisons for the combined pricing given specific site characteristics (e.g., comparing the pricing for a small 50 kW rooftop system with a large 900 kW carport would have been misleading to decision makers without a proper context). Figure 6 illustrates the price reduction due to bundling for several bidders on the large bundle as compared with prices for individual sites and the prevailing utility rate. Contract negotiations were also conducted on a bundle-group basis. This approach was important in driving better terms and conditions with all participating agencies' input and to streamline PPA documents for both the vendor and buyers. Based on vendor feedback

Figure 6

Twenty-Year Average Pricing for Selected Large Bundle Bidders



Source: SV-REP

and analysis of other PPA contracts, the final contract for the SV-REP may be in the top 10th percentile from a buyer's perspective when all terms and conditions are considered.

The SV-REP project timeline (see Table 2) is included to provide details that assist from a planning perspective. Every milestone on the timeline is related to one or more of the best practices, but the major milestones are mapped to best practices in Column 1.

Results

The first contracts between the vendors and participating agencies were signed in January 2011, and in the following months project teams began working on project implementation. Table 3 summarizes the sites, participants, and contracts by bundle.

Table 2
SV-REP Project Timeline

Best Practice	Milestone	Date
1	**Project Concept Initiated**	July 2007
1	**Leadership Team Formed**	Spring 2008
1, 2	**Formal Project Launch** Task Force Meeting	February 2009
2	**Requested Preliminary Site Information**	March 2009
	Web Portal Created Mapping of Project Sites Task Force Meeting	May 2009
3	**Solar Project Workshop**	July 2009
	Task Force Meeting	September 2009
6	**RFI Released** Task Force Meeting	November 2009
4	**Engaged Technical Advisor**	December 2009
5	**Special-Purpose Participant Meetings**	December 2009-January 2010
	Task Force Meeting	January 2010
7	**RFP Released** Press Conference Held Task Force Meeting	March 2010
	Preproposal Conference Held	April 2010
	RFP Addenda Released	April - May 2010
	Deadline for Step 1 (Prequalification) Task Force Meeting	May 2010
	Prequalification Finalized Special-Purpose Participant Meeting	June 2010
	Deadline for Step 2 (Proposal Submission)	July 2010
8	**Vendor Selection Finalized**	September 2010
	Task Force Meeting	November 2010
9	**First Contracts Signed**	January 2011

Table 3
SV-REP Installation Sites by Bundle, with Associated Capacity and Benefits

Bundle	Participating Agencies	Total Capacity	Benefits
Large Systems	County of Santa Clara Santa Clara Valley Transit Authority	8,125 kW Avg. 1,354 kW	Annual Output: 11,200 MWh Annual CO2 Offset: 8,050 Metric Tons REC Pricing: $100–$200/MWh Performance Guarantee: 85–110 %
Medium Systems	City of Cupertino City of Milpitas City of Morgan Hill County of Santa Clara	4,191 kW Avg. 299 kW	Annual Output: 5,700 MWh Annual CO2 Offset: 4,100 Metric Tons REC Pricing: $100–$200/MWh Performance Guarantee: 85–110 %
Small Combined & Rooftop Only	County of Santa Clara City of Cupertino City of Milpitas City of Morgan Hill City of Mountain View City of Pacifica South Bayside Waste Management Authority Town of Los Gatos	1,690 kW Avg. 77 kW	Annual Output: 2,300 MWh Annual CO2 Offset: 1,650 Metric Tons REC Pricing: $100–$200/MWh Performance Guarantee: 80–100 %

Source: Optony, based on bundled contracts

Conceptual rendering of one of the SV-REP installation sites, the Santa Clara Valley Transit Authority's Bus Storage and Maintenance Facility: view looking west (above), and possible layout (below)

Source: Santa Clara Valley Transit Authority

Chapter 6

Private-Sector Case Study:
The Collaborative Solar Project

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Introduction

This case study describes the first attempt to structure a collaborative, aggregate purchase for commercial solar PV installations in the United States. The experience that WRI and its corporate partners gained in undertaking this pilot informs the best practices presented in this guide. Although in this case the pilot did not result in final contracting by the participant companies together, several participants later installed solar equipment at their facilities. The lessons learned through this pilot and these partners' additional feedback can guide future replications of this concept.

Background

The World Resources Institute convened a group of its partners to pilot a collaborative purchasing model for commercial solar PV installation in the United States.[18] The Collaborative Solar Project (TCSP) had its genesis in the Green Power Market Development Group (GPMDG) and its California chapter (GPMDG-California Affiliates). WRI launched the GPMDG in 2000 to build corporate markets for renewable energy in the United States. The project's goal—to build corporate demand for 1,000 megawatts (MW) of new, cost-competitive green power by 2010 in the United States—was met a year early in 2009. Partners had discussed the barriers to solar PV in group meetings, especially problems related to fragmentation and high transaction costs. WRI and partners conceived of TCSP as a pilot to test whether collaborative purchasing could make solar PV more affordable by reducing the balance-of-system costs (those not related to the panel itself) and by lowering transaction costs (such as legal fees and staff time).

Objectives and Expected Outcomes

In February, 2008 WRI presented a proposal for a solar collaborative purchase to the GPMDG-California Affiliates at a semiannual meeting. Partners were interested, given that several of them were pursuing solar PV at their individual facilities, but acknowledged that it was a challenge even in the fairly solar friendly market of California. However, the goal of reducing costs and taking distributed solar to scale encouraged them to pursue the initiative despite the anticipated challenges of "selling" this new concept to developers and aligning their own preferences sufficiently to pursue a joint purchase. The companies involved, including Staples, Walmart, Intel, and Hewlett-Packard, were motivated by the desire to prove a model that would yield cost reductions and operational efficiency and that others could replicate.

Box 8
Expected Outcomes

The TCSP was initiated in an effort to—

- install solar at participants' facilities at the lowest possible cost via bulk procurement of components and integration services;
- facilitate the process of learning about solar technology and financing;
- reduce transaction costs and legal fees associated with solar purchasing via a standardized PPA;
- encourage corporations to invest in on-site renewable power generation;
- support technology advancements; and,
- reduce greenhouse gas emissions

Roles and Responsibilities

- Convener: World Resources Institute
- Technical Steering Committee:[19] Staff from Staples and Walmart
- Lead Organization: World Resources Institute
- Participants:[20] Staples, Intel, Walmart, Hewlett Packard

In terms of roles and responsibilities, WRI fit naturally into the convener role, but in practice it also handled other responsibilities. WRI performed in-depth research on solar markets and financing models, and it also issued the RFP on behalf of participants. Staff from Staples and Walmart's energy procurement department provided valuable counsel on solar financing, procurement, and the strategy for the initiative. Participating companies attended meetings to shape the strategy of the initiative and selected facilities that were included in the pilot. WRI assisted with facility screening, which in best practice would be handled by a separate technical adviser.

Project Summary

TCSP began conceptually in February 2008 and then progressed through multiple steps, which roughly correspond to Steps 1- 8 of the Best Practices. Ultimately, a set of untimely real estate issues prevented the process from going beyond bid analysis and initial due diligence in October 2009. It is important to note that late 2008 through 2009 was an extremely poor environment for private investors to attempt to execute solar deals because solar developers had very little certainty about their future, especially their ability to finance deals (and on what terms). PV installations in the commercial solar sector did not grow at all in 2009 over 2008, reflecting the difficulty of predicting future electricity demand and power prices.[21] In addition the value of the incentive provided by the California Solar Incentive (CSI) program stepped down from 22 to 15 cents/kWh in February 2009. These factors posed challenges to completing contracts in TCSP, but many useful lessons were learned that inform this guide. Participant companies benefited educationally from the pilot. A number of them have installed solar PV on their own facilities since then and have been satisfied with the results. This experience suggests that collaborative initiatives can add value by enabling more companies to purchase solar than would have the bandwidth to do so independently.

Timeline

From approximately February 2008 to late September 2008, WRI completed the steps of recruiting companies, mapping their roof space in California, identifying a bundle of proximate roofs, and prescreening them to exclude facilities that were clearly not feasible. An RFI was issued ahead of the RFP as WRI and the participants felt it would be beneficial to gather additional information, help shape the RFP, and "warm up" the development industry to the new idea of aggregate purchasing-installation. WRI and participants analyzed the indicative pricing and the cost savings information in the RFI responses and discussed the key relevant terms on which their purchase decision would rest.

Table 4
Timeline of The Collaborative Solar Project

Best Practice	Milestone	Date
1	**Initial Recruitment Meeting**	Feb 2008
3	**Solar Project Workshop**	May 2008
2	Assess Potential Sites & Participating Organizations	May–June 2008
4,5	Research Phase, Scoping RFP, Building Support from Participants	June–Sept 2008
4	**Drafting RFI**	Sept-Oct 2008
	RFI Issued	Nov 2008
	RFI Responses Received	Dec 2008
6	Drafting RFP and Process Documents	Jan-Feb 2009
5	**Participants validated RFP**	March 2009
-	California Solar Incentive Step-Down from 22 cents/W to 15 cents/W	Feb 2009
7	**RFP Issued**	April 2009
7	**Site Evaluations**	May 2009
8	**RFP Responses**	June 2009
8	**Bid Evaluation and Initial Due Diligence**	June-July 2009

Timing is a major challenge with a collaborative purchase. The slower decision making processes of individual participants can hold up group action. Because TCSP was the first pilot of commercial collaborative solar purchasing, the timeline was not entirely predictable. Based on this experience, the following actions are keys to mitigating timing risk:

- Early on (i.e., at the solar workshop and in initial recruitment) the convener highlights key timing contingencies such as foreseen changes in available incentives or policies.
- The convener establishes a timeline for the group to which all participants commit going into Step 5.
- The timeline is approved by decision makers in Step 5 so that the process timeline can be clearly specified in procurement documents in Step 6.

Preparatory Research and the RFI

Participants expressed interest in issuing a joint RFP by May 2008, but not enough was known about how developers would view such a concept, what terms to expect (i.e. pricing), and whether those would be attractive given the prices that companies were paying PG&E for electricity. WRI performed additional research on the solar market, pricing, feasibility indicators, and business models. Participants needed further information in order to commit to a set of terms that they jointly expected would be attractive and feasible. The RFI was undertaken as a complementary piece to research already completed on solar technology and to get developer feedback on how to shape the eventual RFP. This is not to say, however, that it needs to be repeated in other future efforts at collaborative solar procurement. The results of the RFI indicated that the scale of solar purchase affects the cost for participants in several unique ways.

Seven RFI responses were received, and they indicated that the model could drive cost savings in some areas, especially in labor for installation as well as reducing the transaction costs associated with operations and maintenance and the PPA. Figure 7 illustrates responses from solar industry representatives about where they expected savings via aggregation of sites, based on their own cost structures for installation. They did not all respond in each category, hence total opinions differ in each row. It appears that benefits were expected mainly in installation services, contract negotiations, and operations and maintenance costs.

Figure 7

Areas for Cost Savings through Aggregation

Source: Vendor responses to WRI Request for Information, December 2009

Table 5
Evolution of TCSP Bundle Before and After Screening

	Facilities	Square Feet Roof Space	Radius of bundle
Prescreening Bundle (June 2008)	36	2.1 M	21 miles
RFI Bundle (Nov 2008)	27	1.8 M	10 miles
RFP Bundle (April 2009)	19	1.2 M	15 miles

Bundling and Portfolio Composition

The WRI initiative began with 11 interested participants who wanted to test their collective buying power. By May 2008, these companies had submitted facility location data for the mapping exercise. They supplied WRI with location data for about 500 facilities representing 22 million square feet of roof space, and WRI mapped these facilities across the entire state of California using Google maps to determine proximity.

The facilities under consideration were initially screened by WRI based on size of roof, building ownership (owned, or leased), and ability to enter into a third-party PPA. This narrowed the amount of roof space (square feet) in the portfolio by about half. Based on the initial statewide mapping, there was a high concentration of facilities within PG&E territory (almost twice as much roof square footage as in the second largest territory, Southern California Edison).

Based on feedback from solar developers before the RFI and in submissions to the RFI, the facilities in the bundle amounted to a transaction that they considered quite sizable. Eventually, a bundle of proximate sites was identified, including facilities belonging to five companies, and bids were solicited via RFP. The final RFP issued sought proposals for 19 facilities with aggregate roof space of 1.2 million square feet.

Issuing the RFP

The RFP issued for TCSP was written in close cooperation with the partner companies, ratified by them, and issued by WRI on their behalf. Drafting took approximately two months during January-February 2009 and the document was ratified and issued in April 2009. The RFP included a schedule of site visits for developers, evaluation criteria, and other components (the original document is available online in Technical Appendices). A thorough RFP includes description of the insurance requirements, both during construction as well as on PV systems installed, and specifies who arranges and bears the costs of such. The RFP should also provide pricing scenarios where the developer retains or remarkets the RECs, as well as where the host company retains the RECs (in order to be able to make claims about solar energy use). Technical warranty requirements of buyers should be provided up front if they are a firm requirement for purchase.

Participants agreed that the goal was to develop a common PPA with the best respondent to the RFP, if pricing was attractive. TCSP did not develop a boilerplate PPA for issuance with the RFP, but rather intended to develop and vet a boilerplate PPA among the group starting with the PPAs that vendors provided. (This is not recommended as a best practice.). Getting participant agreement on the length of the contract was more difficult than pricing. Some participants would have preferred to go with a longer term (20 years) because longer terms provide lower per kWh pricing. In WRI's experience from evaluating PPA pricing over different terms, 20-year PPA prices were 10 to 15 percent cheaper than for 15-year contracts. Fifteen-year PPA prices were 15 to 30 percent cheaper than for 10-year contracts. However, a number of companies could not get internal approval for 20-year contracts. The lesson

is that private-sector participants may be hesitant to take on longer-term commitments due to business uncertainties 20 years into the future. Because there was interest in different modes of purchasing and participants wanted to see all their options, the RFP requested three options:

- $/kWh for a 10-year PPA
- $/kWh for a 15-year PPA
- $/watt installed for a turnkey development

This experience underlined the importance of involving the key internal decision makers from a participant organization early on, in order to establish the range of acceptable financing terms. These should include acceptable pricing ranges, tenor of contract, and escalator rates (in the case of a PPA), among other factors. It is important to establish participants' expectations on these key issues up front, before the group participants who will issue the RFP are finalized. It is also important to finalize a timeline that is feasible for all participants at this stage in the process. This makes it more likely that the RFP will achieve bids with terms attractive to all.

WRI had a good response rates to the RFI (7) and the RFP (4), considering that the RFP was issued in 2009 when the financial crisis was making many developers unsure about their ability to commit to financing such large projects. Only two of the original respondents dropped out between the RFI and RFP, while another two joined in a combined bid for the RFP stage. There are three drivers of strong participation in an RFP: a clear scope of work and associated evaluation criteria, ample technical information about the potential sites, and a demonstrated commitment by RFP issuers to closing a contract for the installation.

Results and Lessons Learned

The total "bundle" provided for bidding was assessed at between 6 and 8 MW of potential in total, with individual installation sizes ranging from 31 kW to 1,833 kW (1.8 MW). It is difficult to estimate how much the group of smaller sites caused a premium in the average applied to all sites, but the bundle was clearly at or above the scale "sweet spot" (i.e. big enough to enjoy any effects of bulk pricing). It could have been beneficial to break it into two separate (but still large) bundles. Turnkey installation pricing was received from three developers and was fairly consistent across proposals.

Ultimately, proposals received in response to the collaborative solar project were very encouraging. Bids ranged from $0.09 to $0.24 per kWh, varying based on term, technology, and the party retaining ownership of RECs. Prices for 15-year PPAs were competitive with the average brown power rate, even with the reduced CSI incentive. Prices for 20-year PPAs were below the brown power rates being paid by the commercial facilities participating in the RFP. In some instances, pricing for solar power dropped below the actual cost of grid power. Anecdotally, these prices were below the solar power prices quoted to companies for 2008 installations at individual facilities separately. An ex-post analysis of the turnkey pricing versus statewide (CA) 2009 pricing suggests that the pricing for TCSP was 7.9 to 10 percent lower per watt than the capacity-weighted average for commercial systems.[22]

Several unexpected variables affected the final pricing of the RFP responses. First, in February 2009 the California Solar Incentive stepped down from $0.22/kWh to $0.15/kWh. This 33 percent drop in subsidy negatively affected solar project economics. However, the first six months of 2009 also saw a significant drop in the price of solar panels and solar modules. A combination of variables, including reductions in European incentives, decreased global demand for solar panels due to economic conditions, and large amounts of new silicon production capacity driving down raw material prices contributed to a 40 percent decline in panel prices.[23]

This confluence of factors makes it difficult to differentiate the collaborative solar purchasing model's cost impacts from cost fluctuations in the PV market.

Vendors' feedback pointed to several types of aggregate pricing benefits. The geographical confluence can reduce installation costs by concentrating deployment resources and shipping costs. The volume of the portfolio was cited as a reason for pricing "sites more aggressively than any single site would have been priced." Other overhead and transaction costs could be lowered as well from elements such as a standardized PPA.

Obstacles and Lessons: Ultimately, TCSP did not proceed past proposal review and initial due diligence. After proposals were received, two real estate issues shrunk the portfolio considerably. One participant decided to scale back real estate holdings and was not able to provide certainty about which facilities would remain viable. Another participant ran into unexpected barriers to expansion of a key facility that they had included in the bundle. As a result, both participating companies had to withdraw a significant portion of their roof space from the bundle.

To maintain a critical mass of roof space, WRI approached the solar vendors for guidelines to "backfill" roof space by recruiting new RFP participants. During that process, one vendor indicated that the proposal pricing would be honored as long as the RFP included more than 3 MW of system capacity. Another vendor requested that any new facilities added to the RFP be located within the existing eight-mile radius to qualify for the RFP pricing. A final vendor requested that all new facilities meet a 500 kW threshold for participation. Recruiting other nearby companies to participate and replace the facilities lost would have been easier if macro factors such as the economy or the CSI incentives available had been more favorable.

This feedback for bringing new facilities into the RFP would indicate that total capacity, proximity, and scale of facilities are all factors to achieving the cost savings presented in the vendors' RFP proposals. The TCSP did not complete contracting due to nonsolar real estate issues and the poor economic climate. However, the project provided WRI and the participants with valuable lessons learned about the economics of solar energy, and how to structure solar purchases. Future collaborative purchases can learn from these insights into strategies to develop a regional base of support, facilitate participant data gathering, and build support early with internal decision makers, as well as from the template documents provided with this guide. Preliminary pricing data and feedback from companies support the conclusion that there were cost reductions resulting from the aggregation of individual participants' facilities.

Closing Thoughts

Both WRI and Joint Venture have learned valuable lessons about how to structure and execute a collaborative solar purchase effectively, from which we hope the reader benefits. The best practice process provided here is informed by both our mistakes and our successes, as well as by additional research and expert consultation. It should serve as a plan of action from which to model collaborative purchasing initiatives and may be adjusted by each group to serve its own unique needs and circumstances. We believe this guide and related materials provide sufficient preparatory tools to embark on a multi-megawatt solar purchase.

Since the inception of this model and the two pilots described in our case studies, interest has grown in collaborative solar purchasing as a model with local conveners and the Environmental Protection Agency holding outreach events for stakeholders around the country. As of February 2011, at least four other regions have actively begun evaluating this model for renewable energy deployment. Two of these, Contra Costa County, California, and Washington, D.C., have begun work on collaborative solar purchasing initiatives. Both are using the best practices presented in this guide and are targeting larger-scale projects in terms of size and number of participants. These new initiatives have the opportunity to further validate the results and replicability of the model.

We wish you much success in your efforts.

Acknowledgments from Project Teams

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Glossary

Note that the definitions provided here are more specific than the broader technical definition in some instances in order to explain their relevance to the collaborative solar purchasing process.

Aggregate purchase: contracting with one vendor for solar electricity (system installation or electricity provision) for a bundle of individual sites

Bundle: a group of proximate facilities with similar characteristics that are grouped together and solicit bids for solar (or other renewable) energy installations together, with pricing based on the aggregate size and equal across all sites

Buyout option: Option in the PPA for the solar PV system host (company purchasing the power) to buy the system outright at the end of a specified period of time

Collaborative purchase: contracting with one vendor for solar electricity (system installation or electricity provision) for a bundle of individual sites

Economies of scale: the effect of increased production in reducing the average cost per unit by spreading fixed costs over more units

Escalation rate: the annual increase for the price of electricity or other commodity (used in PPAs and project financial models)

Investment Tax Credit (ITC): a federal incentive that reduces federal income taxes for qualified taxpaying owners of renewable energy projects, based on based on the dollar value of the initial capital investment

Kilowatt (kW): unit of power measurement equivalent to 1,000 watts

Kilowatt-hour (kWh): power output of 1,000 watts sustained over one hour

Levelized cost of electricity (LCOE): Per unit cost of electricity that represents the total fixed and variable costs of all production over the system lifetime (including up-front capital, cost of financing, operations and maintenance), expressed in $/kWh

Megawatt (MW): unit of power measurement equivalent to 1 million watts

Megawatt-hour (MWh): power output of 1 million watts sustained over one hour

Net metering: a methodology under which electric energy generated by or on behalf of a customer and delivered to the electricity provider's distribution facilities may be used to offset electric energy purchased from the electricity provider by the customer during the applicable billing period

Nondisclosure agreement: agreement of confidentiality between all parties with access to sensitive information provided as part of the bidding process

Power purchase agreement (PPA): Agreement between a third-party owner of an electricity-generating system and the purchaser of the electricity that specifies the terms and conditions for purchase

Renewable Energy Certificate (REC): Proof that 1 MWh of energy from a renewable energy source has been generated. Additional environmental attributes may be included in definitional boundary of the REC as determined by the definitions and uses of the regulatory and/or programmatic framework where the REC is recognized. (This is also known as a Renewable Electricity Certificate or Credit.)

Request for information (RFI): Formal open solicitation of information, typically from vendors or industry participants, often issued as a precursor to a call for commercial proposals

Request for proposal (RFP): Formal open solicitation of bids from technology suppliers on specific terms of reference and plan of work

Endnotes

1. Numerous companies have saved money with solar. For two examples, see the stories of Johnson & Johnson and Staples as quoted in Mother Nature Network, 2010 and Sunedison, N.D.
2. G. Barbose, G., N. Darghouth, & R. Wiser (2010).
3. Based on the feedback received from vendors and other reviews of recent PPA contracts for similar projects
4. Data for module price are the average of estimates in the fourth quarter of 2010 from IHS Energy Research (IHS Energy Research, as cited in Lacey, S., 2010). Total installed price estimates based on in-field observations by Optony. Solar module prices are expected to continue to fall in the future due to technical progress and manufacturing efficiencies.
5. This price benefit was calculated using the pricing received for the SV-REP where bids were priced both by site and in aggregate. The "group purchase benefit" shown here represents the average difference between the pricing for individual sites versus the bundled price. The difference actually ranged from 2 to 29 percent across all the projects.
6. At the federal level, there is a precedent for a third-party-led procurement option. Certain agencies have done green power procurement through NREL or the Defense Energy Support Center, functioning as a supportive resource and procurement partner. In these cases, such groups are acting like the lead organization by organizing the procurement and facilitating negotiations.
7. Refer to www.dsireusa.org for detailed information on incentives, and www.irecusa.org for net metering/interconnection. For additional perspectives on incentives and how to improve commercial solar purchasing, see WRI's publication "What's Blocking the Sun?" by J. Goodward (2010).
8. Refer to www.dsireusa.org for the most current information on incentives.
9. State of California, California Energy Commission, and California Public Utilities Commission (2011).
10. Solar Energy Industries Association (SEIA) Web site is available at www.seia.org.
11. Research by the convener and lead organization of the SV-REP and by WRI via their respective RFIs found that solar vendors estimated savings ex-ante of approximately 10 percent for bundles of 5 MW or more. In practice and via further discussions with developers, WRI found that 3 MW is a rough benchmark for the minimum bundle size that still captures some returns to scale, although they may not be as significant as for bundles of 5 MW or larger.
12. Request for Proposal (RFP), Non-Disclosure Agreement (NDA), and Draft Power Purchase Agreement (PPA) and/or Lease, if opting for those financing methods.
13. U.S. Department of Transportation (2008).
14. Levelized cost of Electricity (LCOE) is a measure of the average cost of electricity over the system's lifetime, generally expressed in cents per kWh.
15. Resources to consult for up-to-date solar project design and installation best practices and standards include the National Renewable Energy Lab (NREL), Interstate Renewable Energy Council (IREC), Solar America Board of Codes and Standards, SolarTech, and others. See links in the Web resources section of www.wri.org/buying-solar.
16. Based on analysis of submitted proposals to determine incremental impact of bundled pricing.
17. Based on analysis of the time and administrative costs spent by the lead organization and participants of the SV-REP as compared to another local (non-collaborative) project.
18. Later in 2008, a company called One Block Off the Grid was founded to try to apply it to the residential PV sector. To date, WRI is not aware of other commercial PV demand aggregation efforts and would welcome contact from others who have also used this concept.
19. This committee served a similar function to the steering committee described in the Roles and Responsibilities section of the guide. The committee provided very valuable technical counsel.
20. Participants included, but were not limited to, the companies listed here.
21. L. Sherwood (2010).
22. Based on a comparison of pricing received by WRI in TCSP versus pricing for individual projects in California as reported via the California Solar Initiative (CSI) Database. The capacity-weighted average installed cost per kW was calculated for solar PV systems in the database that received quotes in 2009 and compared to pricing quotes received in response to TCSP's RFP. To generate a data set from a comparable time period as TCSP, projects reported via the CSI were included in the dataset for comparison if they entered the queue for application review in 2009. Entering the queue is the proxy for having received pricing, because it is the earliest point at which pricing is required and reported.
23. K. Galbraith (2009).

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The World Resources Institute is an environmental think tank that goes beyond research to find practical ways to protect the earth and improve people's lives.

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Joint Venture: Silicon Valley Network is a nonprofit public-private partnership based in San Jose, California. Established in 1993, Joint Venture provides analysis and action on issues affecting our region's economy and quality of life. The organization brings together established and emerging leaders—from business, government, academia, labor, and the broader community—to spotlight issues and work toward innovative solutions.

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About Optony, Inc.

Optony is a global research and consulting firm focused on enabling government and commercial organizations to bridge the gap between solar energy goals and real-world results. Optony's core services offer a systematic approach to planning, implementing, and managing large-scale solar power systems, while simultaneously navigating the dramatic changes in the solar industry—from emerging technology choices to government incentive programs and private-public financing options. Leveraging our independence, domain expertise, and unique market position, clients are empowered to make informed decisions that deliver the greatest long-term return on their solar investments.

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