CITY OF NEWTON

IN BOARD OF ALDERMEN

PUBLIC FACILITIES COMMITTEE REPORT

WEDNESDAY, JULY 18, 2012

Present: Ald. Salvucci (Chairman), Lennon, Albright, Gentile, Crossley, Danberg, Laredo, and Lappin
Also present: Ald. Hess-Mahan
City officials present: Jay Babcock (Police Sergeant), Robert Rooney (Chief Operating Officer), Alan Mandl (Assistant City Solicitor), Maciej Konieczny (Project Manager, Public Buildings Department), Lou Taverna (City Engineer), David Turocy (Commissioner of Public Works), Ron Mahan (Superintendent of Equipment; Department of Public Works) and Fred Russell (Director of Utilities; Department of Public Works)

Chairman's Note: Stephanie Pollack, Chair, Transportation Advisory Committee (TAC) provided the Committee with the attached PowerPoint presentation of the recommendations of the Transportation Advisory Committee. The TAC was appointed in July 2011 and was comprised of Newton residents with a focus on transportation. The TAC's mission was to review the City's decision-making processes and policies related to transportation and make recommendations to improve those processes and policies.

The TAC concluded that the City needs a transportation system that works for all the citizens of Newton. There are different types of residents with different needs including people without cars, cyclists, children and seniors. The TAC recommended that the City adopt a "Complete Streets" Policy, which has the support of the Executive Department. A "Complete Streets" Policy addresses the needs of all street users including pedestrians and bicyclists. A "Complete Streets" Policy makes walking, biking and using the MBTA more attractive as the streets will be safer and easier to navigate. The attached handout provides specific details on "Complete Streets."

Ms. Pollack explained the use of traffic calming measures as part of the "Complete Streets" approach. There are a number of different traffic calming measures that could be used on a street. The City needs to determine which options work best on particular streets. There is a toolkit of different traffic calming measures to address different traffic and safety issues. These tools can be used to create a balance.

Ms. Pollack provided a brief overview of different traffic calming tools at the request of some of the Committee members. She is aware that there is some concern regarding raised devices such as crosswalks and speed humps due to the impact they may have on the response time of emergency vehicles. However, the raised devices could be modified to allow fire engines to continue through the device without slowing down or the City could install bump-outs that do not really require vehicles to slow down but provide the illusion that it is necessary. The roundabout is a small raised circle in the middle of an intersection, which is used to create a safer

intersection. Ms. Pollack will provide statistics on the use of roundabouts. She also pointed out that roundabouts need to be installed in the right place to be effective. The last tool overviewed was a road diet, which is used to describe the narrowing of vehicle travel lanes to build in accommodations for other users such as cyclists and pedestrians. A road diet has minimal impact on drivers.

There was concern regarding the addition of bicycle lanes to some streets. There are streets that are unsafe for bicyclists even with the addition of bike lanes. Ms. Pollack explained that not every road needs bike lanes but there do need to be good options for cyclists to traverse the City. The City needs to work to identify and find the best walking and biking routes to village centers and schools. The new Transportation Advisory Group (TAG) is working on a framework of principles and plans for a bike network plan and sidewalk plan. Committee members expressed some apprehension regarding loss of parking because of new bike lanes. Ms. Pollack explained that people like the idea of parking in front of their home but do not necessarily utilize it. The City needs to provide realistic alternative parking nearby to properties with bike lanes in front of the property. Residents are supportive when their visitors have a place to park.

It was pointed out that goals and recommendations of the TAC would be sellable to residents and commuters if people's driving experience were improved. Ms. Pollack stated that she believes that the City can achieve a win/win situation that improves safety for everyone that uses the streets and sidewalks. With that, the Committee thanked Ms. Pollack for her presentation.

Public Hearing

#197-12 HIS HONOR THE MAYOR requesting the Board of Aldermen authorize a long-term lease with the solar photovoltaic firm, Ameresco Solar Inc., to allow for the installation of solar panels on the rooftops of five (5) public schools: Newton North High School, Brown Middle School, Memorial-Spaulding Elementary School, Countryside Elementary School and Bowen Elementary School. [07/02/12 @ 5:03 PM]

ACTION: HEARING CONTINUED AND ITEM REFERRED TO FINANCE 8-0

NOTE: Chief Operating Officer Robert Rooney presented the request for authorization to enter into a twenty-year lease with Ameresco Solar, Inc. for the installation of solar panels on portions of the rooftops of five schools. Ameresco Solar, Inc. would install, operate, and maintain the solar panels over the lease period and the City would pay for the energy produced by Ameresco Solar, Inc. through a Power Purchase Agreement. The City would also receive net metering credits from NStar for the metered energy produced by the solar panels.

Net metering credits would be generated when the solar panels were installed and operational. Each of the schools would be connected to a meter that measures the amount of electricity generated and sent to the electric grid. NStar would credit the City the calculated value of the electricity sent to the electric grid.

The Administration began looking at the possibility of installing solar panels eighteen months ago by advertising for Requests for Qualifications, as stated in Chapter 25A of the Massachusetts General Laws. The City received responses and interviewed three prospective firms. The City entered into a memorandum of understanding with Ameresco Solar, Inc. in February 2012, as they demonstrated the ability to reach an agreement with the City and meet the City's goals. At this point, Ameresco conducted evaluations of the rooftops of the City buildings and selected five school buildings based on the amount of sunlight on the rooftops, the condition of the rooftop, and the structural capacity of the rooftops. The solar panels on the five rooftops are expected to generate a total of 879,121-kilowatt hours per year or 4% of the City's annual energy consumption. The installation of the solar panels are in keeping with the City's Energy Smart Initiative to reduce energy consumption, generate or allow generation of clean energy and pay less for energy.

Mr. Rooney pointed out the benefits of entering into a lease and Power Purchase Agreement (PPA) with Ameresco. The addition of the solar panels provides the City with a stable electric rate and should generate approximately $40,000 in savings in year one of the contract. The savings are generated through NStar's net metering credits for energy generated by the solar panels and the impact of those credits on the net electricity rate for those units of electricity. However, there is no guarantee that the electricity rate and net metering credit rate will remain the same in the outlying years of the lease and PPA; therefore, the savings could fluctuate from year to year. There is no upfront cost to the City and a small risk going forward, as all the equipment would be owned, operated and maintained by Ameresco. In addition, it is unlikely that the solar panels and associated equipment, with the possible exception of the connection to the electrical system, would require roof penetration.

Assistant City Solicitor Alan Mandl reviewed the recently adopted ordinance related to the lease of city-owned property for solar panels, which is attached. The new ordinance establishes procedures for the lease of the property to be used for the installation of solar panels. Per the ordinance, the Docket Item is a request for the Board to authorize the Mayor to enter into long-term site leases for solar panels, as part of an agreement in which the City would use or receive net metering credits for energy produced by the solar panels.

Mr. Mandl provided an overview of a Power Purchase Agreement (PPA), which would essentially be the contract between Ameresco and the City. It defines the terms related to the City's purchase of the electricity and the supplier's obligation to supply the agreed upon amount of electricity. The PPA includes guarantees and protections for the City that include protection of the City's roof warranties and provisions that allow the City to repair rooftops without penalty. In addition, there is a buyout option if the City wishes to purchase the solar panels at the end of the agreement and language that states that it is the Ameresco's responsibility to remove the solar panels at the end of the lease if the City chooses not to buy them.

The public hearing was opened and no one spoke for or against the petition. There was concern among Committee members that no one was present for the public hearing. Notice was sent to the abutters, as required by ordinance. It was pointed out that the Administration had

neglected to consult with Ward Aldermen and abutting property owners during the development of the proposal, as called for in the ordinance.

Jim Walker of Ameresco provided the attached PowerPoint presentation. He gave a brief overview of the company. Ameresco has a number of PPAs and leases with different cities in towns in Massachusetts for solar panels. The presentation continued with the construction steps for solar panel installation. The process begins with design and permitting, which includes a review by an independent structural engineer, who provides Ameresco with the appropriate locations for the solar panels on each rooftop. In addition, Ameresco contacts the roof manufacturer for each rooftop and requests a roof audit. The manufacturer provides Ameresco with list of conditions that must be met in order to continue with the roof warranty. Ameresco also does testing on wind and snow load and the location of the panels is determined by the newest structural codes related to both wind and snow. Ameresco involves the appropriate City departments like Inspectional Services and Planning in the construction process.

The presentation also included sketches of the likely locations of the solar panels on the five rooftops. Ameresco would work around each school's schedule to install the solar panels. The solar panels would not be visible from street level. The only piece of equipment at street level would be an inverter, which is used to convert of the solar panel into power that can be fed into the electrical grid. The inverters are noiseless. Ameresco would work with the schools to determine the best location for the inverter. The inverters could be screened and fenced.

Mr. Walker informed the Committee that Ameresco provides the schools with an educational program on the solar panels and power generated by the solar panels. The program has different topics, which have been developed for each grade level. The materials include online data and teacher topic summaries. The topics of the program follow the Massachusetts Learning Standards for Science and Technology/Engineering Frameworks. It was suggested that the business aspects of the solar project be added to the educational materials.

Several Aldermen felt that they needed further information including a copy of the draft lease and PPA before voting on the item. Committee members would like to know that the City has protections against early termination and bankruptcy. In addition, Committee members felt that although there was no request for funding, there were financial implications to leasing the rooftops. It was suggested that the item be referred to the Finance Committee for discussion of the financial aspects. Therefore Ald. Lappin moved to continue the public hearing and refer the item to the Finance Committee, which carried by a vote of eight in favor and none opposed.

Public Hearing

#198-12 NATIONAL GRID petitioning for a grant of location for a utility control box, regulator station and to install and maintain 128' ± of 12" and 8" gas main in AUSTIN STREET from the existing 8" gas main in Chestnut Street easterly to the proposed regulator station and from the proposed regulator station to the existing 8" gas main. (Ward 3) [06/19/12 @ 1:44 PM]

ACTION: APPROVED 8-0

NOTE: Dennis Regan, National Grid Permit Representative, presented the petition to abandon an obsolete regulator station located at the corner of Austin and Chestnut Streets and replace it with a new regulator station in Austin Street, associated gas mains, and an above ground utility control box.

The utility control box is necessary to allow for emergency remote operation of the regulator station. The utility control box will be installed in the sidewalk on Austin Street at location determined by the Commissioner of Public Works and a National Grid representative. National Grid will screen the utility control box and will work with the Ward Alderman on the location of the utility control box.

The public hearing was opened and no one spoke for or against the petition. The Department of Public Works has reviewed the petition and recommended approval with the standard street opening permit conditions. Ald. Crossley moved approval of the item, which carried unanimously.

Public Hearing

#199-12 NATIONAL GRID petitioning for a grant of location for a utility control box, regulator station and to install and maintain 78' ± of 8" gas main in WASHINGTON STREET at CHESTNUT STREET from the exiting 24" gas main easterly to the proposed regulator station and from the proposed regulator station to the existing 10" gas main. (Ward 3) [06/19/12 @ 1:44 PM]

ACTION: APPROVED 8-0

NOTE: Dennis Regan, National Grid Permit Representative, presented the petition to abandon an obsolete regulator station located at the corner of Watertown and Washington Streets and replace it with a new regulator station in the sidewalk in Washington Street at the corner of Chestnut Street, associated gas mains, and an above ground utility control box. A National Grid representative will work with the Commissioner of Public Works on the placement of the utility control box. In addition, National Grid will work with the Ward Alderman on possible screenings for the utility control box. The attached handout provides a picture of the utility control box and its dimensions.

The project is expected to take approximately one month to complete. Committee members expressed concern that the work would create traffic jams in West Newton Square. Mr. Regan explained that National Grid could install the new gas main connections at night to avoid the heaviest traffic times in the square. The installation of the regulator station should be done within a couple of days, as it is a prefabricated box. National Grid will also be using a large police detail to ensure that traffic flows around the project.

The Department of Public Works has reviewed the petition and recommended approval with the standard conditions including a police detail. The public hearing was opened and no one spoke for or against the petition. Ald. Danberg moved approval, which carried unanimously.

Public Hearing

#200-12 NATIONAL GRID petitioning for a grant of location for a utility control box, regulator station and to install and maintain 60' ± of 16", 12", and 8" gas main in BEACON STREET at WABAN AVENUE from the existing 16" gas main easterly, to the proposed regulator station and from the proposed regulator station to the existing 12" gas main. (Ward 5) [06/19/12 @ 1:44 PM]

ACTION: APPROVED WITH CONDITIONS 8-0

NOTE: National Grid Permit Representative Dennis Regan presented the petition to replace an obsolete regulator station in the traffic island at Beacon Street, Collins Road and Waban Avenue. The new regulator station will be located in the same location as the previous but will require new gas main connections and an above ground utility control box.

The new utility control box is shown on the plan as being installed in the island's sidewalk. Committee members would prefer that the utility box be installed in the grassy area of the island to improve passage on the sidewalk. Mr. Regan stated that National Grid is willing to work with the Public Works Department to place the utility control box in the grassy area and that the Community and Customer Management Manager Victor Santana will work with the Ward Alderman and the Commissioner of Public Works to screen the utility control box.

National Grid will also be sealing the existing 16" gas main in Beacon Street to stop any gas leaks. The public hearing was opened and no one spoke for or against the petition. The Department of Public Works has reviewed the petition and recommended approval. Ald. Crossley moved approval of the petition with conditions that National Grid reconsider the location of the utility control box and that the utility control box is screened.

REFERRED TO PUBLIC FACILITIES AND FINANCE COMMITTEES

#187-12 ALD. SALVUCCI AND GENTILE requesting discussion with the Administration regarding the contracts that the City has entered into pertaining to natural gas and electricity. [05-31-12 @11:02 AM]

ACTION: NO ACTION NECESSARY 8-0

NOTE: The Committee requested that Chief Operating Officer Robert Rooney describe the natural gas and electric contract and how the decision was made to enter into the contracts. Mr. Rooney explained that the natural gas contract was done through a broker. It is a four-year contract that was signed last year. Committee members asked the Chair of the Energy Commission, Eric Olsen, if the Commission had reviewed the contract. Mr. Olsen explained that the Commission does not advise on natural gas pricing; therefore, it did not look at the contract. Mr. Rooney suggested that the Committee discuss the natural gas contract with Chief Financial Officer Maureen Lemieux, as she was very familiar with the details of that contract.

Mr. Rooney provided an overview of the three-year energy contract. The Administration investigated various methods of procuring electricity and conducted interviews of different groups to figure out the best time to enter into the electricity market. After considerable research, the Administration decided to use a reverse auction for procuring electricity. The

reverse auction works by packaging electricity in different increments of green and brown electricity, which are then bid on by suppliers. After seeing the bid for the supply of 100% green electricity, the city opted to accept that bid. The bid saves the City money but the City could have saved additional money if it had opted to accept bids for less green energy packages.

Committee members asked why the City spent more money than necessary for electricity, as taxpayers are paying the bill for the electricity. When the new electricity contract was announced, it was not stated that there were less expensive options available to the City. Mr. Rooney explained that the City did save money with this contract over the previous contract. The choice to go with 100% green energy was a value judgment. In addition, the Administration feels that government should lead in terms of what community values are important.

Eric Olsen, Chair of the Energy Commission, stated that the City has established a City policy to look at using renewable energy when there are opportunities. The City's Energy Action Plan speaks to seizing opportunities to purchase renewable energy. The electricity contract was a feasible opportunity to meet the goals of the Energy Action Plan. By facilitating the purchase of green energy, the City is improving the environment. James Purdy of the Energy Commission added that the City's contract for 100% green energy is a progressive step towards a cleaner atmosphere.

By committing to purchase Renewable Energy Certificates (RECs) that equal the City's demand for electricity, the City is increasing the demand for renewable energy. If there is a larger demand for green energy, it will need to be supplied thereby encouraging the production of environmentally friendly energy. Committee members asked how the City is sure that it is purchasing 100% green electricity. Mr. Rooney explained that it is certified by a third-party non-profit company.

The Committee members understood the reasoning for entering into the contract for 100% green electricity and felt that the Finance Committee could address the natural gas contract during its discussion on the contracts. Therefore, Ald. Danberg moved the item no action necessary, which carried unanimously.

Please note there is additional information attached from the U.S. Department of Energy that provides further detail on the purchase of green energy.

REFERRED TO PUBLIC FACILITIES AND FINANCE COMMITTEES

#106-12 HIS HONOR THE MAYOR requesting authorization to appropriate the sum of one hundred sixty thousand dollars ($160,000) from bonded indebtedness for the purpose of purchasing a street sweeper. [04-09-12 @ 3:39]

ACTION: APPROVED AS AMENDED 8-0 @ $172,000

NOTE: Public Works Commissioner David Turocy and Superintendent of Equipment Ron Mahan presented the request for funding to purchase a new street sweeper. The request for the sweeper is part of the Fiscal Year 2013 Capital Improvement Plan. The new sweeper will replace a 1999 sweeper that has been taken out of service. The street sweepers have a life span of

approximately eight years due to the environment in which they operate and when one fails, it is used for spare parts.

The Public Works Department needs at least six street sweepers to meet their goal of sweeping all streets four times a year and sweeping village centers and parking lots once a week. With one of the sweepers out of service, there are six functional sweepers available for street sweeping. Street sweepers are a high-maintenance machine, which means that one machine is generally being serviced on any given day. The Department of Public Works requires seven sweepers in order to keep six out on the streets.

Mr. Mahan requested that the docket item be amended, as the estimate of $160,000 did not include the purchase of necessary spare tires and equipment. The total purchase price with the related equipment is $172,000. Ald. Lappin moved approval of the item as amended, which carried unanimously.

#172-11 ALD. CROSSLEY, FULLER AND SCHNIPPER requesting discussion with the Utilities Division of the Public Works Department regarding the identification of storm water inflow connections to the sewer system, so as to begin the process of systematically eliminating such illegal connections, including notifications to property owners, educational materials, requirements for corrective actions and technical and financial assistance that may be available from the City in order to facilitate removal of inflow connections. [05/26/11 @3:33 PM]

ACTION: HELD 8-0

NOTE: Utilities Director Fred Russell provided an update on the City's goal of removing illegal sewer connections from private properties. The Committee last discussed the item on January 18, 2012 but there was an informal update on the program on June 6, 2012, as part of the discussion on the Underground Infrastructure Strategic Improvement Plan. Mr. Russell provided the Committee with the attached update on the Private Source Removal Program.

During the meter replacement project, 669 illegal sump pumps were identified. Sixty-seven notification letters were sent to properties owners with illegal sump pumps over the past year. The letter stated that the property owner had a year to address the removal of the illegal connection. Mr. Russell has had contact with the 54 property owners to educate them on their options to deal with the illegal connections. Twenty-six illegal connections have been removed at this point. A second letter was recently sent out to the property owners, who did not respond to the first letter.

Mr. Russell continues to work with property owners with illegal sump pumps to find the most feasible and economical way to address the illegal connection. The City's Environmental Engineer is also working with Mr. Russell to follow up with the property owners. Mr. Russell hopes to address all the illegal connections over the next couple of years. The Utilities Division of Public Works also recently sent notification letters to 42 properties with illegal driveway drains or roof leaders and will begin to work with those property owners to address those illegal

connections. Mr. Russell would like to confer with all of the property owners who have received letters from the Utilities Division before sending out the next set of letters.

Committee members inquired if there were any fines associated with the illegal connections. Mr. Russell responded that there are provisions within the ordinances that allow a per day fine of $300 until the illegal connection is removed. However, the City has not reached the point where fines are being considered. However, if the property owners do not address the illegal connection, the City may need to levy fines, as an incentive to remove the illegal connection. With that, Ald. Danberg moved hold for future updates on the program, which carried unanimously.

All other items before the Committee were held without discussion.

Respectfully submitted,

Anthony J. Salvucci, Chairman

Moving Forward with the Recommendations of the Newton Transportation Advisory Committee

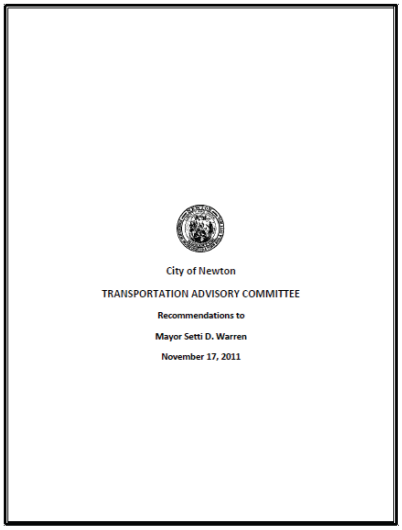
Briefing for the Public Safety and Transportation Committee

June 20, 2012

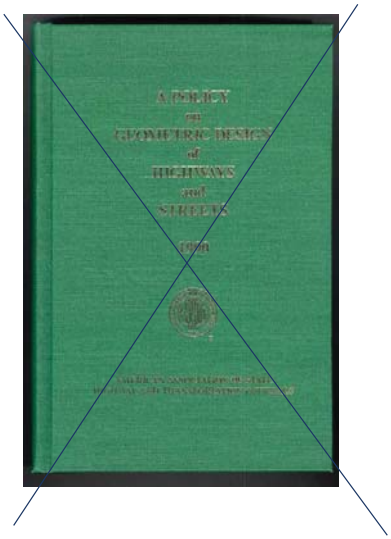
Stephanie Pollack
Chair,
Transportation Advisory Committee

Newton Transportation Advisory Committee

- Appointed by Mayor Setti D. Warren in July in order to undertake a wide-ranging review of transportation issues in Newton
- Diverse group of residents, including some already active on transportation issues and others who were not
  - With strong support from staff of key City departments
- Charged to "examine all transportation decisionmaking, policy, planning and investments and craft recommendations for making changes both small and large"


City of Newton
TRANSPORTATION ADVISORY COMMITTEE
Recommendations to
Mayor Setti D. Warren
November 17, 2011

Context for TAC



Context for the TAC

- Comprehensive Plan
  - And other planning efforts
- Many types of residents, many different needs
  - *Not* different types of users or "modes"
  - 22% of residents under 18, 15% over 65
- Newton as both city and suburb
  - Density of 4,700+ persons/square mile
  - But "walk score" of 60

Walk Score®
Drive less. Live more.™

Arlington	67
Boston	79
Brookline	83
Cambridge	89
Marblehead	54
Needham	46
Newton	**60**
Quincy	62
Somerville	84
Worcester	60

Four kinds of recommendations

An overarching set of citywide transportation **goals** to guide the decision-making of all city departments and staff whenever they are making transportation, planning, land use or other decisions that may affect the City's transportation system;

Creation of a **new system of coordinating and implementing transportation decisionmaking** including a permanent Transportation Advisory Group, bicycle and pedestrian coordinators and the eventual evolution of the new interdepartmental Transportation Team and Transportation Division in the Department of Public Works into a true Transportation Department;

A series of executive orders and planning efforts, issued according to specific timetables, to create a new **transportation policy and planning framework** for Newton, including a Complete Streets policy, bicycle master plan, urban fabric master plan and parking management plan; and

A host of **specific recommendations**, large and small, on issues ranging from safety to urban fabric and address the needs of youth, seniors and everyone in between – everyone who travels in Newton whether they drive, use transit, walk or bike.

Citywide Transportation Goals

1. Real Options: Newton's transportation system will provide Newton residents and visitors with a variety of options for getting to work, school, shopping, recreation and other destinations. Newton's transportation system will provide real options for everyone, including those too young or too old to drive, those having disabilities that preclude or limit driving and those who choose not to drive for budgetary, health or environmental reasons.

2. Quality of Life: Newton's transportation system and policies will support and advance a broader vision for the Newton that we all want to live in, maintaining the quality of life in our neighborhoods and village centers and reducing the negative impacts of traffic and congestion on those neighborhoods and village centers.

3. Reducing Driving and Strengthening Alternatives: Transportation policies, investments and decision-making will focus on reducing motor vehicle travel, particularly cut-through traffic and solo driving. While driving will remain an important option for many trips, the City will work to strengthen alternatives including walking, biking, and public transportation and to capture more of the costs of motor vehicle travel from those who drive.

Citywide Transportation Goals

4. Safety: Safe travel will be a top priority and transportation policies, investments and enforcement strategies will be based on the principle of "safety first" so that everyone (from children to seniors and including pedestrians, bicyclists and scooter riders) feels safe and so that motorists, bicyclists and pedestrians alike practice safe travel behavior.

5. Balance: Transportation policies, investments and decision-making will be designed to address and improve performance across all modes of travel and balance the needs of all users of the transportation system (including drivers, pedestrians and bicyclists) rather than focusing solely on a single transportation mode or element of the problem (for example, traffic congestion).

6. Smart Growth: Creating real transportation choices and reducing driving will require changes to Newton's development patterns and therefore all transportation, planning and land use decisions will support walkable, mixed-use and higher density development (particularly where transit is orwill be available) in order to enable more walking, biking and use of public transportation.

7. Consistency: Transportation policies, investments and decision-making will also be consistent with and support the City of Newton's goals and policies with respect to reducing greenhouse gas emissions and promoting healthy lifestyles for all residents.

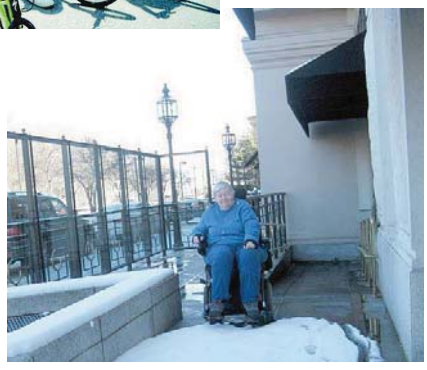
Governance and policy-setting

"Many transportation and land use decisions in Newton are made on a case-by-case basis rather than pursuant to overarching policies designed to guide decisions with respect to specific projects. Even when policies have been put in place, many are informal, without public input into their development and sometimes not even reduced to writing. In order to implement the Transportation Goals recommended by the TAC and achieve more consistent and progressive transportation policies and projects, the City of Newton should seek to develop a set of written policies to guide decision making on specific projects by the Planning and Development, Public Works and School departments as well as by the Traffic Council."

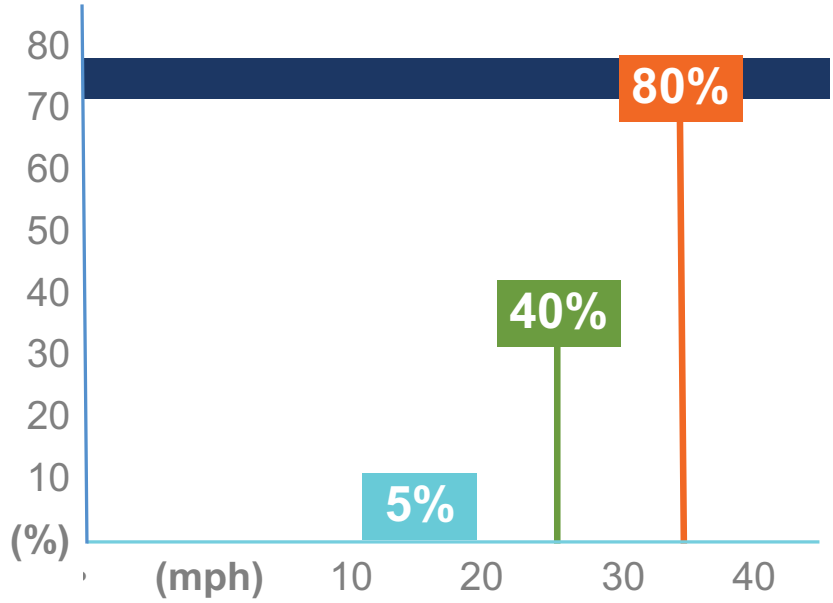
Recommendations crafted by subcommittees

- Safety
- Transportation Planning and Complete Streets
  - Bicycle Accomodations
  - Transit
- Parking
- Urban Fabric
- Youth and Senior Travel
- Outreach and Engagement

What are complete streets?



Complete streets are about safety

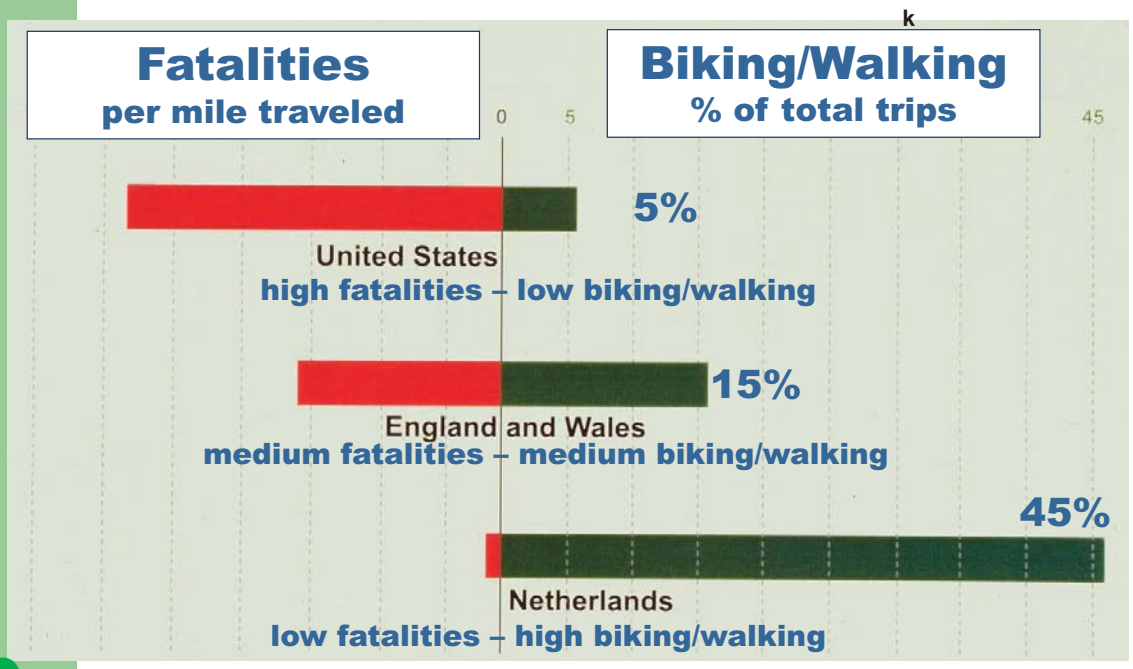


Source: Pasanen (1992) http://tinyurl.com/yuohsg

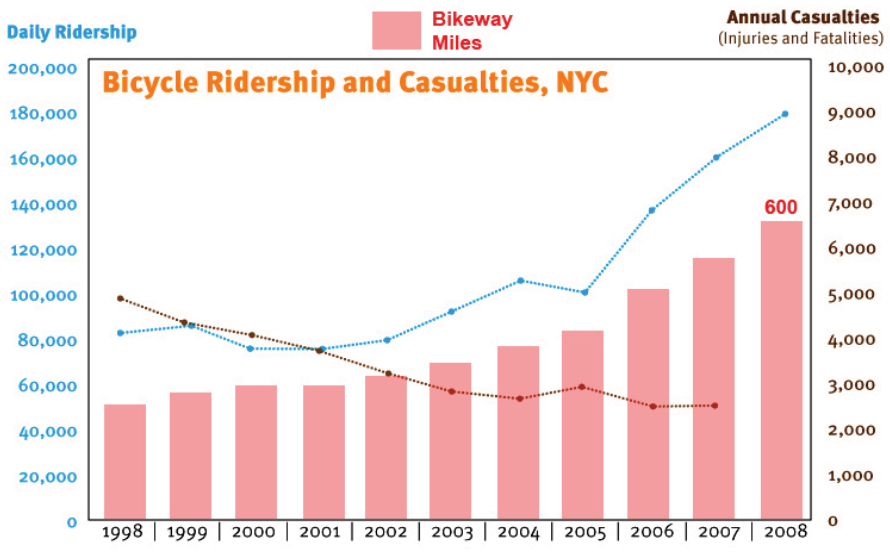
Complete Streets are about economic vitality for commercial centers

Complete streets are about community

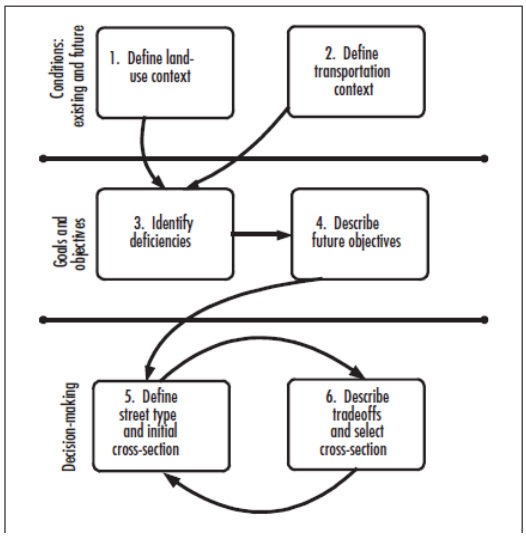
Safety in numbers



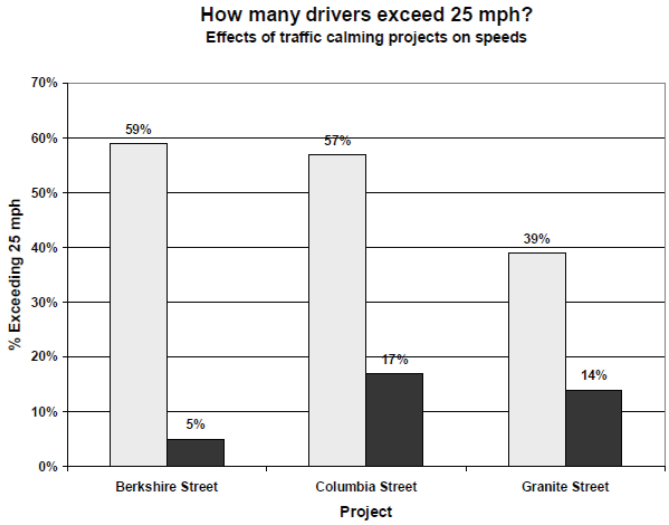
Safety in numbers



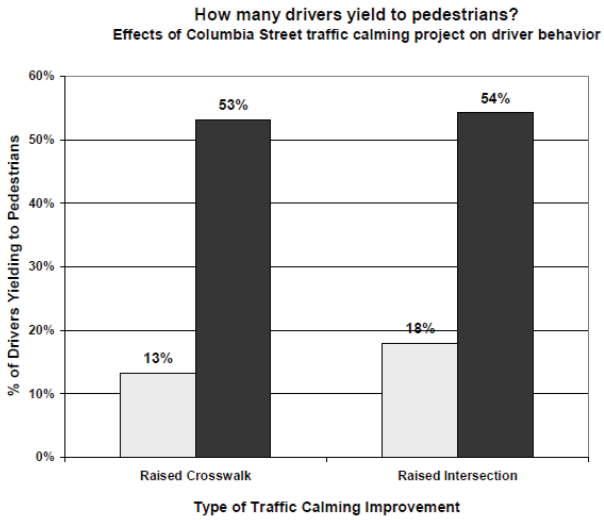
Complete Streets is a process, not just a result



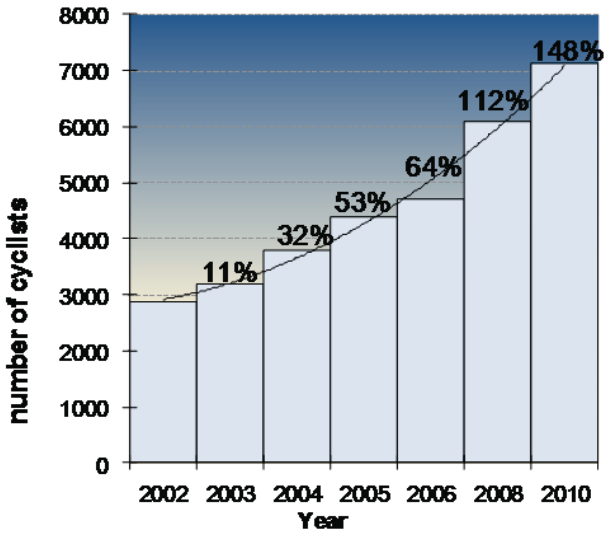
Traffic calming works



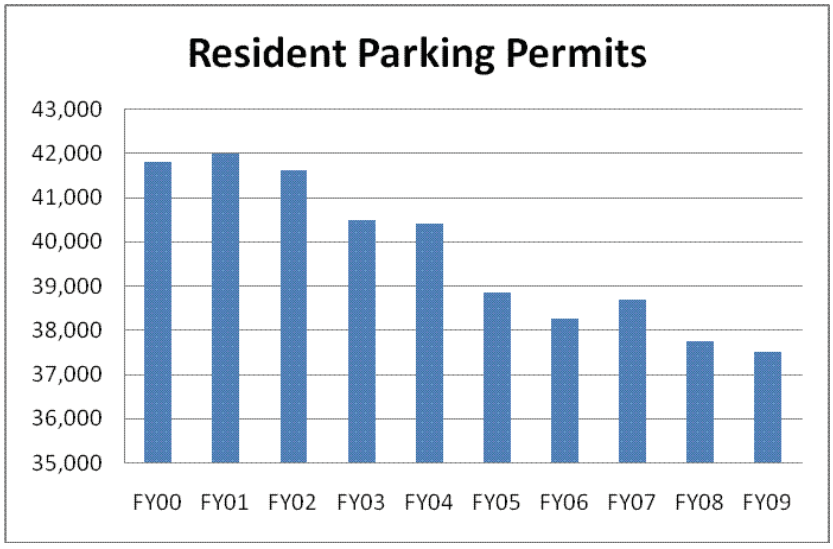
Traffic calming works



Policy change works: Cambridge bicycle trips more than doubled



Policy works: Driving is declining in Cambridge



What are "Complete Streets" and Complete Streets policies?

Complete Streets are streets for everyone. They are designed and operated to enable safe access for all users. Pedestrians, bicyclists, motorists and transit riders of all ages and abilities must be able to safely move along and across a complete street. Complete Streets make it easy to cross the street, walk to shops, and bicycle to work. They make it safe for people to walk to and from train stations.

By adopting a Complete Streets policy, Newton directs transportation planners and engineers to **routinely design and operate the entire right of way to enable safe access for all users**, regardless of age, ability, or mode of transportation. This means that every transportation project will make the street network better and safer for drivers, transit users, pedestrians, and bicyclists – making your city a better place to live.

What does a "complete street" look like?

There is no singular design prescription for Complete Streets; each one is unique and responds to its community context. A complete street may include: sidewalks, bike lanes (or wide paved shoulders), special bus lanes, comfortable and accessible public transportation stops, frequent and safe crossing opportunities, median islands, accessible pedestrian signals, curb extensions, narrower travel lanes, roundabouts, and more.

Complete main street in a Boston suburb

Why has Newton adopted Complete Streets policies?

Incomplete streets – those designed with only cars in mind – limit transportation choices by making walking, bicycling, and taking public transportation dangerous, inconvenient and unattractive. Newton's Complete Streets policies mean that walking, riding bikes, and riding buses and trains will be safer and easier. People of all ages and abilities will have more travel options.

Complete Streets are particularly prudent when more communities are tightening their budgets and looking to ensure long-term benefits from investments. An existing transportation budget can incorporate Complete Streets projects with little to no additional funding, accomplished through re-prioritizing projects and allocating funds to projects that improve overall mobility. Many of the ways to create more complete roadways are low cost, fast to implement, and high impact.

Where are complete streets being built?

MassDOT has adopted Complete Streets as the guiding principal behind its award-winning Design Guidelines, which are regularly cited as a national model. Communities such as Northhampton, Cambridge and Boston have also adopted Complete Streets policies. Among the other places with some form of complete streets policy are the states of Oregon, California, Illinois, North Carolina, Minnesota, Connecticut, and Florida.

What are some of the benefits of Complete Streets?

Complete streets can offer many benefits:

1. *Improved safety.* A Federal Highways Administration safety review found that streets designed with sidewalks, raised medians, better bus stop placement, traffic-calming measures, and treatments for disabled travelers improve pedestrian safety. Some features, such as medians, improve safety for all users: they enable pedestrians to cross busy roads in two stages, reduce left-turning motorist crashes to zero, and improve bicycle safety.
2. *More walking and bicycling for health*. The Centers for Disease Control and Prevention recently named adoption of Complete Streets policies as a recommended strategy to prevent obesity. One study found that 43% of people with safe places to walk within 10 minutes of home met recommended activity levels; among individuals without safe place to walk, just 27% were active enough.
3. *Lower transportation costs.* Americans spent an average of 18 cents of every dollar on transportation, with the poorest fifth of families spending more than double that figure
4. *Strengthen communities.* Complete Streets play an important role in livable communities, where all people – regardless of age, ability or mode of transportation – feel safe and welcome on the roadways.

Commonwealth Avenue, Boston, Before & After Complete Streets

CITY OF NEWTON

IN BOARD OF ALDERMEN

ORDINANCE NO. Z-106

April 2, 2012

BE IT ORDAINED BY THE BOARD OF ALDERMEN
OF THE CITY OF NEWTON AS FOLLOWS:

That the Revised Ordinances of Newton, Massachusetts, 2007, as amended, be and are hereby further amended with respect to **Section 2-7 Sale or lease of city owned real property.**, as follows:

1. In the first paragraph of Section 2-7 insert after the last sentence the following:

   Notwithstanding the foregoing, this section shall not apply to the lease of city owned real property for solar panels; provided, however, that in the case of such a lease the procedures outlined in subsection (9) of this section shall apply.

2. Re-number existing subsections (9) and (10) to (10) and (11), respectively.

3. Insert a new subsection (9) as follows:

   (9) In any instance where the lease of city owned property for solar panels is part of an arrangement under which the city uses power produced by the solar panels and/or receives net metering credits pursuant to state law, the following procedures shall apply:

   a) The executive department shall submit a proposal for such lease to the board of aldermen for approval. Such proposal shall indicate the location of the city owned property for which a lease is sought and such other information as may be available regarding the likely types of solar panels and related equipment that may be placed at the site. In preparing the proposal, the executive department shall consult with such city departments, aldermen for the ward involved and abutting property owners as the executive department may consider appropriate, taking into account the procurement requirements applicable under the General Laws.

   b) At the earliest opportunity, the board of aldermen shall, for purposes of this section, assign the proposal for public hearing before its committee dealing with matters of public buildings and/or other city owned real property and this committee shall hold a public hearing. Due notice of such public hearing shall be given to the abutters of the city owned real property which is proposed for lease and to the abutters of such abutters. Said notice shall include the location of the property proposed for lease for

solar panels and related equipment and, if available, a description as to the likely types of solar panels and related equipment that may be placed at the site. The committee shall deliberate and, if recommending approval, may affix such restrictions and conditions to the lease terms, other than financial conditions, as it deems in the public interest. The committee shall make a recommendation to the board of aldermen within forty-five (45) days following the public hearing as to whether the proposed lease is in the public interest.

c) Within sixty (60) days of receipt of the committee report, the board of aldermen shall vote as to whether to authorize the mayor to lease such city owned property for solar panels and related equipment. If the vote is in the affirmative, then the mayor may proceed on such terms and conditions as determined by the mayor to be in the public interest. If the vote is in the negative, then the mayor shall not lease such property for solar panels and related equipment, provided, however, that nothing herein shall preclude the board from authorizing the mayor to lease such property pursuant to a subsequent request to lease such property.

d) The requirement of notice and public hearing under subsection (9)(b) may be waived by a three-fourths vote of those members of the board of aldermen present and voting.

Approved as to legal form and character:

DONNALYN B. LYNCH KAHN
City Solicitor

Under Suspension of Rules
Readings Waived and Adopted
24 yeas 0 nays

(SGD) DAVID A. OLSON
City Clerk

(SGD) SETTI D. WARREN
Mayor

4/13/12

Ameresco

Solar PV for the City of Newton, MA

770 kW, Waltham HS, Massachusetts

884 kW, Arizona Garage

210 kW, Hill AFB, Utah

2 MW, Arizona State University

AMERESCO
Green • Clean • Sustainable

Topics

1. **Ameresco**
2. Construction Steps
3. Solar PV Projects for Newton
4. Project Financials
5. Discussion

ameresco.com

AMERESCO
Green • Clean • Sustainable

Ameresco: Company Overview

62 offices in **34 states** and **5 provinces**

- Leading *independent* energy efficiency and renewable energy company throughout North America
- **2000**: year incorporated
- **2010**: year went public on NYSE
- **$728.2 million:** 2011 Revenue
- **$3 Billion:** constructed projects
- **900+:** employees
- Corporate Headquarters in Framingham, MA

ameresco.com

AMERESCO
Green • Clean • Sustainable

Ameresco: Award-Winning Expertise

2012 EXCELLENCE IN RENEWABLE ENERGY awards WINNER

U.S. DEPARTMENT OF EDUCATION
GreenRibbonSchools

AWARD • 2012
Ranked #33 on Area's 50 Fastest Growing Companies List
AMERESCO, INC.
Boston Business Journal

Ameresco
Area's Fastest-Growing Public Companies
Boston Business Journal - May 2012

Forbes 2011 BEST SMALL COMPANIES

AWARD • 2012
Ranked #49 on Top 150 Public Companies in Massachusetts
AMERESCO, INC.
Boston Business Journal

Worcester Business Journal

Climate Change Business Journal Business Achievement Award, Growth 2010 Silver Medal

THE GLOBE 100
THE BEST OF MASSACHUSETTS BUSINESS 2012

ameresco.com

AMERESCO
Green • Clean • Sustainable

Ameresco: Building Solar PV on Schools in MA

Newburyport, MA: 502 kW
2 Schools and DPW Bldg.

Waltham, MA: 1,931 kW
6 Schools and Muni Center.

Fall River, MA: 576 kW
3 Schools and Water Treatment

Lowell, MA: 348 kW
4 Schools and LMA

Natick, MA: 1,058 kW
5 Schools and Senior Center.

Milton Academy: 192 kW
Student Activity Center

ameresco.com

5

AMERESCO
Green • Clean • Sustainable

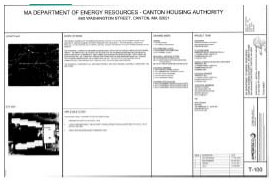
Topics

1. Ameresco
2. **Construction Steps**
3. Solar PV Projects for Newton
4. Project Financials
5. Discussion

ameresco.com

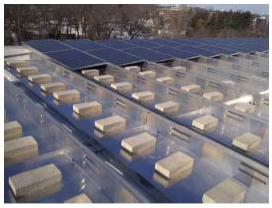
AMERESCO
Green • Clean • Sustainable

Construction Steps



Design & Permitting

Mobilization & Crane Ops



Ballast Layout

Panel Assembly & Wiring

Inverter Installation

Commissioning & Witness Test

Additional Structural and Roof Warranty Approvals

CARLISLE

To: Building Owner

Re: Letter of Compliance – Photovoltaic Installation on Carlisle Warranted Roof

This memo outlines Carlisle's recommendations concerning the installation of Photovoltaic (PV) systems over a Carlisle warranted roofing system in order to facilitate the installation of the PV system with limited disturbance to the Carlisle roofing system. The determination of the most suitable PV technology, racking and installation method is the responsibility of the Building Owner or its designated representative. Listed below are the recommendations along with conditions that may impact the Carlisle warranty.

Please note that this list is not an exhaustive one:

1. Determine the building's structural ability to withstand the PV system.
2. The roofing system should be protected during installation of the PV system to prevent damage. This includes the staging and assembly areas and other areas heavily traveled.
3. To avoid PV system removal costs to the building owner, the PV system should provide adequate clearance for access to the roof membrane should maintenance or repair be required.
4. Field seams that may be concealed by the PV system, and therefore harder to access, should be overlaid by a Carlisle authorized roofing applicator using approved details and products.
5. For non-penetrating PV racking systems, a protection course consisting of Carlisle's Pressure-Sensitive Molded Walkway Pads is recommended between the PV support system and the roofing membrane. Walkway pads of thickness and density equal or greater to those which can be provided by Carlisle SynTec may be used to prevent damage to the roofing membrane.
6. PV laminates must not be adhered directly to the Carlisle primary membrane. A compatible Carlisle membrane shall be used as a slip sheet and spliced to existing membrane.
7. Racking systems that require penetration of the roofing membrane must be flashed in accordance with the appropriate Carlisle published detail. All flashing details must be performed by a Carlisle authorized roofing applicator.

It is recommended that areas frequently accessed for the purpose of operation or maintenance of the PV system be protected by walkways installed in accordance with the Carlisle published specifications and details. Should Carlisle be contacted to investigate a warranty claim, or to make warranty related repairs, providing access to the membrane (removal and replacement of the PV System) is the responsibility of the Building Owner.

The following table lists the roofing inspections during the PV system installation to ensure continuation of the Carlisle warranty. Upon completion of the roof alteration, an inspection must be scheduled and performed by a Carlisle Field Services Representative.

STRUCTURAL FINAL AFFIDAVIT

To the Commissioner, Town of Canton, MA.,

I certify that I, or my authorized representative, have inspected the work associated with Permit No. B-11-729, issued November 22, 2011, located at 660 Washington Street on the dates used below or on at least One (1) occasions during construction, and that to the best of my knowledge, information, and belief the work has been done in conformance with the permit and plans approved by the Inspected Services Department and with the provisions of the Massachusetts State Building Code, 780 CMR and all other applicable laws, regulations, statutes, and ordinances.

- Ballast weight agrees with design
- Attached system installed per design

Wayne R. Lawson, P.E., SECB 35102
ENGINEER – MASS REG. NO.

CBI Consulting Inc.
COMPANY

250 Dorchester Avenue, Boston, MA 02127
ADDRESS

(617) 268-8977
PHONE

Inspection Dates:
December 13, 2011

Then personally appeared the above-named WAYNE R. LAWSON and made oath that the above statement by him is true.

Before me

My Commission expires 12-24-20 15

Topics

1. Ameresco
2. Construction Steps
3. **Solar PV Projects for Newton**
4. Project Financials
5. Discussion

ameresco.com

AMERESCO
Green • Clean • Sustainable

Project Summary

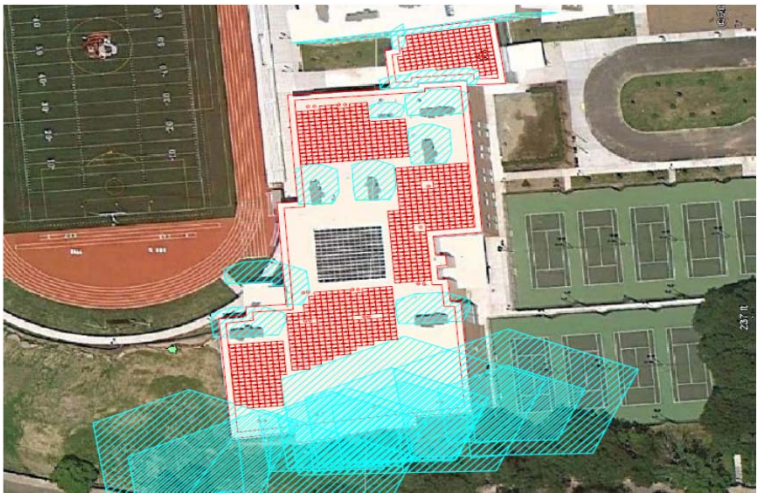
Site	kW	kWh (Year 1)
Newton North High School	262	300,600
Brown Middle School	262	309,250
Memorial Spaulding Elementary School	112	132,425
Countryside Elementary School	66	78,300
Bowen Elementary School	50	60,175
TOTAL	752	880,750

ameresco.com

10

AMERESCO
Green • Clean • Sustainable

Newton North High School (262 kW)

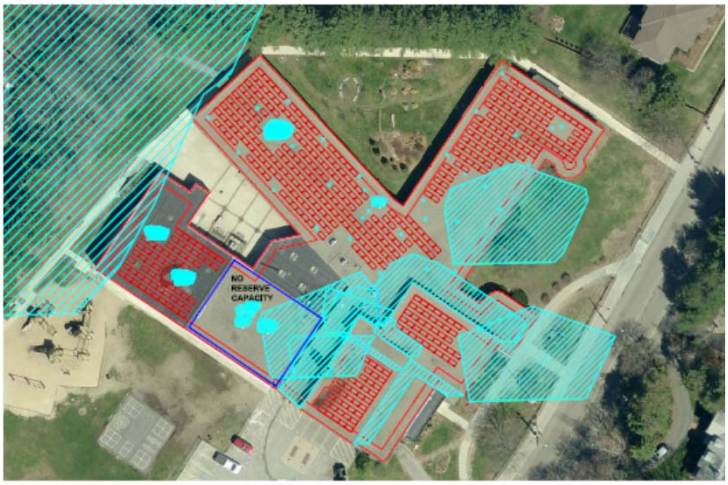


AMERESCO Green • Clean • Sustainable

Brown Middle School (262 kW)

AMERESCO Green • Clean • Sustainable

Memorial Spaulding Elementary School (112 kW)

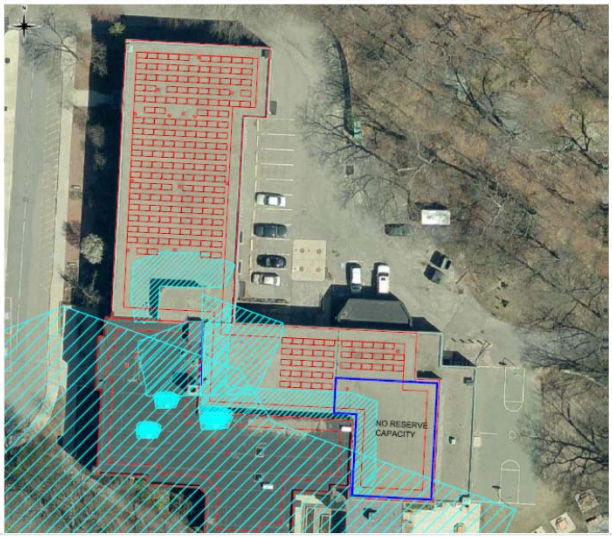


AMERESCO
Green • Clean • Sustainable

Countryside Elementary School (66 kW)

AMERESCO
Green • Clean • Sustainable

Bowen Elementary School (50 kW)



AMERESCO
Green • Clean • Sustainable

Educational Program: Online Data & Teacher Curriculum

- 15 Solar PV Topics for K-12:
  - Renewable energy fundamentals
  - Solar PV design considerations
  - Data analysis
- Teacher topic summaries
- Topics matched with MA Learning Standards for Science and Technology/Engineering Frameworks
- Curricula accessible online

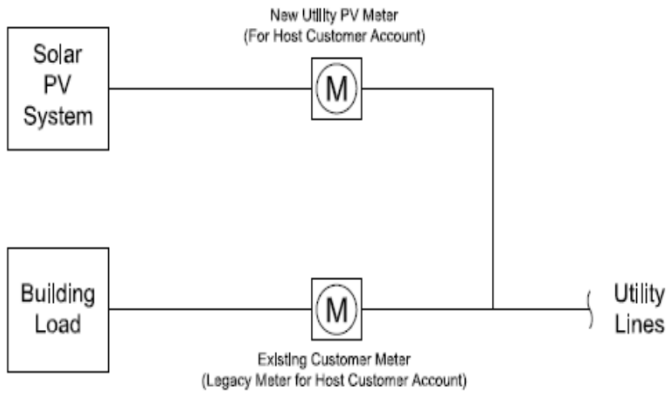
Middle school students showing solar panel to Mayor William A. Flanagan of Fall River

AMERESCO
Green • Clean • Sustainable

Topics

1. Ameresco
2. Construction Process
3. Solar PV Projects for Newton
4. **Project Financials**
5. Discussion

Net Metering Provides Additional Energy Savings



Connecting Solar PV Behind New Customer Meter

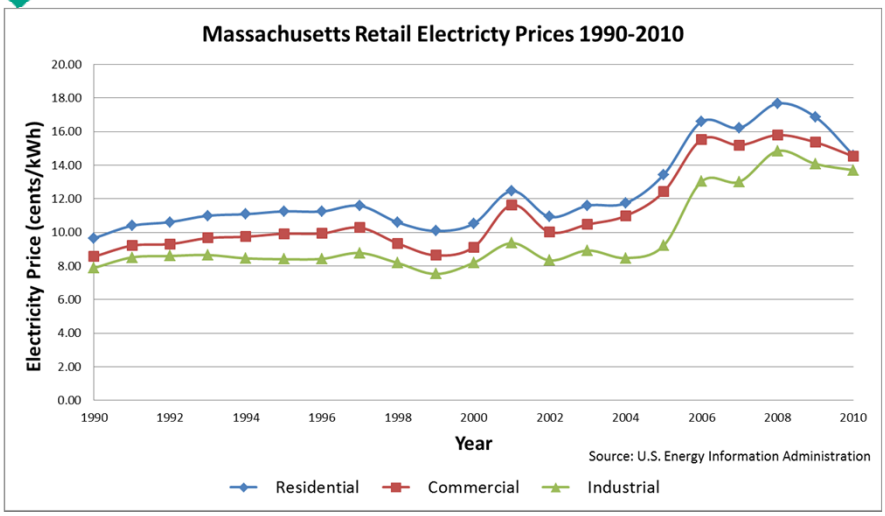
Solar PV Energy Savings

NSTAR Plus Supply Rate	$	0.101
Plus Ameresco PPA Price (Year 1)*	$	0.110
Total Rate Payments	$	0.211
Less: Net Metering Credit	$	0.153
Net Electricity Rate ($/kWh)	$	0.058
Electricity Rate Savings	$	0.043

* 2.5% annual price escalator

AMERESCO Green • Clean • Sustainable

Retail Utility Rates Have Trended Up, But Also Unpredictable

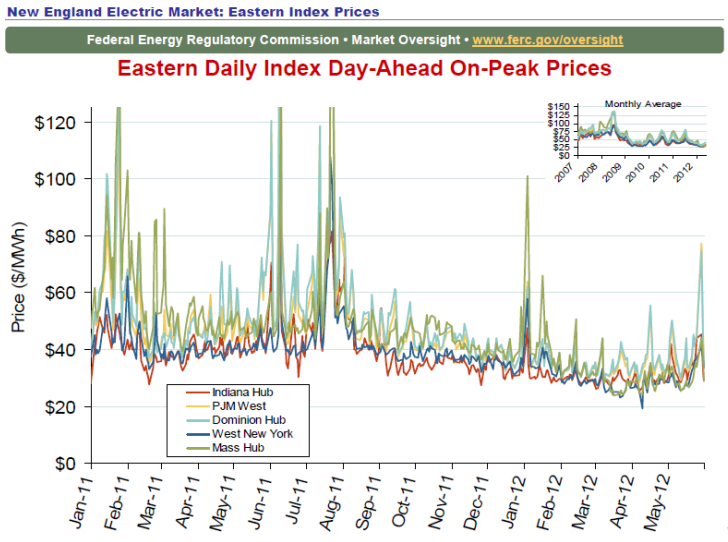


AMERESCO Green • Clean • Sustainable

Discussion

AMERESCO
Green • Clean • Sustainable

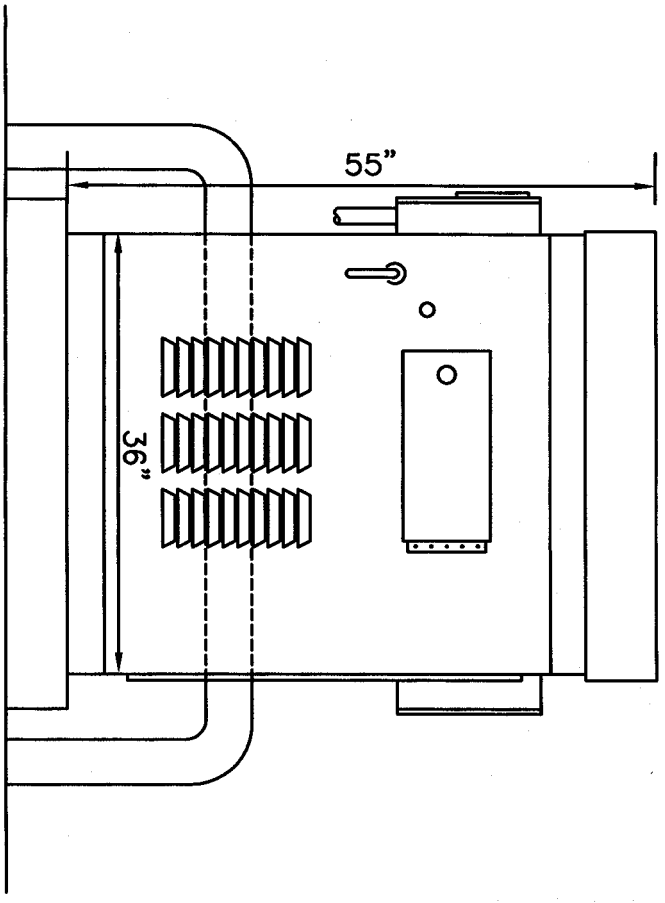
Wholesale Electricity Prices Are Volatile



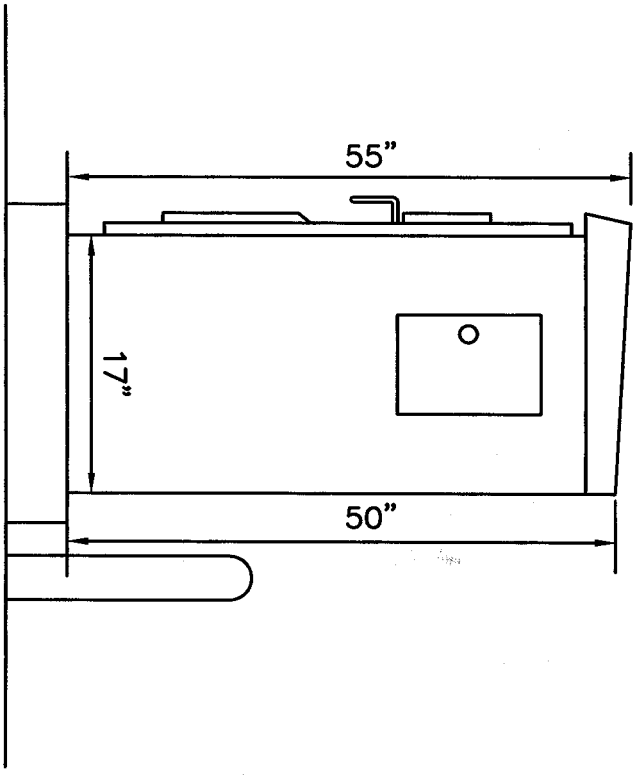
AMERESCO
Green • Clean • Sustainable

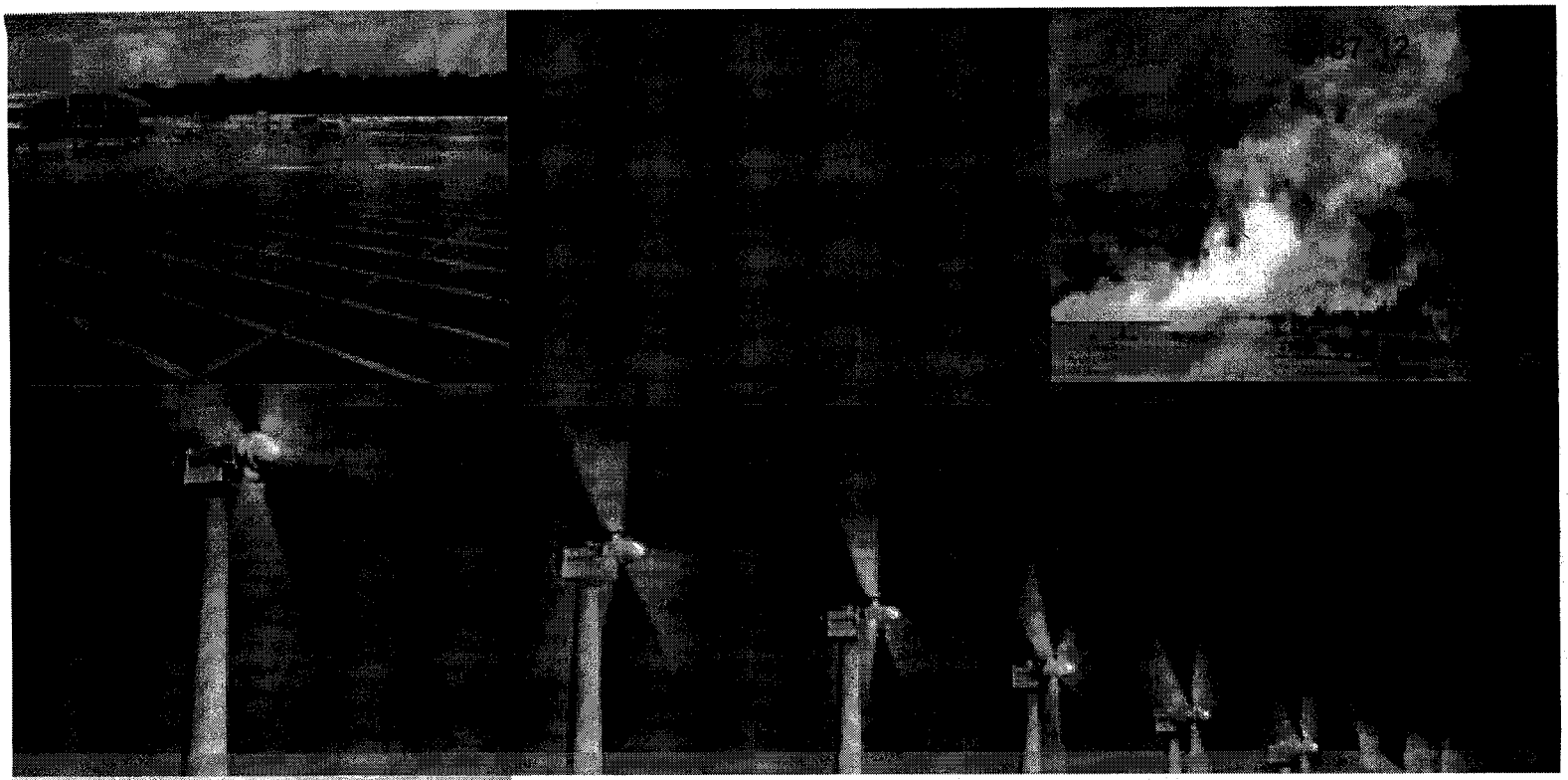
#198-12

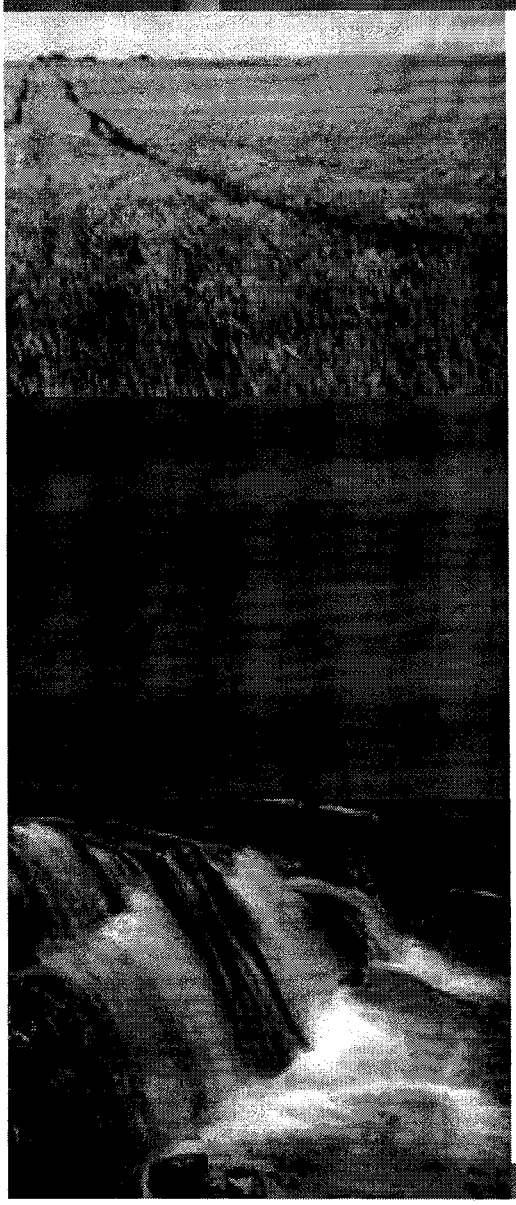
FRONT



SIDE







Guide to Purchasing Green Power

Renewable Electricity, Renewable Energy Certificates, and On-Site Renewable Generation

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

EPA GREEN POWER PARTNERSHIP

WORLD RESOURCES INSTITUTE

CRS center for resource solutions

DOE/EE-0307

Table of Contents

Chapter 1
Introduction

Today, the energy sources used to create electricity differ in many ways, including in their environmental impacts. In the United States, electricity is most often generated using fossil or nuclear fuels—forms of power generation that can have detrimental effects on human health and the environment through air emissions and other problems. Despite advances in pollution controls over the last 30 years, this conventional power generation is still the nation's single largest source of industrial air pollution and is a major contributor to greenhouse gas emissions.

Electricity markets now offer cleaner ways of producing power, however, and give many consumers the ability to choose how their power is generated. One of these choices is power from renewable sources, or "green power."

In some parts of the United States, consumers can buy green power from the provider of their electricity. All consumers can buy green power in the form of renewable energy certificates (RECs), which are available nationally regardless of whether a customer's local electricity provider offers a green power product.

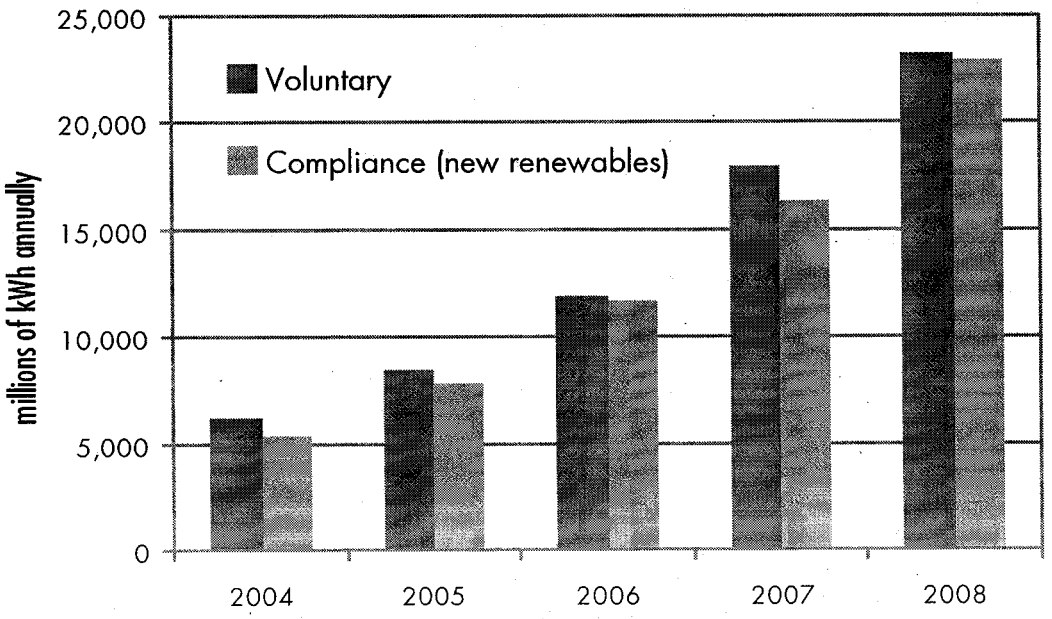
While no form of electric power generation is completely benign, electricity generated from renewable resources such as solar, wind, geothermal, small and low-impact hydropower, and biomass has proved to be environmentally preferable to electricity generated from conventional sources such as coal, oil, natural gas, and nuclear. This *Guide to Purchasing Green Power* focuses on electricity generated from renewable resources, both delivered through the grid and generated on-site. Although renewable energy can also be used for heating needs or for transportation fuels, this guide does not address those applications.

According to the U.S. Environmental Protection Agency (EPA), on average, replacing each kilowatt-hour (kWh) of traditional power with renewable power avoids the emission of more than one pound of carbon dioxide. Because of the sheer quantities of electricity involved nationwide, consumers have enormous influence to reduce environmental impacts from conventional power generation. If the typical commercial building switched to 100 percent renewable electricity, the use of green power would have the equivalent environmental impact of avoiding the carbon dioxide emissions of nearly 28 vehicles each year.

A wide range of organizations purchase green power, including: federal, state, and local governments; universities; businesses; nonprofit organizations; and individual consumers. By purchasing green power, these organizations are helping the environment and meeting their own goals, such as financial benefits, public relations benefits, and even national security benefits. In 2008, renewable electricity generation in the United States (excluding hydropower) equaled nearly 124 million megawatt-hours (124 billion kilowatt-hours)—enough to meet the annual electricity needs of nearly 12 million average U.S. homes.

Many states already require utilities to supply some of their electricity from renewable sources. These state mandates (known as "compliance" markets) require a percentage of the utility's power mix to come from renewable sources, so that utility customers will "green" their power mix somewhat without taking any conscious action. Voluntary purchases, however, are still an important strategy for organizations that want to buy most or all their power from renewable sources or want to promote innovative development of green power. Voluntary green power purchases have played an important role in driving development of the market (see Figure 1) and are expected to be an important part of the market for the foreseeable future.

Figure 1. Comparison of voluntary and compliance markets for renewable energy, 2004–2008



Note: "New" renewable resources generally refer to renewable facilities that began operation in 1997 or later.

Source: Bird, Lori, Claire Kreycik, and Barry Friedman. 2009. *Green Power Marketing in the United States: A Status Report (2008 Data)*. Golden, CO: National Renewable Energy Laboratory.

Leading organizations are finding that using green power is an effective part of a strategic energy management plan. Successful energy management plans are based on a "portfolio analysis" that considers options such as energy efficiency, load management, power purchases, on-site generation, and non-electric (thermal) energy needs. As with any investment portfolio, the best mix of these options depends on the organization's goals, the cost of various alternatives, and external market conditions.

While voluntary purchases of green power are becoming more common practice in today's electricity markets, these markets offer a wide range of choices. This guide is intended for organizations that have decided to buy green power but want help in figuring out how to do it, as well as for organizations that are still considering the merits of buying green power.

The *Guide to Purchasing Green Power* addresses the following commonly asked questions:

- What is renewable energy and green power? (p. 4)
- What benefits will my green power purchase bring? (p. 5)
- How do I make a business case for buying green power? (p. 5)
- What is the cost of green power? (p. 6)
- What are the options for purchasing green power? (p. 9)
- What is the importance of product certification and verification? (p. 19)
- How should an organization choose a green power product? (p. 15)
- What are the best ways of buying green power? (p. 18)
- What are the steps to installing on-site renewable generation? (p. 24)
- How do I communicate my green power purchase to stakeholders? (p. 30)

Chapter 2
Green Power Defined

The term *green power* is used in a number of different ways. In the broadest sense, green power refers to environmentally preferable energy and energy technologies, both electric and thermal. This definition of green power includes many types of power, from solar photovoltaic systems to wind turbines to fuel cells for automobiles.

In this guide, green power refers specifically to electricity generated from a subset of renewable resources, including solar, wind, geothermal, biogas, biomass, and low-impact hydroelectric sources. These electricity sources are derived from natural resources that replenish themselves over short periods of time, including the sun, wind, moving water, organic plant and waste material (biomass), and the Earth's heat (geothermal).

Note that the terms green power, environmentally preferable, clean power, and renewable energy may be used in slightly different ways, which differ primarily according to the varying assessments of the environmental impacts of harnessing specific resources and of the relative significance of each impact. The exact definitions of these terms, while always important, take on added significance when dealing with state and federal government requirements or determining eligibility for government and utility incentives. For more discussion of how each of the organizations that collaborated on this document defines green power, please refer to their Web sites, listed in Chapter 10, Resources for Additional Information.

Helping Consumers Identify Green Power

To help consumers more easily identify green power products, the "Green-e Energy" certification program has coordinated the development of market-based, consensus definitions for environmentally preferable renewable electricity and renewable energy certificates (RECs). The Green-e Energy program, administered by the nonprofit Center for Resource Solutions, certifies and verifies renewable energy products offered in competitive electricity markets, sold in utility green pricing programs, and sold in national markets for RECs. Further details about Green-e Energy certification are available from the Green-e Web site listed in Chapter 10.

Chapter 3
The Benefits and Costs of Green Power

The Benefits

Green power can offer organizations a variety of environmental, financial, stakeholder relations, economic development, and national security benefits. This Guide is designed to help buyers navigate the costs, contracting challenges, and public relations risks.

Environmental

- **Reduce environmental impacts.** Conventional electricity generation is a significant source of greenhouse gas emissions as well as the single largest industrial source of air pollution in the U.S. The emissions from conventional electricity generation contribute to a number of serious environmental problems, including acid rain, fine particulate pollution, and climate change. Green power generates less pollution than conventional power and produces no net increase in greenhouse gas emissions, helping protect human health and the environment.

Financial

- **Provide a hedge against risks posed by:**
  - **Electricity price volatility.** Purchasing electricity generated by renewable energy sources may provide the buyer protection against unstable or rising fossil fuel prices, for example through long-term, fixed-price supply contracts directly with developers or generators. Organizations can also encourage stable electricity prices by supporting new renewable power resources on the local grid, thereby diversifying the energy mix with resources that are not subject to the rise and fall of fuel costs.
  - **Fuel supply disruptions.** On-site renewable generation can reduce the risk of disruptions in fuel supplies, like natural gas, resulting from transportation difficulties or international conflict.
  - **Additional environmental regulation.** To address global climate change and regional air quality issues, federal and state regulations could effectively increase the price of conventional electricity, making green power financially more attractive.

Price Stability of Green Power

Unlike power generated from fossil fuels, some green power products are not subject to the impact of volatile fuel prices. For this reason, companies like IBM and Advanced Micro Devices (AMD) use green power to hedge against energy cost variability.

In 2001, the energy managers at IBM's Austin, Texas, facility were able to lock in power rates by signing up for Austin Energy's GreenChoice® program. With GreenChoice, the normal fossil fuel charge on the customer's bill is replaced by a green power charge for the amount of green power that the customer chooses to buy. Unlike the fossil fuel charge, the green power charge is fixed until 2011. As it turned out, Austin Energy's fuel charge for conventional power spiked in 2001 and IBM saved $20,000 in its first year in the program. When the fuel charge increased again in 2004, IBM saved more than $60,000.

Similarly, AMD saw significant cost savings after its first purchase of renewable energy in 2000 from Austin Energy. Shortly after AMD's purchase, natural gas prices soared and became more costly than the fixed green power premium. By 2001, AMD saved approximately $100,000 and, in response, doubled the company's green power purchase for the following year. In 2009, AMD purchased nearly 74 million kilowatt-hours of green power annually, which supplies 100 percent of its Austin facility's energy needs.

Stakeholder Relations

- **Meet organizational environmental objectives.** Reducing an organization's environmental impact is one of the main motivations for buying green power and is often important to stakeholders. For example, buying green power can help reduce greenhouse gas emissions from electricity consumption. If an organization is interested in creating a third-party certified environmental management system (e.g., ISO-14001 certification for environmental performance) or is conducting an organization-wide inventory of its greenhouse gas emissions, a program for reducing emissions will be an important part of this certification process.

- **Demonstrate civic leadership.** Being among the first in a community to purchase green power is a demonstration of civic leadership. It makes a statement that an organization is willing to act on its stated environmental or social goals. These purchases also demonstrate an organization's responsiveness to its customers, the majority of whom favor renewable energy. See Chapter 10, Resources for Additional Information, for details.

- **Generate positive publicity.** Buying green power affords an opportunity for and builds on existing public recognition and public relations activities. Companies that are in the public eye need to be responsive to the concerns of environmentally conscious customers, shareholders, regulators, and other constituents. Programs promoting green power, such as EPA's Green Power Partnership or Green-e Marketplace, provide assistance in reaching broad audiences to convey the benefits of green power purchases.

Green Power's Role in Overall Environmental Strategy

A recent survey of corporate participants in the Green-e Marketplace program indicates that most companies view their renewable energy purchases as part of a larger commitment to environmental sustainability.

- 75 percent said support of renewable energy was part of a multi-pronged corporate environmental strategy.
- 70 percent differentiate their company as an environmental leader by supporting renewable energy.
- 45 percent of respondents indicated that developing an environmentally friendly brand was very important.

A Web link to the full survey is provided in Chapter 10, Resources for Additional Information.

- **Improve employee morale.** Progressive action and leadership on environmental issues like renewable energy may improve employee morale, which in turn can reduce employee turnover, attract new employees, and improve productivity. In a survey of 464 organizations, sponsored by the National Wind Coordinating Collaborative, improving employee morale was cited as the third most important motivation for buying green power.

- **Differentiate products or services.** By purchasing green power, a company may be able to differentiate its products or services by, for example, offering them as "made with certified renewable energy." Purchasers of green power can also join their power supplier to market their products together. In addition, purchasers of products certified by the Center for Resource Solutions' Green-e Marketplace program can display the Green-e logo on their product packaging to indicate a commitment to using 100 percent green power in the manufacturing of the product. Many companies are also finding that producing their products with green power gives them an advantage in selling to their business customers who are trying to "green" their supply chain.

Demonstrating Community Leadership: City of Bellingham, Washington

By a unanimous city council vote in mid-2006, Bellingham, Washington, took a leadership role in promoting renewable energy by choosing to purchase 100 percent green power for all electricity used in city-owned facilities. From September 2006 through Earth Day 2007, the city partnered with the local utility's green power program and a local nonprofit organization to conduct the "Bellingham Green Power Community Challenge." The goal of the challenge was to increase green power purchasing among the city's residents and businesses to meet at least two percent of the citywide electric load. Bellingham's results have far exceeded original challenge goals. To date, the green power annually purchased by more than 2,680 households, 125 businesses, and five large volume purchasers totals 82.8 million kilowatt-hours of renewable energy certificates (RECs) and represents approximately 12 percent of the community's total yearly electricity use. The community's purchase resulted in EPA recognizing Bellingham as the first EPA Green Power Community in Washington State.

Economic Development and National Security

- **Stimulate economies.** Manufacturing, installing, and operating renewable resources in the United States requires a clean energy workforce. By purchasing green power, an organization can help create new, domestic jobs. These high-quality, often well-paying, jobs help grow the local economy. Renewable power facilities can also increase a local tax base and can provide income for farmers and rural communities through landowner lease payments. The renewable energy industry is an important growth sector that can simultaneously boost the nation's economy while meeting the nation's energy challenges.

- **Increase fuel diversity.** Green power diversifies the nation's electricity portfolio—a good way to manage risk—and, because renewable resources are indigenous,

green power reduces the country's dependence on imported fuels.

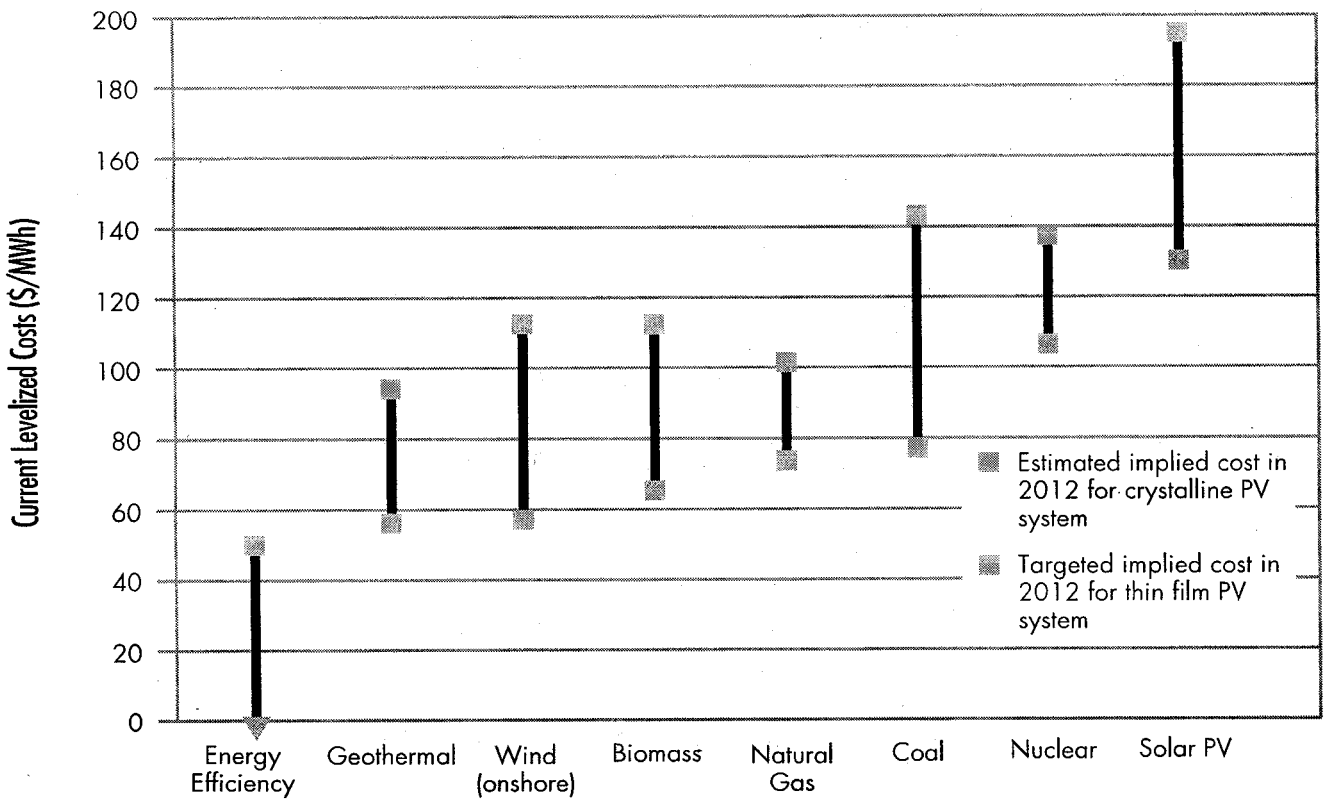
- **Reduce infrastructure vulnerability.** The distributed nature of renewable resources allows for the distributed generation of renewable energy, thus, reducing the country's reliance on a vulnerable, centralized electricity infrastructure.

- **Economies of Scale.** Most renewable energy technologies are manufactured on assembly lines, where mass production can reduce costs. By purchasing green power, organizations can help build demand, which in turn could lead to lower production costs and potentially lower prices.

The Costs

Green power can be priced differently than standard power sources. It has usually been more expensive than conventional electricity sources, largely due to the relative newness of renewable technologies and their gradual diffusion into mainstream markets, compared with conventional electricity. Chapter 6, Procuring Renewable Electricity and Renewable Energy Certificates, suggests ways of minimizing these costs in conjunction with a procurement plan. Nonetheless, the cost of green power is continuing to fall as growing demand drives the expansion of manufacturing facilities and reduces production costs. Figure 2 illustrates the levelized costs of renewable and fossil fuel technologies, showing that several green power technologies are now cost-competitive with conventional sources.

Figure 2. Levelized cost of new power generation technologies in 2008



Note: Costs have been levelized over the lifetime of the technology and include construction, fuel, and operation and maintenance costs. The bars represent typical cost ranges at average capacity factors for each technology.

Source: Lazard. February 2009. Levelized Cost of Energy Analysis, Version 3.0.

<blog.cleanenergy.org/files/2009/04/lazard2009_levelizedcostofenergy.pdf> .

The actual price for green power depends on a number of factors, including the availability and quality of the resource, manufacturing capacity and world demand for the technology, the availability of subsidies to encourage green power, and the quantity purchased and terms of the contract. Generally, the price of green power ranges from less than that of the standard power mix, especially in competitive markets and where state subsidies exist, up to one to four cents more per kilowatt-hour. When the market price of conventional electricity is high, purchasers of green power at a fixed price may actually save money. Of course, when the market price of conventional electricity drops, they will be paying a premium. Since 2000, the average price premium has dropped at an average annual rate of eight percent (see Figure 3).

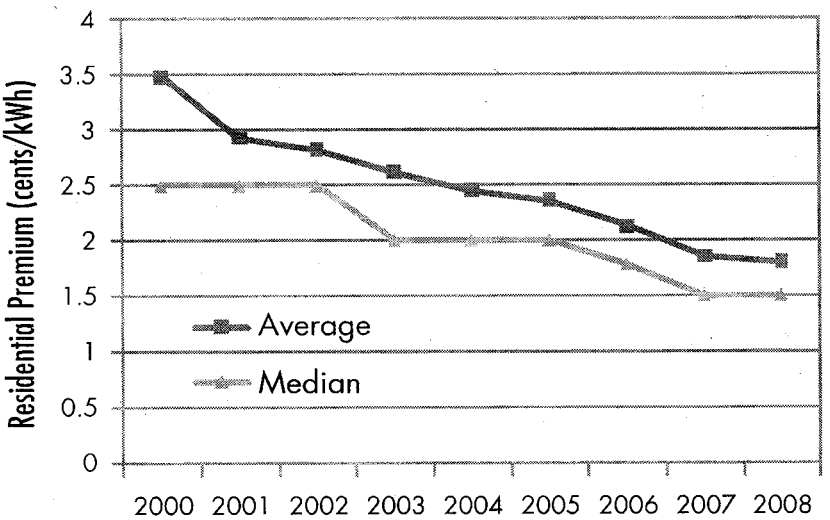
Contracting Challenges

Green power may also be more difficult than conventional power for an organization to purchase, causing transaction costs in addition to any price premiums. Although organizations that are buying green power for the first time might need to invest extra effort, these costs fall significantly over time as the electricity purchasers gain experience. Following the information and strategies provided in this guidebook, particularly Chapter 6, Procuring Renewable Electricity and Renewable Energy Certificates, should help reduce the contracting challenges faced by new purchasers of green power. In addition, sample contract templates are publicly available to help buyers avoid difficulties in signing a green power contract (see Chapter 10, Resources for Additional Information).

Public Relations Risk

Some stakeholders might regard the purchase of green power as a token effort or "greenwashing." Organizations can improve the credibility of their green power purchase by buying green power as part of a broader environmental management program and by working with third-party organizations for independent auditing, certification, endorsement, and minimum purchasing benchmarks.

Figure 3. Trends in utility green pricing premiums, 2000–2008



Source: Bird, Lori, Claire Kreycik, and Barry Friedman. 2009. *Green Power Marketing in the United States: A Status Report (2008 Data).* Golden, CO: National Renewable Energy Laboratory.

Chapter 4
Options for Purchasing Green Power

Green power can be procured several different ways. The main distinction among the options is the type of supplier and where the electricity generation equipment is located: on the electric grid or at the facility. For electricity delivered over the power grid, the status of utility restructuring in that state will determine whether an organization is limited to buying green power from its local distribution utility or whether it can choose among competitive power suppliers. Even if the state has no green power marketers or the utility does not offer a green power option, an organization can buy renewable energy certificates (RECs). For on-site green power, the resources available at that site (e.g., solar, wind, biomass) are the main factors determining a project's feasibility.

The range of supply options in the market provides considerable flexibility to green power buyers. Organizations are able to consider factors such as price, specific green power generation resource (e.g., wind versus solar), ease of procurement, and the location and year of the generating facility in their purchasing decisions. By considering these issues, buyers may be able to choose a specific type of green power product or mix and match green power products to meet their desired goals.

Renewable Electricity Products

Customers in many states have the ability to purchase a green power product directly from their electricity provider. In regulated electricity markets, customers may be able to buy a *green pricing* product from their local utility. Green pricing is an optional service offered by regulated entities to allow customers to support a greater level of utility investment in renewable energy by paying a premium on their electric bill. In competitive electricity markets, customers can switch electricity service providers if their current provider does not offer a green pricing product. In this market, the customer can purchase a *green marketing* product from a provider other than their local utility. Again, a green marketing customer pays a small premium in exchange for electricity generated from green power resources.

Most renewable electricity products (i.e., green pricing or green marketing products) are one of three types:

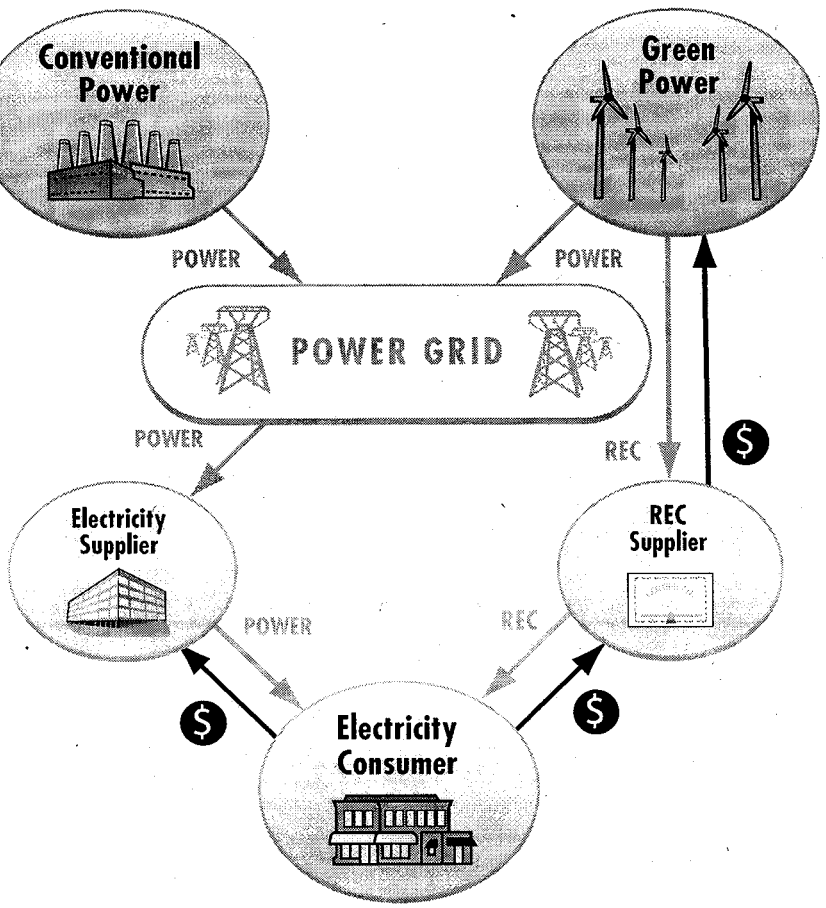
- **Fixed energy quantity block.** A block is a quantity of 100 percent renewable electricity, often 100 kilowatt-hours (kWh), offered for a fixed monthly price. The price is often expressed as a price premium above the price of conventional power. Customers usually may sign up for as many blocks as they wish, with the monthly cost of these products based on how many blocks they buy. This type of product is available in some competitive markets but is more often found in regulated utility green-pricing programs.

- **Percentage of monthly use.** Customers may choose green power to supply a fixed percentage of their monthly electricity use. In practice, this usually results in the purchase of blended green and conventional power. This is typically priced as a premium on a cents per kWh basis over the standard rate or as a fixed charge per kWh. The monthly cost for these products varies with use and the percentage of green power chosen.

- **Long-term fixed price contracts.** Buying a portion of the output of a renewable energy project in a long-term contract can help a project developer secure financing, while giving the end-user a stable electricity contract. This model has been used with several government and academic institutions. WRI's Green Power Market Development Group is exploring this model for commercial users.

Some renewable electricity products require a fixed monthly fee to support a given amount of renewable generation capacity. Others require contributing to a green power fund that finances renewable projects. These products can be an effective way to assist the green power industry but do not, however, result in a metered amount of renewable electricity being generated, which is necessary to quantify the environmental benefits of the green power purchase. For this reason, these products are not discussed further in this guide. Chapter 6, Procuring Renewable Electricity and Renewable

Figure 4. Renewable energy certificate (REC) transaction path in a voluntary green power market



Note: Figure 4 is not intended to represent a comprehensive view of all the possible ways a REC can be traded and used.

Energy Certificates, provides more details about implementing a renewable electricity purchase.

Renewable Energy Certificates

Renewable energy certificates (RECs), also known as "green tags," "green certificates," and "renewable energy credits," are tradable instruments that can be used to meet voluntary renewable energy targets as well as to meet compliance requirements for renewable energy policies. A REC is a certificate that represents the generation of one megawatt-hour (MWh) of electricity from an eligible source of renewable energy. Each REC denotes the underlying generation energy source, location of the generation, and year of generation (a.k.a. "vintage"), environmental emissions, and other characteristics associated with the generator. RECs represent a claim to the environmental attributes associated with renewable energy generation, but purchasers should nevertheless ensure that their contracts are explicit about which environmental attributes are conveyed to them. Figure 4 (above) illustrates the REC transaction path.

RECs may be sold "bundled"—paired by the electric service provider with grid electricity delivered to the buyer—or "unbundled" from electricity as a stand-alone product and paired by the buyer with its grid electricity purchase. RECs combined with plain grid electricity are functionally equivalent to green power purchases from a local utility, no matter where the REC may be sourced. Purchasers of RECs may make claims about their purchase of green power similar to purchasers of renewable electricity products.

Because RECs are not tied to the physical delivery of electrons, they allow organizations to purchase green power from

suppliers other than their local electricity provider. RECs help overcome a major barrier to renewable facility development—the fact that the best renewable resources may not be located close to population centers. The sale of RECs allows these more remote facilities to benefit from support for green power.

Unlike electricity, RECs do not need to be scheduled on a transmission system, and they can be used at a different time than the moment of generation. Certificate tracking systems have been established in different states or regions to issue and record the exchange of RECs, making REC markets even more accessible.

Customers do not need to switch from their current electricity supplier to purchase RECs, and they can buy RECs based on a fixed amount of electricity rather than on their daily or monthly load profile. Because RECs are independent of the customer's electricity use, load profile, and the delivery of electricity, they provide greater flexibility than purchasing bundled RECs and electricity from a utility. While RECs offer increased contracting convenience, they do not provide the same protection against price volatility as long-term contracts.

The price for voluntary RECs can be lower than the premiums for renewable electricity products for several reasons: 1) RECs have no geographic constraints and therefore can provide access to the least expensive renewable resources; 2) the supplier does not have to deliver the power to the REC purchaser with the associated transmission and distribution costs; 3) the supplier is not responsible for meeting the purchaser's electricity needs on a real-time basis.; and 4) REC prices reflect greater competition because RECs are fungible in a voluntary market. To the extent that electricity providers are also sourcing their green power products from purchased RECs, however, the premium that they would charge might not differ greatly from the cost of the unbundled RECs that organizations can buy.

An alternative way to buy RECs is through a subscription, or "future RECs," which involves an up-front purchase of RECs to be generated in the future by a new or soon-to-be-built renewable electricity facility. The advantage of this approach is that it promotes new renewable facilities by providing up-front financial assistance for their development and construction. In return, the purchaser receives the RECs as they are generated over an extended period of years. Nevertheless, even though they are paying upfront for future RECs, buyers cannot make environmental claims against those RECs until they are generated. A risk of this approach is that the facility might not be constructed or could be destroyed by a natural disaster after construction, and buyers should investigate what remedy the seller proposes in such an event. As with all products, independent product certification and verification of the claims made is an important aspect to consider.

For a company or institution with operations and offices in multiple locations, purchasing RECs can consolidate the procurement of green power thus eliminating the need to buy green power for different facilities through multiple suppliers. Chapter 6, Procuring Renewable Electricity and Renewable Energy Certificates, provides more details about purchasing RECs.

Business and organization purchases of different green power product types is shown in Figure 5, but on-site renewable generation is not included because equivalent data are not available.

On-site Renewable Generation

In addition to buying renewable electricity from a utility or buying renewable energy certificates, organizations can install renewable power generation at their facilities. They can either buy the system outright or install a system that is owned by another party and buy the electricity as it is generated.

On-site renewable generation offers advantages such as enhanced reliability, power quality, and protection against

Figure 5. Nonresidential green power sales by product type, 2008 (millions of kWh)

Green Pricing	Green Marketing	REC Markets	Total
2,100	1,200	15,400	18,700

Note: Nonresidential customers refer to business and institutional customers. Data for on-site renewable generation are not available.

Source: Bird, Lori, Claire Kreycik, and Barry Friedman. 2009. *Green Power Marketing in the United States: A Status Report (2008 Data)*. Golden, CO: National Renewable Energy Laboratory.

price volatility, as well as a visible demonstration of environmental commitment. It is important to note that selling RECs from an on-site facility negates the system owner's claim to using a corresponding amount of renewable electricity generated on site because the REC buyer is buying that claim specifically and contractually. In order to claim the zero greenhouse gas emissions from electricity generated on-site, the RECs would need to be retired and not sold to a third party. In many states, excess electricity generated with on-site renewable generation may be sold back to the grid at the same price at which power is bought, through a process called net metering. This arrangement can improve the financial return for on-site renewable power systems, although net metering is often limited to small installations. For example, the state of California limits on-site generation systems to 1 megawatt (MW) (10 MW for up to three biogas digesters) and the aggregated on-site systems' capacity may not produce more than 2.5 percent of a utility's peak demand.

On-site renewable energy technologies for power generation include photovoltaic panels, wind turbines, fuel cells, and biomass combustion. Large facilities sited near a municipal landfill or sewage treatment plant may be able to use recovered methane gas for on-site electricity and/or heat production. The following describes each of these options in more detail:

- **Solar.** Solar systems can be configured to almost any size from a few kilowatts up to several megawatts. On-site photovoltaic (PV) systems may be situated on schools, homes, community facilities, and commercial buildings. They can be integrated into a building, displacing other building material costs, such as for roofing shingles or car park shading.

- **Wind.** Wind turbines vary in size. A typical small unit provides 100 kilowatt (KW) or less, whereas large turbines range from 500 kW to more than 3 MW. On-site applications are usually only possible in nonurban areas, and often require zoning permits to exceed 35-foot height restrictions (a tower for a 250 kW turbine is 130 feet high with a blade sweep of 98 feet). Such installations usually require approximately 1 acre of land per turbine and wind speeds that average 15 mph at a 150-foot height. In addition, placing turbines in urban areas is inadvisable because nearby buildings may create wind turbulence that can disrupt the turbines' performance.

- **Landfill and sewage methane gas.** Methane gas derived from landfills or sewage treatment plants can be used to generate electricity. Methane gas also may be generated using digesters that operate on manure or agricultural wastes. The methane gas is then converted to electricity using an internal combustion engine, gas turbine (depending on the quality and quantity of the gas), direct combustion boiler and steam turbine generator set, microturbine unit, or other power conversion technologies. Most methane gas projects produce from 0.5 to 4 MW of electrical output.

- **Biomass.** Biomass is plant material burned in a boiler to drive a steam turbine to produce electricity. This system is good for producing combined heat and power (CHP) at facilities with large thermal loads. Biomass projects are best suited to locations with abundant biomass resources (often using waste products from the forest industry or agriculture).

- **Fuel cells.** Fuel cells are another way of producing power. They emit essentially no air pollution and are more efficient than other forms of generation, but they cannot be considered a renewable resource unless they operate on a renewably generated fuel, such as digester gas or hydrogen derived from PV or wind power.

In this era of power reliability problems and national security concerns, domestic, on-site renewable generation offers important advantages over central-station and fossil-fueled power plants. Moreover, on-site generation can be designed to provide backup power for critical loads when power from the grid is interrupted, as well as when the renewable resource is not available. This ability to operate independently of the power grid is a great advantage, particularly at remote facilities. Because renewable generation technologies can be modular and used on a small scale, the on-site gen-

On-site Generation: BMW Manufacturing Company

Automaker BMW pipes methane gas 9.5 miles from a landfill to serve the electric and thermal needs of its manufacturing facility in Greer, South Carolina. Rather than invest in new internal combustion engines to generate electricity, in 2003 BMW converted four turbines that previously ran on purchased natural gas. In 2009, BMW replaced the original four turbines with two new highly efficient turbines that will increase the electrical output from 14 percent to almost 30 percent. By recovering the waste heat from the turbines, the 11-megawatt combined heat and power project satisfies more than 60 percent of the facility's thermal needs, as well as nearly 20 percent of its electricity use. To date, the project has saved the automaker an average of more than $5 million each year in energy costs. The new turbines installed in 2009 should return an additional average annual cost savings of up to $2 million. With the success of its landfill gas project, the facility is exploring on-site wind and has completed a study of the site's wind speed and direction. For more on-site examples, see Chapter 10, Resources for Additional Information.

eration system can be designed to enhance the redundancy and diversity of a facility's energy supply.

On-site renewable generation typically has higher capital costs and lower operating costs compared with installing fossil-fueled generation. Although these costs can make the initial investment in on-site generation more difficult to justify, once that investment has been made, the annual budgets for maintaining the system are much easier to justify (compared with purchasing renewable electricity), which makes sustaining a commitment to renewable power easier. Additionally, there are new financing models for on-site generation being developed to lower the upfront capital investment, such as the solar power purchase agreement (SPPA).

An organization that installs its own generation capability may have problems with the requirements for connecting to the utility distribution system, commonly referred to as interconnection. Interconnection rules designed for large generators often are unnecessarily burdensome for small generators. Increasingly, however, state interconnection rules are being standardized and simplified for smaller generators. In addition, national standards have been issued by the Federal Energy Regulatory Commission (FERC) that may ease interconnection in special cases. Chapter 7, Planning an On-site Renewable Generation Project, provides more details about procuring an on-site renewable generation system. Customers considering on-site generation should check with their local utility or with the state utility commission about interconnection rules. Chapter 10, Resources for Additional Information, provides more sources of information about utility interconnection.

Chapter 5
Steps to Purchasing Green Power

To buy green power, an organization first should determine what green power products will help fulfill its electricity needs and decide how to procure those products. Figure 6 illustrates the steps in this process.

The preliminary steps described in this section are the same for all types of green power products. The final steps differ for purchased green power products (renewable energy certificates [RECs] and utility-supplied) and on-site renewable generation. These steps are explained in later chapters of this guide.

Setting Goals

The first step in any type of green power purchase is to set goals about what the objectives are for purchasing green power, considering the following questions at a minimum:

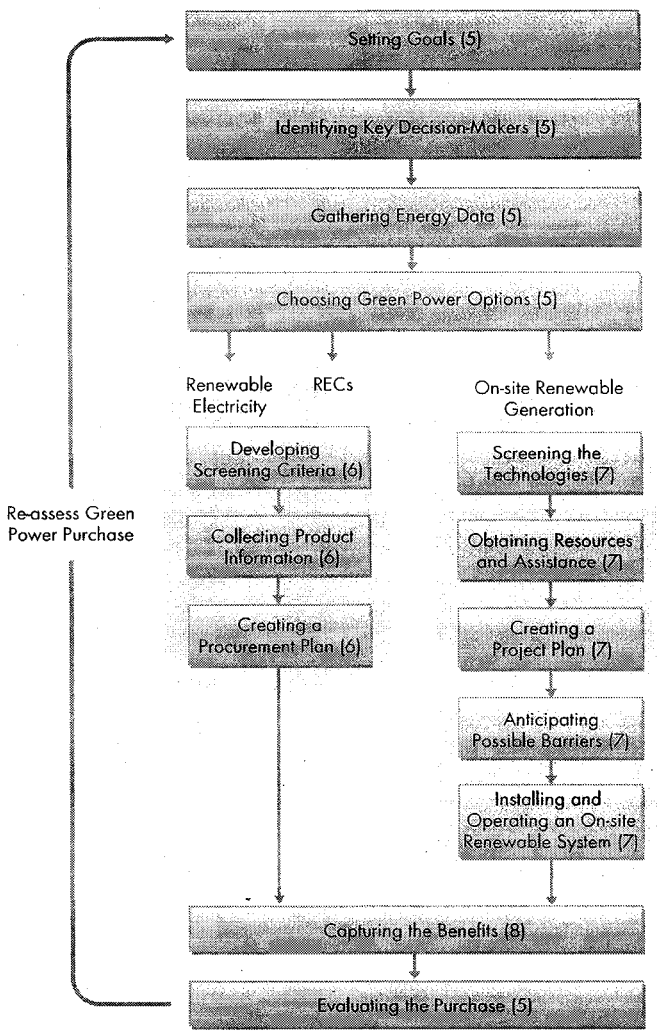
- Why is the organization considering green power?
- What does the organization hope to get from it?
- What selection criteria are important to the organization?
- Are independent certification and verification important to the organization?

These questions are best considered as part of the organization's overall energy or environmental management process. Such a process is an ongoing effort to improve the energy and environmental performance of the organization, usually driven by goals set by the organization's top-level leaders. The goals for a specific purchase of green power then flow from, and are greatly informed by, these overall goals.

Identifying Key Decision-Makers

The people in an organization who are interested in green power may be high-level decision-makers as well as staff from the purchasing, facilities/energy management, environmental health and safety, legal, corporate relations, and/or marketing departments. All of their interests and concerns must be addressed early in the planning process. Experience has demonstrated that not doing so often leads to disagreements later in the process. Because buying green power is ultimately a financial decision, it is very important to have

Figure 6. Steps to a successful green power project



(Indicates Corresponding Chapter)

the chief financial officer involved in and supportive of the decision. In addition, other departments, such as marketing or environment, health, and safety, may also contribute funds to help pay for green power.

Designating a contact person who can draw on expertise from throughout the organization is an important step. The departments chosen to participate will probably depend on the type of products being considered. It also is important to involve senior management in the planning and decision process. In many cases, the greatest advocate of buying green power is an executive such as a chief executive officer or president. With this high-level support, buying and promoting green power is much easier. Some organizations involve their employees (or students, in the case of educational institutions) in selecting the green power products.

Gathering Energy Data

The organization considering green power should take an inventory of its energy use, including electricity and thermal. Its annual electricity use can be calculated from the utility bills for each facility or business unit and for the entire organization. These data will help: 1) compare the organization's energy performance against peer facilities' energy performance and understand energy use patterns and trends; 2) determine how much green power to buy; and, 3) evaluate the environmental impacts of the organization's electricity use. Monthly electricity consumption data are the most important, while peak demand and interval-meter data are useful if available. Each organization should study its consumption data over the past year before specifying its requirements in order to have a complete and accurate picture of energy use. Outside consultants or organizations can help with these steps.

As mentioned earlier, green power can be considered part of an energy portfolio that includes energy efficiency upgrades, load management, and combined heat and power. The more an organization's energy requirements can be reduced, the less green power it will need to buy to achieve a given objective, which in turn makes green power more affordable. Some organizations have saved enough money from energy efficiency upgrades to enable them to pay for their green power purchases.

Many resources are available to help improve the energy efficiency of buildings and equipment. A good starting point is the ENERGY STAR Portfolio Manager, an online tool that compares a building's energy usage with that of similar buildings. The ENERGY STAR Web site <www.energystar.gov> offers simple energy-saving tips and a directory of energy services companies to provide additional assistance, such as a facility energy audit.

Calculating an organization's annual electricity use can determine the quantity of emissions associated with that use and help estimate the emissions that could be prevented by buying green power. EPA offers an online tool to help estimate emissions from an organization's current conventional electricity use at <www.epa.gov/cleanenergy/powerprofiler.htm>.

Choosing Green Power Options

The next step is finding the appropriate green power solutions for the organization. Another goal of this step is becoming familiar with the electricity markets in the organization's area and the available green power technologies.

The first decision is whether to generate power on-site and/or to purchase power or RECs from outside vendors. The main differences between these options are the ease and cost of implementation, the need for capital investment, the ability to hedge risk, and the length of time over which one realizes the benefits. On-site renewable generation typically requires an up-front investment (as part of either a financed project or a capital appropriation), but the reduction in the consumption of conventional energy can last for as many as 30 years. There are new financing models being developed to help overcome the upfront financial barriers to on-site generation. These models are discussed in more detail in Chapter 7, Planning an On-site Renewable Generation Project.

Renewable electricity purchases and RECs usually require no up-front capital and are relatively easy to procure, but they deliver benefits only for the term of the purchase contract.

An organization's motivations for purchasing green power will help decide which costs and benefits are most important and thus which type of green power is most appropriate. For example, an organization that wants to manage fuel price risk might be more interested in buying fixed-price renewable electricity. An organization that finds the reliability of its power supply to be most important might be more interested in on-site renewable generation. These options can also be combined. For instance, an organization might install on-site generation to meet part of its electricity needs and purchase RECs to match the remainder of its electricity use. Likewise, organizations with facilities in multiple locations must determine whether to procure green power from one provider for all sites, or whether to procure green power from multiple providers based on unique options that might be available to an individual site. Organizations with facilities in multiple locations must also select the appropriate green power product for each site.

The green power options available to an organization are determined partly by the electricity market structure in the

Using Energy Efficiency Savings to Purchase Green Power: University of Pennsylvania

The University of Pennsylvania is funding its sizeable wind power purchase with savings achieved through energy conservation. Over the past few years, the university reduced peak electricity demand by 15 percent. This reduction enabled the university to purchase nearly 193 million kilowatt-hours of wind-generated renewable energy certificates (RECs), an amount equivalent to 46 percent of its total campus electricity use. Penn's long-term commitment to buying green power helps support development of new wind generation facilities, including a 12-turbine, 20-megawatt Pennsylvania wind farm.

state in which the facility is located. Each state has different rules governing power marketers, and the level of competition varies among the states. Large electricity purchasers might be able to work with their local utility or electricity provider to tailor a product to meet their needs.

For on-site renewable generation, the organization should assess the renewable energy resources available at its facility, including the quality of wind and solar resources, the availability of biomass fuel or landfill gas, and siting constraints (such as space limitations or shading from neighboring buildings). The cost of conventional power at the facility also is important to consider. The organization should read over its utility's and state's interconnection rules to make sure there are no obvious provisions that would prohibit grid-connected, on-site generation. The goal at this stage is to eliminate any renewable options that are clearly not feasible for the organization.

Finding Green Power Suppliers

- Organizations with facilities in several states should use a national locator such as EPA's Green Power Locator <www.epa.gov/greenpower/pubs/gplocator.htm> or the Green-e Energy "Find Renewable Energy" locator <www.green-e.org/buy>. The latter is also useful for locating certified products.
- Many state governments, often the public utilities commission, maintain a list of power marketers offering green power products in the state, especially if state electricity markets have been restructured.
- Smaller facilities (such as retail stores) may find it easier to have a single point of contact compiling this information and making it available across the entire organization. Larger facilities (such as factories or research campuses) often have enough expertise to gather information and negotiate contracts on their own.
- See Chapter 10 for more resources.

When considering green power options, it is useful to consider the motivations of other green power purchasers. A 2008 survey of corporations by the World Resources Institute (WRI) and the Climate Group found that the top criteria against which companies evaluate low-carbon technology projects include:

- **Financial metrics.** The return on investment (ROI) of projects is of paramount importance.
- **Marketing value.** The ability of projects to improve a company's brand value or image is a key factor in decision-making.
- **Carbon dioxide (CO_2) benefit.** The extent to which projects can help companies reach their emission reduction goals is also a factor they considered.

The key conclusion from the WRI-Climate Group survey is that low-carbon technology projects must be able to compete financially with non-renewable related projects in order to be funded.

It is also important to anticipate barriers to making a purchase, so that the process can be structured to overcome these barriers. The same WRI-Climate Group survey found that the most common barriers to wider investment and greater deployment of low-carbon technologies include:

- Cost of the technology.
- Insufficient financial performance.
- Availability of financing.
- Lack of staff capacity and knowledge.
- Inadequate baseline energy data against which to demonstrate improved performance.
- Lack of a streamlined decision-making process.

Evaluating the Purchase

Once the green power purchase has been implemented, it is important to collect information and evaluate how well the purchase achieved the purchase's preliminary goals. Areas of evaluation could include:

- How well the procurement process worked.
- Whether the vendors delivered what was expected.
- Whether the green power purchase is providing protection against rising fossil fuel prices.

- How well the organization promoted its green power commitment.
- How well the organization educated employees about the green power commitment.
- Whether the green power purchase is helping the organization meet its corporate or institutional goals related to environmental improvement and sustainability.

Additional evaluation factors apply for on-site generation systems, such as how much energy the system is producing (both initially and over time), how the system operation and maintenance costs compare to expected, and whether output is being appropriately reported to tracking systems for the issuance of RECs that the owner will use to substantiate its renewable electricity use claims.

Chapter 6
Procuring Renewable Electricity and Renewable Energy Certificates

To select the green power supplier and the product, it is helpful to develop specific criteria for judging the alternatives. These criteria can be ranked, keeping in mind the goals identified early in the process when the project team was assembled.

Developing Criteria for Screening Suppliers and Products

The following criteria might be helpful when screening suppliers and products:

- **Reputation.** A supplier's reputation is influenced by factors such as how well it honors its commitments, how easy it is to work with, its list of clients, and how well it is viewed by the industry. Assessing a supplier's reputation may require references and a perusal of the energy industry's literature. Environmental groups also might have information about the supplier.

- **Financial strength and credit.** To research the financial health of a power supplier, look at its Web site and perhaps its annual report, Securities and Exchange Commission filings, and bond ratings.

- **Location.** If buying green power from a local supplier is important, call the supplier and find out where its renewable generation is located. Public utility commissions' Web sites often have contact information for registered retail suppliers.

- **Product choice.** Some suppliers offer several green power products, varying in the amount of renewable power and types of resources. If a supplier offers a choice of green power products, this may enable the organization to change the product it purchases in the future without having to search for a new supplier and negotiate a new contract.

- **Environmental performance.** Assessing a supplier's environmental performance can be useful. Organizations should review the supplier's annual financial or environmental report, examine its other electricity products, and review its other business activities.

For renewable electricity products, consider the following additional criteria:

- **Price.** When considering price, organizations should make sure they are comparing apples to apples. Prices might reflect different types of products, so it is essential that organizations understand how products under consideration might differ. For example, renewable electricity products might quote total price per kilowatt-hour for electricity including the green attributes, which can be compared to the standard electricity price, but other products, such as renewable energy certificates (RECs) and many utility green pricing products, quote only the incremental cost of green power, which must be added to standard electricity rates. Furthermore, prices might be fixed or escalate over time, or can vary according to a price index such as the wholesale price of electricity. Finally, the purchase of some utility green power products might offer an exemption from variable fuel charges or environmental taxes, which should be factored into the ultimate price.

- **Percentage of renewable energy.** For a particular green power product, the resource mix can range from 1 to 100 percent renewable power. When buying certificates or bundled products, an organization can still calculate the percentage of its electricity use served by renewable power.

- **Percentage of new or incremental renewable sources.** Many experts argue that only new generation provides incremental environmental benefits. "New" renewable resources generally refer to renewable facilities that began operation in 1997 or later, which is when the voluntary market for green power began to grow. Besides the direct impact of purchases from new renewable sources, these purchases also help create the demand necessary for constructing additional renewable resources.

In states that have adopted a renewable portfolio standard (RPS), electricity providers are required to include a minimum percentage of renewable electricity in their standard product offering. Renewable electricity products create additional environmental benefits only if the power purchased is not already part of the provider's minimal RPS requirement. In other words, an organization should purchase a renewable electricity product that is not already being used to satisfy a RPS mandate or goal imposed on a utility nor is the renewable electricity product included in the utility's standard electricity service.

- **Renewable energy/resource mix.** A renewable energy/resource mix refers to the kinds of resources used in the green power product. For example, is the product generated from wind, biomass, solar, geothermal, or hydro? Some resources have a greater environmental impact than others. Wind, solar, and geothermal power usually are the most environmentally preferable energy sources. Each is renewable and nonpolluting, with limited impact on the land or local habitats. Certain environmental groups regard some types of hydropower, biomass, and municipal solid waste as less desirable. Hydropower dams may drastically alter river habitats and fish populations; biomass facilities may emit significant quantities of smog-forming pollutants; and burning municipal solid waste may release heavy metals and other toxins into the environment. Municipal solid waste may also include nonrenewable materials derived from fossil fuels, such as tires and plastics, which when burned release carbon dioxide into the air. It also is important to check the environmental characteristics of any nonrenewable generation resources, as they will contribute to the overall environmental impact of the power purchased.

  Renewable energy resources also have different associated costs. For instance, a green power product generated from a resource that is scarce in one part of the country will be more expensive than purchasing the same resource-derived product from another part of the country.

- **Length of contract.** Some buyers prefer a short-term contract in case the market changes and better offers come along. But an organization may be able to lock in a lower price if it signs a multiyear contract. A longer-term contract might also offer greater price stability as well as provide better support to new renewable energy projects. When determining the value of price stability, be aware of "typical" market fluctuations in power prices and how the price of renewable electricity can vary. Finally, a contract may include options for renewal, which can offer flexibility in the future. Before entering into a long-term contract, however, buyers should take into consideration potential policy changes (most notably, a carbon cap-and-trade program) that impact future environmental claims for purchasing green power.

- **Third-party certification and verification.** A green power product can be certified and verified by an independent third party. Such certification can provide credibility and confirmation of the product's environmental value. By purchasing a product that has met specific environmental and consumer protection guidelines adopted by the certifying organization, a purchaser will be better positioned to address stakeholder questions about purchase quality and credibility. Visit <www.green-e.org> for more information about certification and verification.

- **Location of generation.** In order to support the local economy and to contribute local environmental benefits, some organizations may prefer local or in-state renewable generation. Some renewable electricity products, however, use resources located out-of-state, and renewable energy certificates may be based on generation located outside of the purchaser's region. For example, purchasing RECs from a state in which fossil fuel comprises more of the electric generation mix may provide greater environmental benefit than purchasing RECs from a state in which renewable electricity

The Role of Product Certification

One of the major concerns with buying green power is ensuring that purchasers get what they pay for. It can be difficult to substantiate claims made about the quantity and characteristics of the product purchased. Also, it is important to ensure that two organizations are not claiming to have purchased the same green power, or are double-counting the same green power benefits. Moreover, purchasers may be unable to ensure public acceptance of their purchase and avoid criticism from external stakeholders without independent information about the product. Third-party certification addresses these concerns by setting standards for green power products in the following areas:

- Minimum levels of environmentally acceptable renewable resources
- Overall environmental impact
- Ethical conduct for suppliers, including advertising claims and regular reporting

Third-party certification usually also requires independent verification by an auditor to document that green power sellers have generated or purchased enough renewable energy to match their sales commitments. Visit <www.green-e.org> for additional information about third-party certification and verification.

generation is plentiful; RECs, therefore, do not necessarily represent a uniform set of environmental impacts or attributes. As a reporting convention, EPA allows Climate Leader Partners to claim emission reductions based on the regional average emissions rate for where the REC was generated. Regional average emissions rates can be found by visiting EPA's Emissions and Generation Resource Integrated Database (eGRID) at <www.epa.gov/egrid>. Further guidance can be found in Chapter 10, Resources for Additional Information.

- **Specific generation facility.** Some green power providers generate their power at a specific site, such as a nearby wind farm, rather than offering green power from a mix of different resources. These products, such as the annual output of one particular wind turbine, are sometimes preferred by customers because such products offer a closer sense of connection between a purchase and a specific environmentally beneficial facility.

Collecting Product Information

A good place to start collecting information about specific green power options is the many Internet sources listed in this guide. Be sure to collect enough information to answer the decision criteria listed earlier. For useful comparisons, the information should be as consistent as possible among suppliers and among products. A good way to find consistent information is through an exploratory letter or a request for information (RFI) addressed to specific suppliers.

In many states, competing electricity suppliers are required to provide an electricity label—like a list of food ingredients—that provides information in a standard format and makes product comparisons easier. This information is generally available from the state's public utility commission. Another source of public information is third-party certifiers, such as Green-e Energy, which can provide information about the products they have certified to meet minimum environmental standards.

The next step is estimating the cost of green power for the organization and calculating the cost/benefit ratio. For help finding cost data, contact one of the organizations that sponsored this guidebook (listed in Chapter 10, Resources for Additional Information).

Creating a Procurement Plan

A procurement plan documents the project team's decisions and addresses possible problems in buying green power. A procurement plan can also help convince others in the organization that purchasing green power is a wise choice.

The main audience for the procurement plan is the managers who need to support the purchase decision. Their support should be secured as early in the process as possible. As soon as the team can show the costs and benefits of purchasing green power to the organization, they should present their information to management. Expect managers to ask about the products the organization would buy, their cost, and their benefits. Also find out whether management might limit a green power purchase or whether they would buy more aggressively.

Besides providing the information that management needs to make the decision, a procurement plan can also help overcome resistance to green power within the organization. Some organizations have outdated perceptions of the reliability of renewable energy technologies, misunderstandings about using a variable resource, or worries about the cost. As part of the procurement process, the project team will probably need to educate others about these topics and the benefits of green power. The organizations that sponsored this guidebook can provide helpful information to overcome these misconceptions.

The scope and detail of the procurement plan will depend on the organization's needs and requirements, but it should address the following:

Scope of Procurement

Specify the amount of power that will be purchased (as a fixed quantity, a fixed amount of money, or a percentage of total power use) and for which facilities. If this procurement is a trial that may lead to additional purchases in the future, spell out the criteria that will be used to judge the trial's success. Also discuss whatever is known at this point about future procurement phases.

Expected Benefits

Keeping in mind the general benefits outlined earlier in this guide, list the particular benefits hoped for by buying green power for the organization. Wherever possible, these benefits should be linked to the organization's environmental goals.

Financial Considerations

The procurement plan should discuss cost. Cost has traditionally been the primary concern with green power, but there are an increasing number of financing models for purchasing green power that result in a cost benefit over the long-run. Negotiating the right contract can have a big effect on the financial costs and benefits of buying green power.

Price Hedging With Renewables

Southern New Hampshire University (SNHU) has found an innovative financial arrangement to stabilize its energy budget while also reducing its carbon emissions. The university has entered into a 15-year renewable energy hedge agreement with wind farm owner, Iberdrola Renewables. The hedge is structured as a contract-for-differences financial swap under which the parties agreed to a strike price and duration for the agreement. SNHU continues to buy power from its current supplier, and Iberdrola Renewables continues to sell into the local electricity spot market. The energy sales are then analyzed. If the sales income received by Iberdrola Renewables is greater than the strike price, Iberdrola Renewables pays SNHU the difference between the income and strike price. If the income is less that the strike price, then SNHU pays Iberdrola Renewables the difference. The hedge has stabilized the cost of the 15-million kWh of electricity used by the university annually. If energy costs increase even modestly over the 15 years, SNHU could save an average of $1.2 million per year for both electricity and natural gas.

Several strategies are available to help minimize and manage the extra cost of green power:

- **Seek a fixed-price contract.** Because its cost of fuel is predictable, renewable energy is often available at a fixed price without any fuel-cost adjustments. Check with the supplier, particularly if the organization is considering a utility green-pricing program, to see whether green power customers are exempted from fuel-cost adjustments.

- **Buy green power for only part of the organization's electricity use.** Green power does not have to be used for all electricity consumption. For example, the organization might buy green power for just 5 or 10 percent of its electricity use. Buying 10 percent green power may add less than 1 percent to the organization's electricity bill. Alternatively, some renewable electricity products cost less because they contain less than 100 percent green power or offer lower-percentage options.

- **Make a longer-term purchase.** Consider the contract's length in conjunction with the quantity and cost of power purchased. A short-term contract (typically less than three years) might offer greater flexibility in the future but also might cost more. But a longer contract (e.g., 10+ years) can reduce the risk to the supplier, allowing it to offer a lower price than under a shorter contract. The right contract length is based on the particular situation and products available.

- **Use a contract for difference.** A contract for difference (CFD) is a financial agreement that allows renewable power suppliers and purchasers to lock in stable power prices and revenues by agreeing to pay the difference between the actual power price and an agreed-upon benchmark or "strike" price. CFDs have tended to be used most often for government and college and university customers. Consult with your auditor to understand any associated accounting issues. To learn more about the CFD model, visit <www.epa.gov/grnpower/events/mar31_webinar.htm>.

- **Offset the cost with savings from energy efficiency.** Reducing the total amount of electricity purchased helps make green power more affordable. When reviewing green power providers, organizations may find that some providers also offer energy efficiency services, with the goal of no net increase in their customers' power bills.

- **Use savings from competitive choices.** Competitive choices of either green power or commodity electricity can lead to savings on energy costs, which can be used to buy green power. Or the extra cost of green power can be limited to the amount of savings from competition. Be aware that switching to less expensive conventional power can also mean dirtier power, so ask the electricity supplier for information about the emissions from its product, and make sure those emissions do not cancel out the benefits of the green power bought with the savings.

- **Specify a price cap or maximum total budget.** Specify the maximum price per kilowatt-hour or the total cost, or simply place a cap on the renewable portion of the purchase. A drawback of this approach is that suppliers are likely to bid at or near the specified price cap. But if the organization is interested mainly in other aspects of green power, such as environmental benefits or hedge value, this can be a good approach. Even if a price cap is not the most important consideration, it is a good idea to decide on the highest price the organization is willing to pay for green power, as part of its internal procurement planning.

Procurement Methods

Organizations can purchase green power in several different ways, depending on the options available as well as the organization's procurement rules. Generally, the greater the load that the organization can bundle together in one purchase, the more attractive it will be to a supplier.

The following explains typical ways to buy green power. Federal agencies must work within the procurement rules applicable to the federal government, which are explained further in the Appendix.

- **Call several sellers.** An organization can keep the procurement process relatively simple by calling a few green power providers—either REC marketers, utilities, or other electricity providers that may be available to them. An off-the-shelf product may meet its needs. If the organization wants something different, it can ask for an informal proposal. After a discussion, the organization may be ready to negotiate directly with one of the suppliers about product definition, certification, price, and terms. Or if the organization is planning a large purchase, the suppliers might be willing to tailor something to its needs.

- **Negotiate with the utility.** Buying power is simple, though the choices are fewer, if the organization is served by a single utility in a regulated market. If the local utility offers green power, the organization can collect information by visiting the utility's Web site and calling to discuss its interest. Perhaps the only issue is the quantity the organization wants to buy, but it may be able to negotiate a slight price break if it is making a large purchase. If the utility does not offer green power and the organization is a large, highly visible customer, it may be able to encourage the utility to offer green power by promising to buy a large amount. Likewise, the organization may be able to persuade the utility to seek third-party certification if its product is not currently certified.

- **Request proposals.** Large companies and public institutions, in particular, often issue a formal solicitation or request for proposals (RFP). An RFP requires more time and effort for preparation, evaluation, and negotiation, but it might be more suitable for a large purchase and when many green power options are available. With an RFP, it is important to understand the organization's own objectives and communicate them clearly in the solicitation. Third-party certification and verification can be specified in the RFP evaluation criteria.

  RFPs can be as simple as a letter sent to selected suppliers, describing the organization's objectives and asking for a bid. RFPs can also be more formal, casting a wider net through a broadly advertised solicitation. The latter requires more effort to prepare and evaluate responses. Government agencies must follow the procurement rules governing their agency.

  A two-step process is possible as well, in which the organization first issues a request for information (RFI) and, based on the responses, sends a more detailed RFP to those suppliers that meet its general qualifications. The RFI would be broadcast to a larger audience, not only to find out who meets the organization's qualifications, but also to gauge the amount of interest.

  For large purchases, RFPs may be addressed to renewable power generators (wholesale) as well as retail suppliers. Buying directly from generators might lower the cost but probably will require longer-term purchase commitment. Buyers will still need to work with a retail supplier to integrate the wholesale contracts, so active engagement with your preferred retail supplier will be important. In addition, for RECs there have been instances where market-setting purchasers using the RFP process have yielded higher prices in the short term due to the large purchase size. In this case, buyers planning to make a large purchase may elect not to issue a public RFP but rather contact specific suppliers individually in the market.

  EPA's Green Power Partnership offers assistance to partners putting together a green power purchase RFP, and the Department of Energy's (DOE's) Federal Energy Management Program (FEMP) provides the same service for federal agencies. For RECs, the DOE Green Power Network maintains an online listing of green power RFPs that can be used as models at <apps3.eere.energy.gov/greenpower/financial/>.

- **Use an electronic auction.** Electronic auction platforms (also known as electronic procurement or "e-procurement") allow for real-time transparent bidding and "reverse auctions" to drive bid prices lower than might be achieved otherwise. Initially used in the 1990s by pools of buyers in retail markets that allowed for direct access competition, these electronic auction mechanisms are being tried with varying degrees of success by utilities and large customers and can offer a new forum for renewable energy transactions.

  Online auctions can provide significant price transparency and control that the paper-based RFP process does not always provide. With the reverse auction approach, price quotes are delivered in real-time via a Web-based

Using an RFP versus an RFI

An RFI may be a productive way to engage suppliers about innovative, new purchasing strategies. Suppliers might not want to respond to an RFP if the request is not "cookie cutter," as they know there would have to be significant negotiations once the winner is selected that could require changes to their costs while being locked into a pricing commitment. To ensure broad participation and validate interest from the market about new purchasing ideas, an RFI can provide important information to purchasers. Based on the results of the RFI, you can either proceed directly to negotiating with a particular vendor or refine your procurement goals in order to issue a detailed RFP that will have a better chance of multiple qualified bidders.

platform, which results in dynamic bidding and helps achieve rapid downward price pressure that is not normally achieved using conventional paper-based bidding and procurement. Buyers (currently, utilities) can either award contracts to the suppliers who bid the absolute lowest price, or those that best meet the buyer's specific, pre-established terms for quality, capacity, or other value-adding capabilities.

Special Considerations for RECs

RECs can be bought from marketers or sometimes directly from renewable energy generators. Several environmental brokers are active in REC markets, offering another approach to procurement that is increasingly being used by large purchasers. Brokers do not own the certificates but rely on their knowledge of the market to connect buyers and sellers for a fee. They can help negotiate deals that take into account an organization's unique interests.

REC Tracking Systems

A tracking system is an electronic database that is used to track the ownership of RECs or MWh of electricity, much like an online bank account. A tracking system issues a uniquely numbered certificate for each MWh of electricity generated by a generation facility registered in the system, tracks the ownership of certificates as they are traded, and retires the certificates once they are used or claims are made based on their attributes or characteristics. Because each MWh has a unique identification number and can only be in one owner's account at any time, this reduces ownership disputes and the potential for double counting.

A tracking system can be used to verify compliance with a RPS, to help create environmental disclosure labels, and to substantiate voluntary green power or environmental claims. Tracking systems are not substitutes for product certification and verification, as tracking systems only monitor wholesale transactions; individual retail green power customers do not generally hold accounts in tracking systems unless they make very large purchases. See Chapter 10, Resources for Additional Information, for details.

Reducing the Cost of Green Power: State of Connecticut

In late 2007, the state of Connecticut successfully used Web-based reverse auctions to secure electric supply contracts totaling 909 million kilowatt-hours between November 2007 and June 2009. The supply contracts include more than 22 percent electricity from green power sources, which was a prerequisite of the state. The online auction allowed Connecticut and the energy suppliers to participate in real-time with full price visibility, which heightened competition among suppliers and allowed the state to lock in the lowest price. Under these contracts for electric supply reported savings through December 2008 are $19.5 million, as compared to the price that would have been paid for standard service.

When buying RECs, organizations should make sure that the RECs they buy have not been double-sold and claimed by another party. For example, voluntary purchases of RECs should not also be counted by utilities for compliance with regulatory requirements such as renewable portfolio standards (RPSs), and RECs used to comply with such requirements should not be sold into voluntary markets. If they are double-counted, the voluntary purchaser would not create any benefits over and above what is already required by public policy. Utilizing tracking systems and third-party certifiers can help ensure that RECs are not claimed by more than one party. To avoid potential double claims on environmental benefits, contracts for RECs should be explicit about what environmental characteristics are included with the sale.

Sometimes RECs are incorrectly referred to as carbon offsets, but RECs and offsets are not the same. RECs are tradable instruments, expressed in terms of a unit of electric generation (1 megawatt-hour [MWh]), that represents the source's resource type, facility location, direct emissions, and generation date, among other characteristics. Offsets are expressed in tons of emission reduction and may come from a variety of project types not related to power generation. In voluntary markets to date, some renewable energy projects have qualified as sources for offsets; however, the associated environmental attributes from a green power project that are used to generate a REC cannot also be claimed for offset purposes. See Chapter 10, Resources for Additional Information, for details.

Private Source Removal Program

(update: July 18, 2012)

Sump Pumps:

TOTAL:	669
Notification letters sent-sump pumps:	67
Removed:	26
Incorrectly identified:	7
Sump Pumps Remaining:	636

Other (Area A):

Total Driveway Drains:	36
Total Roof Leaders:	6
Notification letters sent-roof leaders/driveway drains:	42