Chapel Hill, North Carolina

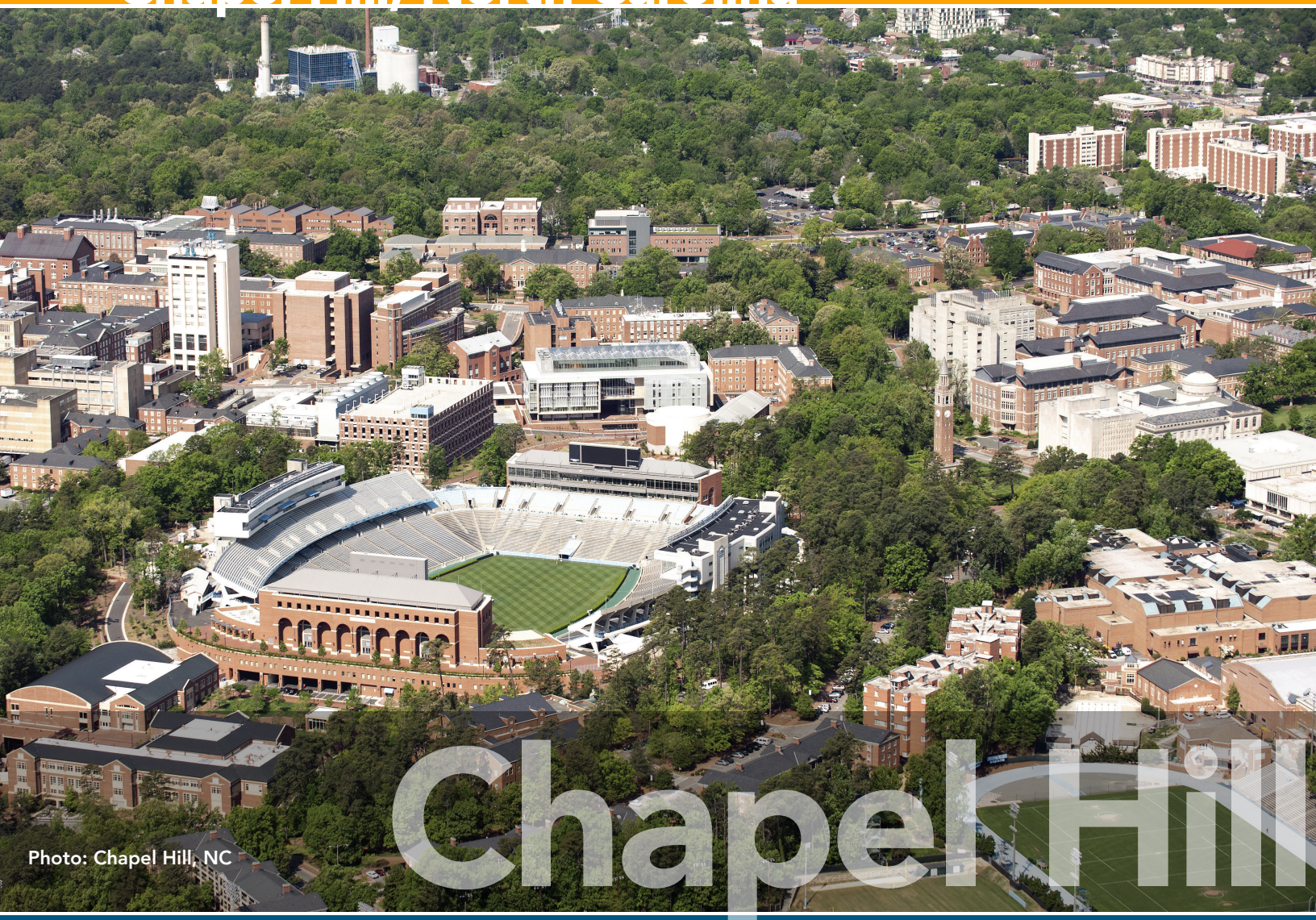

Photo: Chapel Hill, NC

CASE STUDY

SOLAR OUTREACH PARTNERSHIP

Chapel Hill, North Carolina

Chapel Hill is located in the Piedmont region of North Carolina, between the mountains and the coastal plain. It is one of three municipalities that constitute the "corners" of the Research Triangle and is home to the University of North Carolina at Chapel Hill (UNC). More than 57,000 people reside in Chapel Hill's 21 square miles; the town operates under a council-manager form of government and employs 912 staff. It maintains a vibrant small-town feeling with a strong university presence known for its artistic contributions as much as for its academic achievements.

Building on its great tradition of leadership, Chapel Hill is using solar photovoltaic (PV) to improve its environmental and economic performance on public facilities. Drawing upon the experiences of national and international networks, it has used their internal operations as examples for local business and residents to follow. The town has recognized the power of partnerships, and it has identified and rectified potential barriers in its planning and permitting processes so as to make private solar PV projects viable for the entire community.

City Profile

- Form of government: Council-manager
- Total population (2013 census): 59,6351
- Total geographic size (2013 census): 21.12 square miles[1]
- Number of local government employees: 912
- Major departments/divisions: City Manager, City Attorney, Business Management, Economic Development, Engineering and Design Services, Inspections, Parks and Recreation, Planning, Police, Public Works, Purchasing, Streets and Construction Services, Transit
- Total annual budget (2013–2014): $92,747,373[2]
- Type of electric utility: Private (Duke Energy)

1. U.S. Bureau of the Census, "State and County Quick Facts," http://quickfacts.census.gov/qfd/states/37/3711800.html
2. Town of Chapel Hill, North Carolina, 2013–2014 Adopted Budget, http://www.townofchapelhill.org/home/showdocument?id=20969

Participation and Recognition for the Foundation for Solar PV Growth

The town's dedication to creating a more sustainable Chapel Hill by advancing solar PV has led to its participation in national and international programs that provide technical guidance, inspiration, and recognition. By making formal commitments in partnership with strategic stakeholders, the town sets a high bar for its own performance, leverages additional resources, and paves the way for further progress. While the programs described below are not specific to solar PV, they provide a working structure in which solar PV plays an important role.

- ***ICLEI Cities for Climate Protection Campaign (CPC)***. The ICLEI CPC program is an international campaign and network of cities working to reduce their environmental impact. The town of Chapel Hill joined in 2003. Participation in the program provides recognition for the town's leaders on environmental issues and allows them to draw upon the experiences of others around the world to determine which practices are right for Chapel Hill. CPC is conducted through a five-milestone process in which participants measure, commit, plan, implement, and monitor emission reduction efforts. By fall of 2013 the town had completed Milestone 1 by conducting a greenhouse gas (GHG) emissions inventory.[1] A second, community-wide inventory was finished in the spring of 2014 and is being used to evaluate changes in GHG emissions over time.
- ***Community Carbon Reduction pledge (CRed).*** Started in the United Kingdom, the pledge is to reduce carbon emissions by an amount and according to a time line that each participant sets for itself. In 2006, Chapel Hill became the first U.S. municipality to take the CRed pledge. In partnership with UNC, the town committed to a 60 percent reduction of carbon dioxide (of 2005 levels) by

2050. Made through a resolution passed by the town council, the formal commitment included guidance from an expert from the university to set goals for purchasing electricity from clean energy sources, specifically solar technology.[2] This commitment eventually led to the creation of the sustainability officer and energy management specialist positions in the town.

- ***Sierra Club "Cool City."*** Organized by local Sierra Club offices, the Cool Cities initiative asks cities make a commitment to reduce their GHG emissions. Chapel Hill signed onto the initiative in 2005.

Chapel Hill Tire Care Company

As part of its Green Plus Certification, Chapel Hill Tire Care Company installed a 4.8 kilowatt solar photovoltaic (PV) system on one of its facilities. The system uses twenty Enphase microinverters and twenty 240-watt renewable energy–credit solar modules, which are expected to generate over 6,700 kilowatt-hours every year—the equivalent of offsetting 9,000 miles driven per year. Chapel Hill Tire Care Company specifically chose a solar PV as a way to improve its environmental performance because of the partner discount pioneered by Yes! Solar Solutions. Originally the discount was created to reduce the cost of a home solar PV installation, which had increased significantly because of the high cost of solar PV panels, inverters, and other equipment. The cost of such equipment has since seen substantial reductions, and as of the date of this case study the discount is available on a limited basis.

Chapel Hill Tire Care Company's rooftop solar PV system.

- ***Green Plus.*** Created in 2004 as a partnership between UNC and the Chapel Hill Chamber of Commerce, the Green Plus program provides small and medium-size businesses with expertise, resources, and recognition for their efforts to increase their environmental, social, and economic performance. The program has grown since its inception and is now available on a national scale. Green Plus also works to bring participants together to collaborate. An example of this is the Green Plus Partner Discounts Program, in which participating businesses provide discounts to other participating Green Plus businesses (see text box).

Encouraging Rooftop Solar PV: Establishing Standards and Removing Barriers

Chapel Hill is using its comprehensive plan to outline expectations for new development and redevelopment projects to incorporate renewable energy, including rooftop solar PV. In 2001, the town council approved a resolution that amended the plan's energy efficiency policy, establishing the expectation that private sector rezoning applicants will maximize their potential for energy conservation and use of renewable energy. This expectation was expanded in 2007 to include the specific goal of a "'20 percent more energy efficient' feature" in private sector conditional use or rezoning applicants' development plans.[3]

The Chapel Hill 2020 Comprehensive Plan, adopted in 2012, was built around a framework of six core themes, each of which is supported by a series of goals. One theme, Nurturing Our Community, describes the town's goals for living in harmony with and improving the natural environment. One goal, for example, is to "reduce the carbon footprint of all Town-owned or managed services and properties; ... require that all new development meets standards; and ... support its residents in minimizing their personal footprints."[4]

One barrier that the town addressed up front was the potential for neighborhood or homeowners' association covenants to restrict or prohibit solar PV. In 2003, Chapel Hill adopted a land use management ordinance that includes prohibitions against such covenants or other conditions of sale that restrict or prohibit the use, installation, or maintenance of solar-collection devices. This ordinance was adopted prior to North Carolina's statewide solar access law GS 160A-201 and is thought to provide stronger protection for solar energy.

Office of Sustainability Working Toward Rooftop Solar PV

In addition to policies and program participation, the town's commitments led to the creation of the Office of Sustainability in 2008 to facilitate community and business participation in sustainability-oriented programs and resources. Established by Town Manager Roger Stancil in response to the council's interest in achieving greater organizational and community sustainability, the office was created to help implement, coordinate, and advance many of the policies and initiatives that predated it.

Prior to that, a sustainability committee was in place to evaluate the town's progress on its sustainability goals and report on that progress to the planning board. Created in 2007, the committee was made up of citizens who provided environmental, economic, and social perspectives and served as liaisons to council members. The committee has since been disbanded as part of the town's adoption of a more holistic approach to sustainability and integration of that approach as a theme and priority for all town boards and commissions.

Recognizing that renewable energy is, in and of itself, a substantial topic deserving full-time attention, in 2012 the Office of Sustainability created an energy management specialist staff position focused exclusively on finding energy efficiency and renewable energy opportunities for public operations, including solar PV. And specific to solar PV, the office provides general guidance to the community regarding an incentive created through state legislation in 1977 that allows for a personal tax credit of up 35 percent of the cost of a solar PV installation ($10,500 ceiling) for businesses and single- and multifamily residences.

Looking Beyond Grant Funding for Solar Powered Public Operations

The town of Chapel Hill is working to increase its capacity to integrate solar PV into public operations. Recent facility expansion and construction has included solar PV, not as an ornamental feature funded by sources of capital with limited availability (short-lived grants) but as a fundamental component of the facility's function whose costs are covered by replicable, reliable, and familiar sources of funding, such as bonds.

As most municipalities can attest, public bonds (e.g., general obligation bonds) are often used to construct new facilities or engage in special projects (such as library construction). In addition to being available when grant funds may not be, public bonds provide more local discretion over the schedule, eligible uses, and procurement processes than federal grant programs. Bonds are normally issued when a municipality is confident in the public's support of the proposed use of funding, which can help make projects more successful in the long run.

> "Solar PV can be an important feature of any new or upgraded public facility. It is consistent with our sustainability goals, has the potential to support our local economy, and is a visible demonstration of how Chapel Hill can lead by example."
>
> *—John Richardson, sustainability office, Chapel Hill*

Using resources derived and controlled locally underscores the feasibility and practicality of solar PV for public operations. Chapel Hill is working to ensure the viability of solar PV for integration into ongoing operations and regular installations, as illustrated by the following examples.

- **Library expansion.** In 2003, the citizens of Chapel Hill voted in favor of a $16.3 million bond measure to expand the existing public library from 27,000 to 62,000 square feet. In the process, they added 4 kilowatts (kW) of solar energy through rooftop solar panels tied directly into the electrical grid. The town estimates that this investment provides the grid with renewable energy sufficient to offset the energy demand of the library's floor lamps. This project benefits from having a high profile as

Chapel Hill's public library.

it demonstrates the benefits of solar PV to the most visited library in North Carolina.[5] As of June 2014, the library was awaiting its LEED designation.

- **Town Operations Center.** In 2007, Chapel Hill finished construction on its new operations center as a consolidated home to the public works and transportation departments. With 36 PV panels generating 15 kW, the investment reduces the facility's power demand by about 1.5 kW per day. When it was built, it was the largest capital improvement project in the town's history, at over 80 acres and $52 million.[6] Solar PV complements other renewable energy systems on the new facility, including solar thermal hot water and ground-source heat pumps.

Just One of Many Champions

Chapel Hill is not alone in its commitment to renewable energy; there are other organizations as well that actively promote solar PV as a means to power the state of North Carolina. They do so by providing advocacy, research, incentives, and training to advance solar PV as a viable means for powering their communities, improving environmental quality, and creating economic opportunity.

- NC GreenPower is a nonprofit organization based in Raleigh and focused on connecting consumers throughout North Carolina with incentives to produce and benefit from green energy, including large- and small-scale solar PV. The organization provides a financial incentive to homeowners who have installed rooftop solar PV and have entered into a power purchase agreement with their local utilities. On an application basis, homeowners and businesses may have been eligible to receive $.06/kilowatt-hour (kWh) for their solar PV installations up to 5 kW in 2014.[7] As of June 2014, there were 35 participants in the program[8] from Chapel Hill with a combined 188 kWh solar PV generation.
- The UNC Energy Frontier Research Center (EFRC), housed at UNC, is a collaboration among UNC, Duke University, North Carolina Central University, the University of Florida, Research Triangle Institute, Georgia Institute of Technology, and the University of Colorado at Boulder. Funded through the U.S. Department of Energy (DOE) Office of Basic Energy Sciences, the EFRC is largely focused on research related to maximizing technology's ability to efficiently capture, store, and use the sun's energy and solar fuels—specifically, dye-sensitized photoelectrosynthesis cells.

Grants Support Solar Photovoltaic

In addition to creating more independent sources of capital to deploy solar photovoltaic (PV) on public facilities, Chapel Hill has served the community well by accessing limited sources of state and federal grant funding for that purpose.

Fire Station #1. An energy audit funded through a North Carolina State Energy Office (SEO) Sustainable Community Development grant resulted in upgrades to Fire Station #1, including a 4.68 kilowatt-hour solar PV array providing power for the facility. The array was funded through an additional $30,000 SEO grant supplemented with $8,000 of matching funds contributed from an existing Public Safety Bond Fund. The array also provides energy through the grid, for which the town receives compensation via a power purchase agreement with the private utility, Duke Energy.

Town of Chapel Hill Fire Station #1 solar PV panels and biodiesel fire truck.

Solar Bus Stop. Thanks to a 2007 donation by what was then called the Million Solar Roofs Committee, a bus stop on Franklin Street was outfitted with a 165-watt solar panel to keep LED lights on at night, thereby making transportation on Chapel Hill's highly regarded bus system safer and more energy efficient.

- The solar industry and proponents have a strong champion in the NC Sustainable Energy Association (NCSEA). Since 1978 NCSEA has been working with local and state officials, citizens, and private industry to realize sustainable energy, jobs, and a brighter future for North Carolina. As a chapter of the American Solar Energy Society, NCSEA works hard to drive policy changes and investment in solar PV throughout the state.
- Chapel Hill is home to Strata Solar, one of the most successful utility-scale solar PV developers in the country. As of the date of this case study, it has over 300 megawatts of solar PV developed with over a gigawatt still pending development.
- Not far from Chapel Hill, the Durham Technical Community College Sustainability Technologies program offers education and training for solar PV manufacturing, installation, and maintenance through a Solar Photovoltaic Installation certificate, which includes coursework and preparation for the North American Board of Certified Energy Practitioners entry-level exam.

Looking Forward

While Chapel Hill is proud of its accomplishments to date, it recognizes that they are modest compared to the town's operational and community-wide capacity to generate renewable energy through solar PV. To improve public operations through solar PV, the town knows it needs to make the case that solar PV investments and policies are viable from both financial and performance perspectives. Accordingly, it is evaluating the feasibility of a scorecard approach to assessing the performance of the town's solar PV investments and tracking the progress of solar PV installations throughout the community.

To advance community-wide rooftop solar PV, the town is considering different methods to reduce the cost of such installations throughout the community as well as on public facilities. One option is a financing model based on the "Solarize" concept that was pioneered in Portland, Oregon; used in several other cities; and promoted by the DOE's SunShot Initiative. Another option is community-financed solar projects, for which the town would collaborate with third-party investors to purchase a solar PV system and install it on a public facility. The private owners/investors would enter into an agreement to sell the system to the town at the end of an agreed-upon period at a greatly reduced cost. As a public agency, the town is not eligible for the state or federal tax credits available to private entities, but this model allows collaboration between the town and tax credit – eligible entities to generate solar PV power.

Lessons Learned

- **Build Internal Capacity.** Relying exclusively on grant funding will not provide long lasting solar PV outcomes. Including renewable energy in public improvements funded through bond measures resulted in solar PV on the main public library and town operations center. Further, building your capacity through staff dedicated to energy provides continuity for identifying opportunities to facilitate solar PV.
- **Take the Long View.** Chapel Hill's successes are the result of ongoing efforts to amend policy, planning, investment, and public operations over the long term. Short term initiatives will result in limited returns on that investment. As such, Chapel Hill is working to establish innovative models for financing solar PV that build on earlier success.

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Endnotes

1. Sam Clayton-Luce et al., Town of Chapel Hill Greenhouse Gas Inventory, 2012, http://www.ie.unc.edu/for_students/courses/capstone/13/community_carbon_report.pdf.
2. "Potential Strategies for Carbon Reduction, Town of Chapel Hill Municipal Operations," Attachment 3 of 2006 Memorandum from Dr. Douglas Crawford-Brown submitted to Town Council, September 27, 2006, http://townhall.townofchapelhill.org/agendas/2006/06/26/12/12-3_potential_strategies.htm.
3. Memorandum from Roger L. Stanton to J. B. Culpepper, "Expansion of the Policy to Encourage Renewable Energy Planning with Rezoning Applications and Accompanying Special Use Permits," April 11, 2007, http://townhall.townofchapelhill.org/agendas/2007/04/11/10/.
4. 2020 Chapel Hill: Our Town, Our Vision (June 25, 2012), 37, http://www.townofchapelhill.org/home/showdocument?id=15213.
5. The library serves over 1,035 visitors daily and 375,000 people annually; see Town of Chapel Hill, "Library

Expansion," http://www.townofchapelhill.org/town-hall/departments-services/business-management/capital-improvements-program/library-expansion.
6. Town of Chapel Hill, "Town Operations Center," http://townhall.townofchapelhill.org/news/current_issues/toc/.
7. See http://www.ncgreenpower.org/ncgp-announces-a-change-in-premium-payment-for-new-small-solar-pv-agreements-effective-june-3-2013/.
8. February 5, 2014 interview with Katie Shepherd, NC GreenPower

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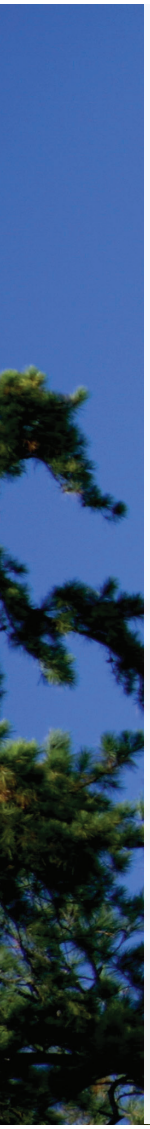

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