Policy Matters Ohio

Sustainable Communities
December 2011

Local Sustainability

A menu of policy options for greening communities

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Executive Summary

Our economy, our communities, our workforce, and our environment are at a crossroads. Past practices and policies of the conventional energy economy produced an economy with vast amounts of waste and low road economic development that left our workers behind, our communities impoverished, our residents dependent on fossil fuels imported from out of state, and our environment polluted.

Ohioans spent more than $54 billion on energy in 2008—created from fossil fuels purchased largely from outside Ohio. Our nation's energy productivity—the amount of goods and services we produce per unit of energy consumed—continues to trail both Japan and NW Europe, and is the lowest of all developed nations. Among states, Ohio ranks 30th for our level of energy productivity. As a result, more than $40 billion leaves our state each year to purchase fossil fuels from outside Ohio. For a state beleaguered by a decade of economic downturn, these are dollars we cannot afford to waste. This is why the City of Oberlin, in partnership with Oberlin College and the city's municipal utility have launched "The Oberlin Project" to make Oberlin the greenest little city in the U.S., grow the local economy in the process, and become a national model for sustainable economic development. This report is meant to assist stakeholders participating in the Oberlin Project, and other communities interested in replicating their efforts.

Examine energy use and emissions. To develop a sustainability strategy, a community must first understand the way it uses energy and where its emissions come. According to a greenhouse gas inventory conducted for the city of Oberlin, its commercial and industrial sector account for the largest share of Oberlin's energy use (28 percent); local government combined with Oberlin's anchor institution, Oberlin College, amount to 1/3 of total energy use; transportation 24 percent; and 15 percent is used by residents in their homes. According to the same study, over half of Oberlin's emissions were due to electricity use. Of non-electricity related emissions, transportation-related energy use accounted for the next largest share (15 percent of the total). These numbers demonstrate that Oberlin needs a strategy to reduce emissions from the electric power sector, green its commercial and industrial sector, enable the college and local government to reduce energy use and lead by example, develop a sustainable transportation system, and promote energy savings opportunities among residents.

Reducing emissions in the electric power sector. In Ohio, nearly 70 percent of all energy generated at centralized electric power plants is lost during generation or transmission, resulting in a waste of scarce resources and unnecessary toxic and carbon emissions. Communities across the nation are using policy levers to encourage more distributed and efficient generation in the electric power sector such as employing municipal power authority to promote clean energy development, setting renewable energy targets, conducting community outreach, providing

technical assistance, organizing bulk purchasing for discounted rates, engaging in comprehensive long-term planning to guide local energy decisions; and streamlining permitting processes and utility interconnection standards. One of the most exciting policy developments is the utility use of CLEAN contracts (Clean Local Energy Accessible Now), or a feed-in tariff or FIT, a set of published rates at which a utility company buys clean energy from local developers.

Greening the commercial and industrial sector. Across Ohio, the commercial and industrial sectors combined account for half of all energy used and over $18 billion in energy expenditures (2008). By targeting this sector for energy savings, we can increase the productivity of our energy inputs, resulting in increased competitiveness, more jobs, and reduced emissions. To do so, cities are creating eco-industrial parks, where they bring together local businesses and manufacturers to share services, transportation infrastructure, energy, and waste streams; engaging in public awareness campaigns, creating revolving loan funds accessible by businesses for clean energy purposes, and incentivizing or requiring new or existing buildings to meet green building standards. Property Assessed Clean Energy (PACE) is an innovative approach using the public works assessment model, typically used for sewers, sidewalks, and other public improvements to finance clean energy projects.

Leading by Example: Local government and anchor institutions. The sector that has most successfully adopted sustainability measures so far is known as the MUSH market (Municipalities, Universities, Schools, and Hospitals). Local Governments and anchor institutions in the community, like Oberlin College, are leading by example. They are examining their own energy use, setting goals, developing strategies to reduce energy use and increase use of alternative energy, encouraging energy saving behavior among employees, faculty and students, and developing green, local, and efficient purchasing guidelines. Many cities and campuses are employing the use of power purchase agreements to purchase renewable energy systems, and Energy Service Companies (ESCOs) to capture energy savings.

Develop a more sustainable transportation system. While many of Ohio's transportation problems require state and regional solutions, there are steps local governments can take to make it easier and safer to walk, bike, use mass transit, and purchase more efficient and alternative-fueled vehicles. There are also ways to grow our communities in a more sustainable fashion: promoting rural products in nearby urban areas, supporting farms and the value-added processing of rural resources, and preserving natural land; investing in existing assets downtown and on Main Street, in existing infrastructure, and on places the community values; and encouraging low-impact development that utilizes natural landscaping for storm water management.

Promote energy savings opportunities among residents. The major barriers to clean energy upgrades in the residential market include uncertainty in length of ownership of home and ability to recoup costs; the fact that rental property owners may not pay utility bills; a lack of motivation, or ability, to undertake the hassle of learning, organizing, financing, and implementing a project, and access to upfront funds to pay for efficiency investments. Successful efficiency programs address these barriers by making efficiency easy, engaging the community, subsidizing the cost of energy audits, offering rebates for clean energy products and services, and making low- to no-interest loans accessible with longer payback periods. With these goals in mind, well-informed contractor networks, community energy action groups, and "energy advocates" are being employed to engage their communities, increase participation rates, and walk consumers through the process. Some of the more innovative financing options involve repayment of equipment installation through the customer's utility or property tax bill.

Conclusion

Achieving the aggressive goals of the Oberlin Project will require a holistic approach addressing all energy-using and emissions-producing sectors. The same goes for any community that wants to become greener and cleaner. This document details many options, not all of which will make sense for every community. The next step in the research process will be to sort through the options, identify what makes sense for each particular community, assess the impact of those options, and identify any barriers to adopting particular policy options and potential solutions. A green job sketch and workforce development strategy also needs to be fleshed out as well to make sure that jobs created from green investments are good jobs accessible to local residents.

Introduction

Our economy, our communities, our workforce, and our environment are at a crossroads. Practices and policies of the conventional energy approach produced an economy with vast amounts of waste and low-road economic development that left our workers behind, our communities impoverished, our residents dependent on fossil fuels imported from out of state, and a polluted environment. Since the last recession in 2001, from which Ohio never fully recovered, more than 377,000 manufacturing jobs and nearly 63,000 construction jobs have disappeared. Five of Ohio's cities were among the top ten nationally for having the biggest increases in poverty.[1] Ohioans spent more than $54 billion on energy in 2008, most of it from fossil fuels purchased outside Ohio. That's roughly $4,700 per person and 11.5 percent of our gross state product, which adds up to additional pressure on our already strained budgets and economy. Ohio ranks sixth in the nation for the total amount of energy we use, and a third for pollution emitted by our electric power industry.[2]

Historically, fossil fuel energy was cheap; pollution was ignored so we could grow our industrial economy. In recent decades, fossil fuel prices have become volatile and emissions have become harder to ignore. Our nation's energy productivity—the amount of goods and services we produce per unit of energy consumed—continues to trail both Japan and NW Europe, and is the lowest of all developed nations. Among states, Ohio ranks 30th for our level of energy productivity. More than $40 billion leaves our state each year to purchase fuels from outside Ohio. For a state beleaguered by a decade of economic downturn, these are dollars we cannot afford to waste.

This is why the city of Oberlin, in partnership with Oberlin College and the city's municipal utility have launched "The Oberlin Project" to make Oberlin the greenest little city in the U.S. In the process, they plan to grow the local economy and become a national model for sustainable economic development. Oberlin, a small city in Ohio, is a deeply loved college community with a lively campus. Its appealing town square has the cafes, boutiques, and book stores you would expect in a college town, but it also has an old-time hardware store, candy shop and ice cream parlor. But Oberlin shares the state's history of economic distress. In fact, Oberlin's poverty rates are higher than those found in the state as a whole, with more than one in four of its residents in poverty, approximately double statewide figures.

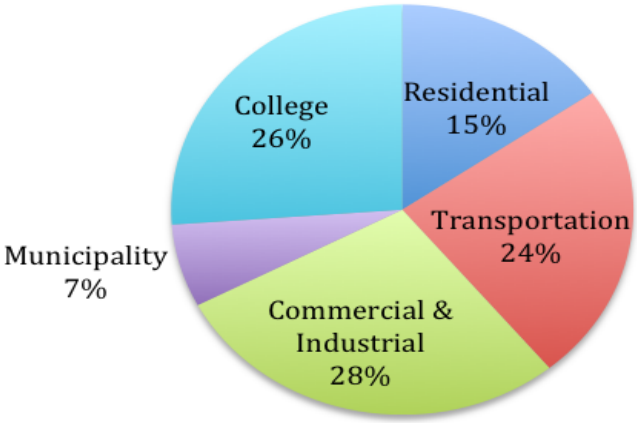
Leaders in the Oberlin community hope to preserve what is so compelling about their city while reversing negative economic and environmental trends in Oberlin and surrounding areas. The Oberlin Project will promote the economic and environmental sustainability of the community and surrounding areas by increasing energy independence, reducing fossil fuel use and the harmful pollutants emitted from them, increasing access to renewable energy sources, and promoting energy savings for local businesses, the college, the city and its residents. If these goals can be reached in city this size, given limited resources, they can be reached anywhere.

[1] Youngstown, Toledo, Dayton, Columbus, Akron are in the top ten for fastest growing poverty.
[2] Energy Information Administration http://www.eia.gov/cneaf/electricity/st_profiles/e_profiles_sum.html

Oberlin energy use. In order to develop a sustainability strategy, a community must first understand the way it uses energy and where its emissions come from. According to a greenhouse gas inventory conducted for the city of Oberlin,[3] an estimated 170,000 mBtus (million British thermal units) of energy were used in 2007 to meet the needs of Oberlin businesses, college, residents, and the local government. The cost of that energy, at the 2009 average rate of $20.30 per Btu in Ohio, amounts to nearly $27 million in energy expenditures for Oberlin. Figure 1 breaks down that energy use by sector, and shows that Oberlin's commercial and industrial sector, not including Oberlin college and local government operations, accounts for the largest share of Oberlin's energy use (28 percent). The combined energy use of Oberlin College and local government operations amounts to one-third of total energy use, making the city and college important players in an effort to lead by example. Transportation accounts for 24 percent of energy use, and the remaining 15 percent is used by residents in their homes. [4]

Figure 1

Oberlin energy use, 2007



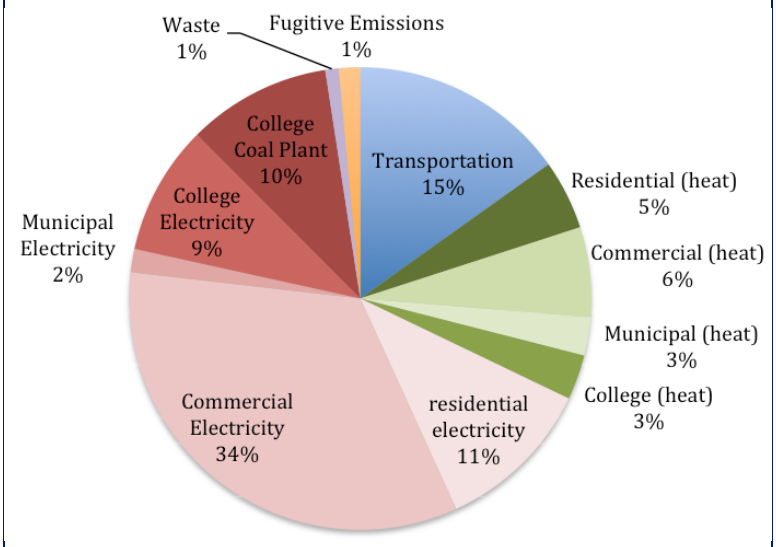
Source: Nathaniel Flashchner Meyer, *A Baseline Greenhouse Gas Inventory for Oberlin: Stepping Up to the Challenge of Climate Neutrality* (2009).

[3] Nathaniel Flashchner Meyer, *A Baseline Greenhouse Gas Inventory for Oberlin: Stepping Up to the Challenge of Climate Neutrality* (2009).
[4] Oberlin College and local government operations accounting for half of that sector's energy use.

Oberlin Emissions. According to the same study on Oberlin greenhouse gases Oberlin emitted 174,391 tons of carbon dioxide in 2007.[5] Figure 2 shows that more than half of Oberlin's emissions were from the combined use of electricity by the college, local government, residents, and businesses. Electricity and on-site fossil fuel use of the commercial and industrial sector resulted in the largest share of total carbon emissions (commercial heat plus commercial electricity totaled 40 percent). The college and the city together accounted for the second largest share of emissions (college coal, college electricity, municipal heat and municipal electricity totaled 27 percent), followed by residential heat and power share of emissions at 16 percent. Transportation-related energy use accounted for 15 percent of Oberlin emissions.

Figure 2

Oberlin CO_2 emissions, 2007



Source: Nathaniel Flashchner Meyer, *A Baseline Greenhouse Gas Inventory for Oberlin: Stepping Up to the Challenge of Climate Neutrality* (2009).

Energy Strategy. The figures help show that to achieve a more sustainable economy and environment, Oberlin needs a strategy to:

1. Reduce emissions from the electric power sector;
2. Green the commercial and industrial sector;
3. Enable the college and local government to reduce energy use and lead by example;
4. Develop a sustainable transportation system that employs smart growth principles;
5. Promote energy savings opportunities for Oberlin residents.

The next five sections of this report identify best practices, sustainability strategies and policy solutions being employed in cities throughout the nation across each of these energy-using and emissions-producing sectors.

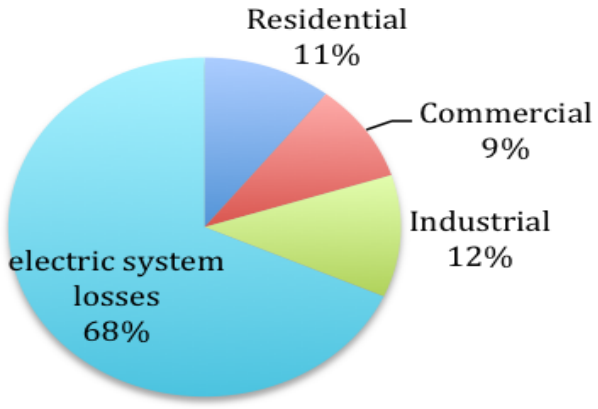
[5] Meyer, 2009.

1. Reducing emissions in the electric power sector

Ohio's electric power industry ranks third in the nation for the carbon it emits, behind Texas and Pennsylvania.[6] It is the largest contributor to emissions, accounting for nearly half of all carbon emissions in Ohio, because our current system of producing electricity is extremely inefficient. Figure 3 shows that nearly 70 percent of all energy generated at electric power plants is lost during generation or transmission of electricity through our outdated electrical system.[7] As one company that builds more efficient heat and power facilities says of conventional electricity production, "for every three lumps of coal you put in, you only get one out."[8] Ultimately, this inefficiency translates into a waste of scarce resources and unnecessary toxic and carbon emissions.[9] Targeted strategies to diversify the energy portfolio of electric utility companies, to increase local renewable energy use, and to help businesses, residents, and local governments to reduce their electricity use will significantly impact emissions. However, a strategy to reduce inefficiencies within the electric power sector itself by promoting more distributed generation of electricity and the recovery of heat typically wasted should also be looked at. Oberlin's municipal electric utility is already on track to secure approximately 90 percent of its energy from renewable sources, mostly local. This will reduce Oberlin's carbon emissions dramatically.

Figure 3

Ohio retail electricity sales and system losses, 2008



Source: Energy Information Administration

[6] http://eia.gov/state/state-energy-rankings.cfm?keyid=86&orderid=1

[7] Nationally, 63 percent of all energy used in the production of electricity is lost during generation. An additional seven percent of net electricity generated is lost during transmission and distribution through our antiquated grid system.

[8] Interview with Melissa Mullarkey, Recycled Energy Development (June 19, 2009).

[9] See Policy Matters Ohio, *Greening Ohio Industry* (2009) at http://www.policymattersohio.org/pdf/GreeningIndustry2009.pdf

Inefficiencies in electricity production are largely the result of heat lost in the production process, a result of our centralized power system. When burning fuels to produce electricity, vast amounts of heat are created and typically discarded through pressure release vents, cooled using lake or river water or cooling towers, or burned off. At the same time this heat is being discarded, Ohio residents, businesses and manufacturers are purchasing fuel to create heat on site in order to meet their heating and cooling needs. If we could transfer the heat lost from the electric power sector to consumers, we would reduce enormous amounts of energy waste and related emissions. Transporting heat requires the use of expensive heavily insulated pipes, however, with great losses over distance; it becomes impractical beyond three miles and is most efficient if transferred less than a half mile. Our centralized system, located at the far corners of the state, means existing power plants are too remote to transfer heat to most energy consumers. Every kilowatt-hour of renewable energy generated at or near the end user reduces the need for 3.3 kilowatts worth of fossil fuels to be burned at a conventional power plant.

Power generation in a clean energy system is spread out geographically. Often called "distributed energy," this approach reduces the waste that comes with centralized power production, and can blur the lines between what are currently separate systems for heat and power. While solar energy is often thought of as an alternative way to generate electricity, solar thermal energy can be used to heat water, rooms, and floorboards. One often-overlooked component of clean energy is combined heat and power (CHP) technology—a 100-year-old technology that harnesses both the heat and power produced during electricity production. Greater adoption of CHP technology can nearly double the efficiency of electricity generation while reducing energy expenditures and emissions.[10] Since CHP technologies often use fossil fuels, but use them more efficiently, it is often referred to as grey power (natural gas is often a source, but biomass use is growing).

Table 1 outlines some of the policy levers cities are using to encourage distributed generation. Table 2 shows utility-related efforts to support the development of clean energy. There are many compelling possibilities out there and these tables are meant to give an overview of the many options, not to suggest that Oberlin, or any community, could move forward simultaneously or immediately with all of these ideas. The most exciting policy developments, described in greater detail in Table 3, are CLEAN contracts (CLEAN stands for Clean Local Energy Accessible Now), formerly referred to as a feed-in tariff or perhaps more aptly termed feed-in rates. CLEAN contracts are a set of published rates at which a utility company buys clean energy from small, local developers. Aside from the general benefits of investing in clean energy, CLEAN contracts put local energy dollars towards community-based infrastructure, make projects more financeable since there is a guaranteed revenue stream for the project, and create a standardized process for developing projects.

[10] Department of Energy, Oak Ridge National Laboratory, *Combined Heat & Power: Effective Energy Solutions for a Sustainable Future* (2008) at http://apps1.eere.energy.gov/news/progress_alerts.cfm/pa_id=131.

Table 1 **How cities can support local investments in more distributed energy**		
Employ municipal power authority	Citizen-owned power utilities across the country are leading sustainability efforts. Some communities without public power entities are considering the creation of a public clean energy utility.	Oberlin, OH; Gainesville, FL; Sacramento, CA.
Pass renewable energy standard	A majority of states and some cities require their municipal utility companies to secure a minimum percentage of energy from renewable energy sources.	Columbia, MO - 15% by 2017; Philadelphia - 20% by 2015; Maine - 40% by 2017.
Establish Targets	Reduce Green house gas emissions by X percent, Shoot for X # of solar installations, X MW of solar installed capacity; X percent Combined Heat and Power technology capacity adoption.	Milwaukee, WI.
Support CHP development	Fund site-specific feasibility studies and demonstration projects; financial incentives; feed-in tariff policy for municipal power (see Table 2).	NYSERDA; Germany (biogas CHP); Ontario; Belgium.
Commitment to increase residents' renewable energy use	Example – Sign up 500 customers to purchase renewable energy systems.	Boulder, CO.
Provide community outreach and technical assistance	Help local businesses, residents understand renewable options. Seattle implemented education and outreach to City Light customers, industry professionals. Sacramento created a solar self-assessment web site.	Seattle, WA; Chicago, IL; Tucson, AZ; Sacramento, CA.
Community aggregation programs and renewable energy purchasing co-ops	Cities and co-ops can get a discounted rate for bulk purchase and pass savings to groups of individuals or businesses. Aggregation allows city governments, regional entities representing multiple governments, and co-ops acting on behalf of residents to negotiate bulk power rates.	Portland, Northeast Ohio Public Energy Council; San Jose; Trico Electric Co-op (AZ).
Renewable energy friendly zoning and planning	*Integrate solar into local or regional planning efforts*; resource planning, economic development, sustainability goals. Pass ordinance allowing renewable energy systems on private property in commercial, residential, and industrial zones (but require permits and set limitations); solar easements; solar access permit; solar rights. Establish a Clean/Green Technology Incentive Zone.	Seattle, WA; Tucson Solar Energy Integration Plan, Greater Tucson Solar Energy Development Plan; Mason City, IA; Sacramento, CA
Rent out solar equipment	Renters pay installation and monthly utility fee	Santa Clara Solar Utility
Streamline permitting and interconnection processes	Seattle conducted a gap analysis between codes and best practices, evaluating and overcoming barriers to interconnection by auditing and reporting on interconnection practices, developing a Customer's Guide to interconnection, and revising City Light's interconnection standards for a more streamlined approach	Seattle, WA; Philadelphia;
Permit fee waivers or Discounts	Reduce or waive local building permit fees, plan-checking fees, design review fees for renewable energy installations and green building certifications.	
Pollution Tax or Health Impact Fee	Charge for the negative externalities from fossil fuel use and use the funds to invest in clean energy.	
Sources: http://www.sustainablecitynetwork.com/topic_channels/finance;The Apollo Alliance, *New Energy For Cities*, at *http://www.policymattersohio.org/pdf/new_energy_for_cities.pdf; and* http://solaramericacommunities.energy.gov/solaramericacities/.		

Table 2 **Clean energy policies and programs for utility companies**		
Smart Grid Expansion	Phase in real-time monitoring of energy consumption through smart meters and thermostats. Provide consumer access via web. Enables use of smart appliances, response to price spikes and grid issues, distributed energy, monitoring portfolio of sources.	Austin Energy; Southern California Edison
Microgrid	Small, locally generated power systems. Eliminates need for heavy transmission infrastructure, and reduces energy losses.	Horizon is working with San Diego Gas & Electric; military bases; UC San Diego
Power Purchase Agreements	Long-term fixed-rate agreements between utility and large energy user for clean affordable power provided by utility or 3rd party producer. Concept can be applied to energy efficiency as well.	See Table 9
CLEAN contracts (feed-in tariff)	Utility engaged in long-term contracts with renewable energy developers for renewable energy generated at published rates that are guaranteed. Rates can differ depending on type of renewable energy produced, whether locally produced/made. Helps local farmers and community members compete with large developers. Amount procured can be capped.	See Table 4
Efficiency Power Plant	Utility purchases a MW of efficiency like it would power. 3rd party aggregates several efficiency projects to achieve savings.	Oberlin Municipal Light and Power Systems
Efficiency Power Plant Decoupling	Utility purchases a MW of efficiency like it would power. 3rd party aggregates several efficiency projects to achieve savings. Sever link between utility profits and sales quantity, a regulatory approach whereby utilities index retail rates to sales volume to reduce profit motive.	Oberlin Municipal Light and Power Systems Gainesville, Fl; Oregon
Clean Energy Funds	Public Benefits Funds can be created from a small surcharge on electricity usage typically based on kw-h use, some flat fee. Money collected supports wide range of clean energy programs.	Nineteen states require of IOUs; a few cities
Clean Energy Funds Green pricing programs	Optional tax-deductible contribution to clean energy	Sacramento Municipal Utility District
	Set aside of % of ratepayer funds	Sacramento Municipal Utility District
	Allow customers to choose to pay rate premium for clean energy. Premium based on difference between fossil fuel price and clean energy; allows customers to buy clean energy without producing themselves; Austin Power provides a long-term fixed rate for clean energy while the fossil fuel rate remains variable (advantage to manufacturers)	Austin Power, Xcel energy (nation's cheapest RE program)
Demand-side management	Programs designed to reduce or modify customer energy use. Cash rebates for lighting, appliances; free energy audits; shift usage from peak to off-peak.	Austin Power, Pacific Gas and Electric, Nevada Power
Net Metering	Allow consumers producing renewable energy for own purposes put excess energy onto the grid, roll back their meter accordingly.	Gainesville Regional Utility
Sources: Center on Wisconsin Strategy, *New Energy for Cities*, at http://policymattersohio.org/apollo/new_energy_cities_2006.htm; Database of State Incentives for Renewable and Energy Efficiency Programs at http://www.dsireusa.org/.		

Table 3	
Clean contracts or feed-in tariffs (rate)[11]	
Clean contracts, aka feed-in tariff, or feed-in rate, is a published rate paid by a local utility company for clean energy sold on the grid. The rate is typically determined by the average cost of the technology plus a reasonable rate of return for the project developer. The utility engages in a long-term power purchase agreement with a clean energy project developer, at the pre-established rate, for the energy that project produces over a set period of years. Unlike the net metering concept, projects under feed-in rate contracts are developed solely for selling power onto the grid. The process for developing a feed-in tariff is outlined below:[12] 1) Determine cost of renewable energy (different technologies, different costs); 2) Use cost data to set rates, rates will decline over time; 3) Develop standardized long-term contracts for generators (15-25 years); 4) Utilities roll costs into rate base; 5) Monitor installation and cost data constantly. Additional considerations to meet community needs may include: 1) Consumer protections such as a total program cap, a cap on electric rate increases, exemptions for low-income consumers or refund rate increases to low-income consumers; 2) multipliers or carve-outs for local ownership, small projects, projects installed by organized labor, and for Ohio-made, or American-made resources. Clean contracts may need the approval of the Federal Energy Regulatory Commission (FERC), but not in the case of municipal utilities.	
City of Gainesville feed-in rate program	
Gainesville, Florida	Gainesville is the home of University of Florida, has 250,000 residents, and a municipal utility serving both the city and suburban area (including electric, gas, water/wastewater, telecom). The city's energy supply strategy focuses on building biomass and solar capacity through solar heater and solar photovoltaic (PV) rebates, net metering at retail rates, and creation of a feed-in rate.
Feed-in rate program	Gainesville is the first city in the U.S. to create a feed-in rate program. Projects are developed to feed all power generated into grid. No rebates are available; Instead, developers are offered a flat rate based on their expected cost plus a reasonable rate of return. Currently, Gainesville is offering 32 cents per kWh for rooftop solar projects, and 26 cents per kWh for ground mounted projects. There is a cap on the amount of renewable energy the utility will purchase of four MW per year, in order to manage the rate impact to consumers. The queue for these projects is now filled through 2016 for a total of 32 MW.
Impact on customer	The impact of the feed-in rate program is $.70 per customer. Prior to enacting the program, the utility conducted a representative survey of 400 customers (based on service territory). The survey essentially asked "if $1 or less, would you support solar?" The response was 75 percent "yes." Separately, a sales tax survey was done. This included 28 different items, including solar, and asked about support for a sales tax increase for different issues: schools were No. 1, solar was No. 3.
Economic impact	Prior to starting its clean energy program, Gainesville's fuel mix was 60% coal, 20% gas, 1% renewable, 15% purchased power, 5% nuclear. By 2013, Gainesville will cut its natural gas use in half, and 22% of electric power will come from renewable energy sources. The city estimates the impact of their feed-in rate to include: $5 million in private funds spent by feed-in rate customers, and $24 million estimated annually going forward (with 261 estimated jobs created); $240,000 has so far gone to 25 owners in payments; First 16 months of feed-in rate led to 1000kW installed PV, there are 3.8 MW under construction (2 large projects, one commercial-sized rooftop); and indirect benefits include location of solar companies in Gainesville, capital infusion, solar-friendly zoning rules, and dramatic improvement in $/watt from competition created in the solar market, and a new market was created in leasing rooftops.

[11] For more resources on the topic, see the guide to FITs put out by the National Renewable Energy Laboratory (NREL) at http://www.renewableenergyworld.com/rea/news/article/2010/08/nrel-releases-feed-in-tariff-guide (144 pages).

[12] Presentation by Richard Caperton, Center for American Progress, ICLEI conference

Other feed-in rate examples	
Ontario, Canada	The Ontario Power Authority has 20-year feed-in rate contracts for nearly 400 megawatts of community-owned renewable energy projects within the province. The policy was designed to enable farmers, community groups, and First Nations to participate directly in the production and development of their own renewable resources by putting them on equal footing with commercial-scale power producers. Nearly one-third of the capacity will be built by Ontario's aboriginal population. The feed-in tariff (FIT) program pays varying rates for generation from the wind turbines, solar, biomass, and small hydro. Most recently, they launched a new program for capturing waste heat (200 MW, $90/mwh). Ontario also includes per kilowatt-hour bonus payment for projects owned by native Canadians, and a per kilowatt-hour bonus payment for community-owned projects. Ontario's separate microFIT program, developed for homeowners and farmers wanting to generate electricity with smaller-scale solar panels, currently has 20,000 applications. Within a few years, Ontario will have the largest installation of community-owned renewable resources outside Denmark and Germany. http://www.powerauthority.on.ca/
Michigan	Consumers Power offers pilot FIT program (2010) which was quickly oversubscribed. Traverse City Municipal Power & Light proposal targets 1% solar generation, prioritizes industrial customers.
Minnesota	Nearly all of Minnesota's community-owned wind generation, which amounts to 239 MW or 10% of the state's total generation capacity of 2500 MW, was installed under its Community-Based Energy Development (CBED) program.
California	US. California Assembly Bill (AB) 1969 of 2006 created a feed-in tariff requirement for all California's investor-owned utilities. California's tariff rates are based on time-of-delivery, rather than the generation cost of individual technologies (Unlike German feed-in tariffs).
Oregon	Oregon passed a small solar FIT-like program in 2009 (rules finalized in 2010), with 25 megawatts cap, a requirement that solar photovoltaic (PV) systems be installed by 2014, 15 year contracts. For projects under 100kw, grid connection is guaranteed and the price paid by the utility for the power is cost based.
Maine	The Maine Community Based Renewable Energy Production Incentive, a pilot project launched in 2010, focuses on community-owned projects (requiring projects to be at least 51% locally owned). The program involves 20 year contracts that pays $.10 per kWh, 1.5 times the cost of a renewable energy credit, or the "cost of the project" for wind, solar, or hydro energy projects that are one MW or smaller.
Vermont	Vermont has a small FIT program, involving 15-20 years contracts for biomass, wind, hydro, landfill methane, and agricultural methane and 25-year contracts for solar power. Costs are based on production costs plus a reasonable rate of return. There is a total program cap of 50 MW.
Wisconsin	Public interest prompted several utilities in Wisconsin, municipal and investor-owned, to launch FIT programs. Alliant Energy offers 10-year contracts for solar, landfill gas, wind, biomass and anaerobic digestion. Madison Gas & Electric (investor-owned public utility) offers 10-year contracts for solar projects. River Falls Municipal Utilities (municipal utility) does ten-year contracts for small systems (up to 4 kW) with a 10 kW program cap. We Energies (a subsidiary of Wisconsin Energy Corporation) does 15-year contracts for biogas from anaerobic digestion. Xcel Energy offers production incentives for wind, biogas and biomass systems between 20 and 800 kW, systems that are too big to qualify for their net metering program with the program capped at .25% retail sales.
Germany	One-half of all wind generation in Germany, or more than 12,000 megawatts, is owned by local investors. The percentage of local ownership is even higher in Denmark and the Netherlands.
Nova Scotia, Canada	The Nova Scotia Utility and Review Board will determine feed-in tariffs for large and small wind, biomass, and tidal power that went into effect in April 2011. Projects in the 100 MW program are set aside for Nova Scotians.
Sources: Former Mayor of Gainesville Pegeen Hanrahan, Feed-in Tariff panel at ICLEI conference on Sustainability; John Ferrell, Institute for Local Self-Reliance; Paul Gipe, Provincial feed-in tariffs spurring community power (NOV 2010) at http://www.grist.org/article/2010-11-04-provincial-feed-in-tariffs-spurring-community-power; http://solveclimatenews.com/news/20100122/states-look-feed-tariffs-boost-renewable-energy; New Rules Project http://www.newrules.org/energy/rules/feedin-tariffs-renewable-energy	

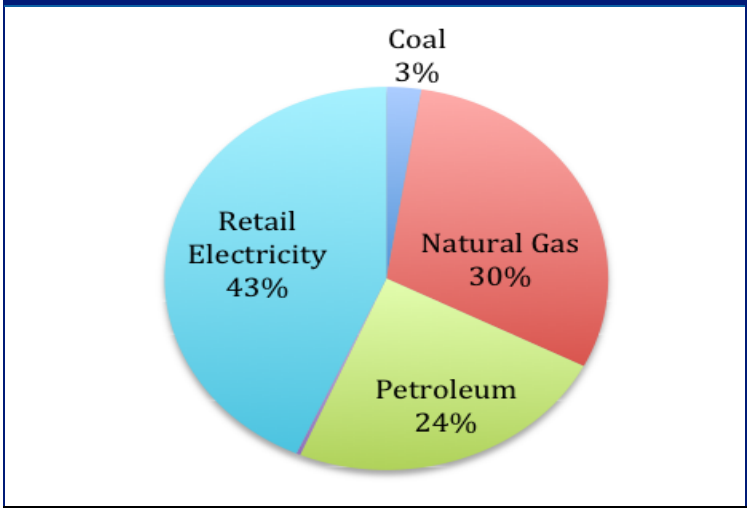
2. Greening the commercial and industrial sector

The commercial sector includes offices, stores, schools, and hospitals. Energy is used by this sector for space heating and cooling, lighting, heating water, and to run appliances.[13] The industrial sector is made up of manufacturing, construction, agriculture and mining, but more than 90 percent of energy used in this sector can be attributed to manufacturing. Manufacturers consume energy mostly in two ways: they burn fuels mostly to heat chemicals, metals, and glass in industrial processes and for drying paint, but also to provide heating and cooling of buildings and to power vehicles; and they access the electric power grid largely to run electric motors that drive machines such as metal cutting tools and conveyer belts, but also to power welding tools, electric furnaces, and electric forklifts. Manufacturers also use electricity to light, heat, and cool buildings. Both sources of energy—on-site fuel burning and electricity—produce carbon dioxide emissions.

Commercial and Industrial Sector Energy Use. Ohio's commercial and industrial sectors accounted for half of all energy used in 2008 and over $18 billion in energy expenditures.[14] Figure 4 breaks down Ohio's commercial and industrial non-transportation energy spending. In Oberlin, the commercial and industrial sectors together account for 61 percent of all of the community's energy use.[15]

Figure 4

Ohio's C&I sectors spent $18 billion on heat and power (2008)



[13] The Need Project, *Intermediate Energy Infobook: Energy Consumption*, p. 44-48 at http://www.need.org/needpdf/infobook_activities/IntInfo/ConsI.pdf.
[14] Energy Information Administration (2008).
[15] Oberlin has a high percentage of people employed in professional occupations, with 45% of Oberlin's labor force employed in education, health care, or social assistance (double the levels of elsewhere in the region and state). The City of Oberlin is less manufacturing intensive than the state and region as a whole, with a smaller percentage of residents currently employed in manufacturing (10% compared to 16% employed in manufacturing jobs across Ohio and 19 percent in Lorain county as a whole).

Saving energy is cheaper than producing it. By targeting energy saving efforts at the commercial and industrial sector, where large amounts of energy are concentrated in the hands of relatively few users, we can make significant progress toward reducing emissions while increasing the productivity of our energy inputs. Since most Ohio companies are not in the energy business, they are typically not experts on energy production or energy management and may be unaware of energy-saving opportunities. Even for a company thoroughly educated on energy savings investment opportunities, capital financing may be difficult to procure and efficiency not the highest priority. Nonetheless, most companies could realize significant and permanent energy savings that more than pay for themselves within a short amount of time. It is in our society's interest to dedicate public resources toward achieving energy savings, and also in the best interest our commercial businesses, manufacturing firms, and their employees. The achievement of significant energy savings would allow Ohio's businesses to invest more to increase productivity, wages, profits, or jobs. The result will be increased competitiveness, more jobs, and reduced emissions. Table 4 gives examples of how cities are encouraging and supporting the greening of our commercial and industrial sectors.

Table 4

Cities are supporting energy savings in the commercial sector

Building performance disclosure and commercial energy conservation ordinances (CECO)	There is an emerging trend to require or encourage disclosure of buildings' energy performance, often limiting disclosure to time of sale or lease of building. CECOs requires certain upgrades to take place at time of sale or large renovation.	Austin, TX; Berkeley, CA; New York City; Washington, D.C.; Seattle; California; Florida; Washington.
Public awareness campaign	Provide free/low cost energy audits and information on incentives, financing. City can partner with green businesses, offer inspections, auditing services, financial support to promote green business certification. Green technology incentive zones.	Chula Vista, CA; Oakland, CA; Sacramento, CA
Revolving loan fund	Offers low-interest loans for local businesses adopting renewable energy and energy efficiency measures.	Miner County, SD
Green building incentives for the private sector	Fee reductions or waivers	Babylon, NY
	Grant programs, rebates, offer zero or low-interest loans	King County, WA
	Modifications to city's zoning regulations; reward LEED buildings with benefits beyond those typically allowed under zoning standards	Arlington, VA
	Expedited permit review for qualified green building projects	Gainesville, Fl
	Technical and marketing assistance	Oakland, CA
	Require green building certification for projects receiving public funds	
Green building requirements	Require efficient building checklist in building permit process. Require deconstruction plans for remodeling or deconstruction. Require minimum points for project. Adopt new construction code (note: The State of Ohio sets code "ceiling").	Aspen, CO; Chandler, AZ; El Paso; Tampa; Monterey, CA; Fairfax County, VA; Starkville, MS
Local government bonding	Fund large-scale initiatives, or loan out funds to businesses for renewable energy or energy efficiency, which can pay back via savings. Can fund utility-scale renewable energy projects or repower coal plants with locally sourced biomass. Climate neutral bonding encourages environmentally-friendly practices by only using them to subsidize projects with no net increase in greenhouse gases.	Lamar, CO; Hibbing, VA; Michigan.

Sources: Green Building Incentive Strategy http://www.usgbc.org/DisplayPage.aspx?CMSPageID=2078#feerd
The Apollo Alliance, *New Energy For Cities*, at http://www.policymattersohio.org/pdf/new_energy_for_cities.pdf.

Table 5 details an innovative concept – eco-industrial parks, where cities bring together local businesses and manufacturers to share services, transportation infrastructure, energy, and waste streams. Indigo Development, a company applying industrial ecology principles to sustainable development, defines an eco-industrial park as "a community of manufacturing and service businesses seeking enhanced environmental and economic performance through collaboration in managing environmental and resource issues, including energy, water, and materials."[16]

Table 5

Elements of eco-industrial parks

Network of green businesses, manufacturers, and/or services companies	Some parks are a mix of residential, office, and retail supporting green tech and consulting groups. Others focus on distributors warehouse/distribution companies, heavy and light manufacturers, companies that focus on environmental services, and industries that re-manufacture and re-use existing products.	Chattanooga, TN; The Green Gold Initiative (Buffalo, NY); Red Hill Ecoplex (Choctaw County, MS); Coffee Creek Center (Chesterton, IN)
Access to landfill gas, biomass, local renewable resources, or co-location with power plant	Some eco-parks incorporate energy systems. Examples include parks that convert landfill into energy system, run a biomass electricity generation plant for manufacturing company, co-locate with a gas-fired power plant; demonstrate and promote technologies that use indigenous renewable resources. Can develop green industry network around anchor power plant.	Berks County, PA; The Cabazon Resource Recovery Park (Indio, CA); Intervale Food Center (Burlington, VT); Red Hill Ecoplex (Choctaw County, MS)
Offer businesses lower overhead costs, access to infrastructure, incentives	Some attempt to bring new industry into town by offering infrastructure, lower overhead costs, and incentives. Some house companies or organizations in a solar-powered or eco-enterprise building. One marine-based park includes an oil recycling business, an ecologically-designed water reclamation system, solar and renewable energy, and a compost business	Brownsville Eco-Industrial Park (TX); Port of Cape Charles Sustainable Technologies Industrial Park (VA); Franklin County Eco-Industrial Park (NC); Shady Side Eco-Business Park (MD);
Resource recovery facility and joint operations	Nearly all the eco-industrial parks facilitate opportunities to identify where one industry's waste can serve as another industry's raw material. Many parks incorporate resource recovery facilities, or centers for reuse, recycling, remanufacturing, and composting. Some redistribute usable materials to public. One park focuses on selling and marketing salvaged building materials. Can ID businesses with core capabilities that could benefit from coordinating activities, sharing resources, and participating in joint operations, such as water treatment, reducing dependence on transportation and increasing competitiveness.	East Shore Eco-Industrial Park (Oakland, CA); Green Institute Eco-Industrial Park (Minneapolis, MN); NWLCC-Northwest Louisiana Commerce (Shreveport, LA); Trenton Eco-Industrial Complex (NJ); Civano Environmental Technologies Park (Tucson, AZ)
Maximize use of intermodal transportation of raw materials and waste streams	Transportation is treated as an important element in a number of eco-parks. One site's superior port, rail, and interstate access will be used to maximize the intermodal transit of raw materials and waste streams, and facilitate creation of industrial "closed loop" production process.	Fairfield Park (Baltimore, MD); Plattsburgh Eco-Industrial Park (NY)
Process waste streams on site	One park, located within a sustainably harvested forest, processes waste streams on site to avoid transporting waste to overloaded wastewater and solid waste facilities.	Raymond Green Eco-Industrial Park (WA)
Brownfield development	Redevelop a brownfield, former military base, or existing industrial park into an eco-industrial park. Can include both new development land and redevelopment of former industrial land.	The Green Gold Initiative (Buffalo, NY); Fort Devens (Devens, MA); Port of Cape Charles Sustainable Technologies Industrial Park

[16] http://indigodev.com/index.html

Property Assessed Clean Energy, a commercial financing option.[17] PACE is an innovative way to finance green projects in the commercial sector via property assessments. This approach to financing applies the public works assessment financing model typically used for sewers, sidewalks, and other public improvements to help finance clean energy projects such as solar panel and energy efficiency retrofits. PACE was first initiated in California, where state-enabling legislation passed in 2008 and the first PACE bond was issued in 2009 in Berkeley, California. Subsequently, PACE legislation has passed in 23 states, including Ohio. Ohio PACE enabling legislation, passed in 2009, allows cities and townships to create Energy Special Improvement Districts (energy SIDs) where solar PV, solar thermal, geothermal, customer generated wind, biomass or gasification, and energy efficiency projects can be financed via a tax assessment on the property. To provide for upfront project funds, cities and townships can use general or special obligation bond financing, or federal loan guarantee programs.

How PACE works.[18] Owners of private property located within a designated special improvement district, referred to as an "energy SID," have the option of the city covering their upfront costs for a clean energy project. The property owners then repay the "loan" in regular installments over an extended period of time, from five to twenty years, via a special assessment on tax bills. In theory, the special assessment stays with the property, or "runs with the land," regardless of whether the property undergoes a transfer in ownership, creating "solar" or "green buildings." Cities must use their taxing authority to create the vehicle that this possible. Property owners will issue a request to their city for a voluntary tax. The city will bundle tax requests of all interested property owners and pass an ordinance. The funds to cover upfront costs often come from the issuance of municipal bonds.

Northeast Ohio Advanced Energy District. A number of communities suspended PACE programs, due to issues related to their use in the residential sector.[19] Some are continuing to

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[17] http://www.greeninstitute.org/programs/green-buildings.htm; http://www.smartcommunities.ncat.org/articles/basicfct.shtml; http://www.devenscommunity.com/about_us/massdevelopment.html and http://www.ecostardevens.com/index_files/Page591.htm; http://clinton2.nara.gov/PCSD/Publications/Eco_Workshop.html#v-b; http://greentogold.wordpress.com/about/; http://www.thriveinlondonderry.com/londonderry-advantage/eco-park.aspx

[18] Sources: http://pacefinancing.org/about-us/ ; http://pacenow.org/blog/ [stating also "the following states have recently passed enabling legislation: CA, CO, FL, GA, IL, LA, ME, MD, MN, MO, NV, NH, NM, NY, NC, OH, OK, OR, TX, VT, VA, WI, and legislation is pending in Arizona. Florida and Hawaii have existing ability to launch PACE programs."]; http://greenlandlady.com/site/business/defying-the-fhfa-fannie-freddie/ ; the state of California v. FHFA (July 2010); http://californiagreenbuildingblog.files.wordpress.com/2010/10/state-of-california-v-fhfa-complaint.pdf; NRDC complaint http://docs.nrdc.org/energy/files/ene_10100601a.pdf); http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=OH41F&re=1&ee=1; Notes of interview with Mike Emancipator, Executive Director NE Ohio Advanced Energy District (11/15/2010); Notes from interview with Tom Bullock, Lakewood City Council (11/11/10). ORC §1720. http://www.bricker.com/publications-and-resources/publications-and-resources-details.aspx?Publicationid=2125

[19] *PACE v. Federal Housing Finance Agency* (FHFA). Public works assessments have been a long-standing practice for municipal projects such as sewers and sidewalks. However, clean energy assessments can be much larger than the typical public works assessment. It is the price tag of these projects that raised red flags with the Federal Housing Finance Authority (FHFA) where PACE loans are in first lien position (meaning the municipality takes priority in line over mortgage lenders in collecting on bad debt). In May of 2010, Fannie Mae and Freddie Mac, who together own or guarantee half of all residential mortgages, issued letters advising lenders not to finance properties with PACE loans. In essence, FHFA believes the currently unregulated form of PACE may present risk to the stability of the "fragile" housing market. As a result, many PACE programs are on hold. However, a few are continuing to offer PACE options in the residential market (others are now focusing instead on the commercial

move forward, however, by focusing on the commercial market. The Northeast Ohio Advanced Energy District takes advantage of the state legislation passed in Ohio. A group of "first ring" Cleveland suburbs created a regional initiative that currently encompasses 15 cities in Cuyahoga County that share a border with Cleveland. By going regional and centralizing services, the communities are hoping to pool their risk, share legal and administrative costs, and in turn, provide cheaper loans because the are going to the bond market together. By limiting their focus initially to the commercial sector, they plan to avoid Federal Housing Finance Agency issues that apply to residential buildings discussed in footnotes 18 and 19.

Standards for PACE financing. Communities are applying existing standards for special assessments such as the requirement that property taxes for the property in question be up to date, and that the property be free of certain types of liens such as delinquent tax liens. The first city to create a PACE program is also leading in the development on standards for their program. The project's loan-to-value ratio may not exceed 10 percent, and consent from the mortgage lender is required for project loan amounts that exceed $30,000.[20]

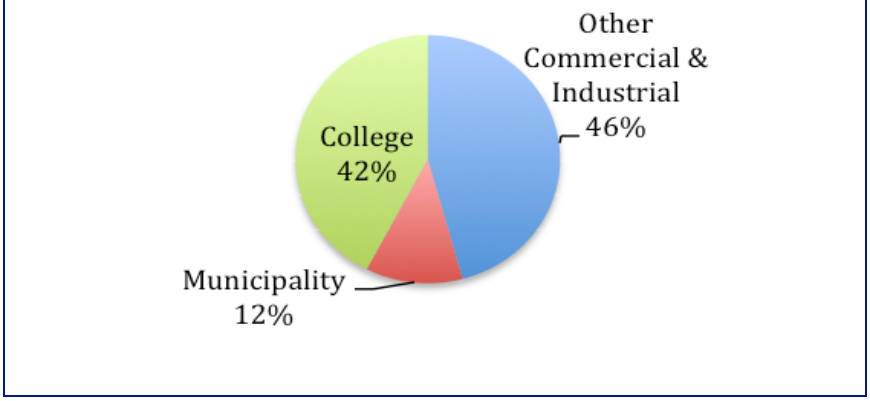
sector). Maine's authorizing legislation put PACE investors second to the senior lien position and continue to move forward with their PACE program using $30 million in federal funding. Vermont went further and extinguished the loan altogether on foreclosure. The problem with this approach, however, is that this increases the risk for clean energy project, thereby increasing the cost of these loans (via the interest rate) and reducing the competitiveness of the price for the loan. Vermont's program essentially creates an unsecured loan. In July 2010, the State of California filed suit against FHFA (and others followed suit with similar arguments). California takes issue with FHFA characterization of PACE "assessments" as "loans," when California clearly defined PACE as an assessment with a public purpose, a financing mechanism that has been used for well over a century.

[20] DOE guidelines are here http://www1.eere.energy.gov/wip/pdfs/arra_guidelines_for_pilot_pace_programs.pdf.

3. Leading by example. The most successful sector thus far in adopting sustainability measures is known as the MUSH market (Municipalities, Universities, Schools, and Hospitals). Local governments and anchor institutions in the community, like Oberlin College, are leading by example. Figure 5 shows that energy use for Oberlin's local government and Oberlin College together accounts for more than half of all energy used in the commercial and industrial sectors, creating important opportunities to lead by example.

Figure 5

Oberlin commercial and industrial sector energy use, 2007



Local governments and anchor institutions in the community can start their effort to lead by example by:

- Examining their energy use (buildings, transportation, electricity, etc.)
- Setting goals for the amount of greenhouse gases or energy use to be reduced, and goals for percentage or amount of clean energy to be used.[21]
- Passing a climate and environment protection resolution or pledge highlighting the importance of clean energy and efficiency, supporting the adoption of new approaches, and outlining existing measures and future commitments.
- Reducing energy use in government buildings by retrofits, building systems management and employee behavior change. This might include water conservation, recycling, passive solar opportunities and innovative transportation solutions; using storm water collectors and more efficient lighting; and encouraging employees to reduce energy consumption in daily practices.
- When new facilities are required, employing deconstruction practices and adopting high-performance building (LEED) policies are examples of sustainability.

Table 6 describes policies cities and campuses are adopting to lead by example. Table 7 describes power purchase agreements, the mechanism which many cities and campuses are using to purchase renewable energy systems, and Energy Service Companies (ESCOs), a mechanism that can be used to capture energy savings in local government operations and on campuses. Table 8 describes the efforts of 25 "solar cities."

[21] For example: Reduce GHG by X%; Upgrade X number of buildings over 10 years; Powered by 100% clean energy; Reduce energy use by 15%; Achieve X MW in self-generation.

Table 6 Leading by example: strategies for cities and campuses		
Encourage energy saving behavior among city and campus employees, faculty and students.	Public awareness or "power-down" campaigns; friendly competition with rival community, between departments, buildings, or dorms; allow some savings to be paid back to department. Create "green teams," peer-education programs, appoint energy coordinators across departments. Encourage energy-saving behavior, use efficiency-monitoring software, work with schools to integrate solar education into the curriculum.	Gainesville, FL; Oberlin College
Generate energy from and purchase renewables. retrofit existing buildings with renewable energy.	Purchase renewable energy through power purchase agreements (see table below), utility green choice program; purchase Renewable Energy Credits. Set Goal such as Get 15% of power in City-Owned Buildings from renewable sources in 15 years, or, all new facilities will be equipped with 25% renewable energy; Put renewable energy in City Hall or other high-profile location; retrofit subsidized housing. Allow students to monitor.	Albequerque, NM; Oroville, CA; Oakland, CA; N. Bonneville, WA; Stark County, OH; Sacramento, CA
Use fossil fuels wisely	When using fossil fuels, employ most efficient technology available. Install or contract for combined heat and power technology.	Honolulu, HI
Municipal biomass collection, Community methane digesters	Convert waste wood to fuel using co-generation technology; use renewable fuel for power; biodegradable bags in dog park; retrofit local dairies and food processors with methane digesters; collect manure from small to midsize farmers; use byproduct as fertilizer	St. Paul, Minn; Phillips Coop in Minneapolis
Energy improvement program	Conduct Energy audits and upgrade public and campus buildings and technologies. Conduct energy audits of buildings; develop energy improvement program; Establish a 10-year schedule for audits, building upgrades and optimization. Reduce energy footprint of technology, equipment, appliances, heating, cooling, and lighting, use occupancy sensors and centralized environmental control system.	San Diego, CA; Springfield, MA; Chula Vista, CA; Los Angeles; Seattle:
Green building standards	Adopt for both existing and new public buildings and on publicly funded projects. Require new municipal buildings, additions, and renovations to meet green standards. Can limit to buildings over a certain size. Require any publicly funded project to meet green building requirements.	New York City; Dallas; Chicago, Ill.; Seattle; Minnesota.
Green, local, and efficient purchasing guidelines	An environmental procurement policy is a system for choosing products with minimal impacts that favors recycled content, minimum packaging, local, energy-efficient, % from local farmers, environmentally-friendly, and durable products. Require departments and agencies to use or give preference to companies employing sustainable practices, incorporate green principles in RFP process, educate suppliers; require carbon disclosure from suppliers. Implement training across departments. Create inter-departmental purchasing partnership.	Dallas, TX; Portland, Seattle; U. of Louisville; Berea College; Carnegie Mellon University; Ithaca College; Lansing Community College; Univ. of Pennsylvania
Pension fund investments	Invest pension fund money into energy efficiency and clean energy projects. Retrofit of portion of pension funds into comprehensive retrofit of city buildings. Direct excess funds for equity investment in clean energy technology.	Los Angeles, CA (0.5%); California Green Wave (ROR=14%)
Community reuse & recyling	"Garage" sale timed with semester end to encourage students to sell furniture instead of discarding. Institute recycling/composting programs.	
Sources: The Apollo Alliance, New Energy for Cities; The Apollo Alliance, New Energy for Campuses; greenteam.ky.gov/NR/rdonlyres/...E663.../WritingGreenPolicy.ppt		

Table 7	
Power purchase agreements (PPA)	
In a PPA, a third-party developer owns, operates, and maintains the renewable energy system, and a host customer agrees to site the system on its property and purchases the system's electric output from the service provider for a predetermined period. See PPA checklist for state and local governments at http://www.nrel.gov/docs/fy10osti/46668.pdf.	
Participants	The **Host customer** enters a long-term contract (usually between 6-25 yrs) with a renewable energy service provider to purchase generated power. Property can be owned or leased (if leased, long-term leases are recommended). Purchase price of the generated electricity is less than or equal to host customer's usual electric service fee. Fixed or adjustable rate (PPAs often contain an annual price escalator in the range of 1 to 5 percent). Only pays for what the system produces.
	The **Solar services provider** acts as project coordinator. Purchases the solar panels for the host customer from a PV manufacturer, which provides warranties for system equipment.
	The **Installer** designs and installs the system, and may conduct follow-up maintenance.
	The **Investor** provides equity financing and receives the federal and state tax and subsidy benefits.
	The **Utility**, serving the host customer, connects the PV system to the grid. Continues its electric service with the host customer to cover periods during which the system produces less than demand.
Benefits	Receive stable and sometimes lower cost electricity; Visibly demonstrable environmental commitment; Potential increase in property value; Support for local economy and job creation
Campus examples	Smith College, Northampton, MA; Anne Arundel Community College, Rockville, MD; College of Wooster, OH; Clatsop Community College, OR; Southwestern University, TX; East Los Angeles Community College; San Diego Community College; William Paterson University, NJ.
Public sector	Galt, CA; Thousand Oaks, CA; Santa Clara County; Boulder County and Denver, CO; CA DOT; Federal entities are also taking advantage of these models, such as Wright Patterson Air Force Base in Ohio
Private sector	Utilities like American Electric Power, companies like Ford Motor Co. and Shearer Potato Chips (1st LEED platinum food manufacturing facility in the world, located in Ohio).
Energy service companies (ESCOs)	
ESCOs provide opportunities for energy savings in the MUSH market (Municipalities, Universities, Schools, and Hospitals). ESCOs contract with building owners to make efficiency improvements, guarantee savings from them, secure upfront funding for the work, monitor performance, and maintain the system, in exchange for regular efficiency service payments over a fixed term. Key benefits of this model include reduced energy consumption and operating costs, business opportunities and jobs in finance and engineering sector, and a market model to overcome finance barriers. ESCOs are self-financing; payments secured for energy savings leverage upfront financing. See *Best Practices Toolkit on Energy Performance Contracting* at http://www.presidentsclimatecommitment.org/resources/eebrp/toolkit.	
Campuses with ESCO contracts	Kent State University; Owens Tech Community College (OH); Montana State University; University of California, California Community Colleges, California State University System; Eastern Michigan University; Ferris State University; Kettering University; Lake Land College; Lewis & Clark College; Pennsylvania State University-Altoona; Salisbury University; Sullivan County Community College; University of Missouri Kansas City; Arizona State; Eastern Illinois University; Allegheny College.
Cities with ESCO contracts	Alexandria Sanitation Authority; Arlington County Justice Center; Bridgeport Housing Authority; City of Big Spring; City of Charlottesville; City of Cleburne; City of Conroe; City of Glendale; City of Glens Falls; City Of Glens Falls Wastewater Treatment Plant; City of Hillsboro, Ore; City of Jacksonville; City of Kings Mountain; City of Kingston; City of Laurel; City of Millbrae; City of Oswego Water Department; City of Rosenberg; City of Tulare; County of Fresno; Gulfport Federal Courthouse; McHenry County, IL ; Miami-Dade County Libraries; Nashville Housing Agency The Clearwater Cogeneration Wastewater Treatment Plant; Three Rivers Solid Waste Authority; Washtenaw County; Wilson County.
Sources: National Assn. of Energy Service Companies at http://www.naesco.org/resources/casestudies/default.aspx	

Table 8 **Solar Cities: 25 examples**	
CITY, STATE **population (2010)** Greenhouse gas goal Renewable energy goal	Solar Cities have summarized their activities on **http://solaramericacommunities.energy.gov/Cities.aspx**
Ann Arbor, MI (n= 113,934) 20% below 2000 levels by 2015 20% renewable energy by 2015	Ann Arbor plans to hold informational solar workshops for consumers and installers Implement a community-based solar marketing campaign. Educate youth about solar energy by including solar curricula in the city's public schools. Identify sites for high visibility commercial solar installations
Austin, TX, (n=790,390) 100% carbon-neutral for all municipal functions by 2020; 100 MW by 2020	Austin will install solar energy systems in local schools and develop curricular materials for local schools. Work with local non-profits to promote and cross-market Austin Energy's solar and green building programs. Assess rooftop areas suitable for distributed solar energy development. Assess the potential for hybrid solar/wind installations in West Texas for central power generation
Berkeley, CA (n=112,580) 80% below 2000 levels by 2050	Berkeley will expand the Pacific Gas & Electric East Bay Energy Watch to serve the cities of Berkeley, Oakland, Emeryville, Albany, El Cerrito and Richmond. Establish program capacity with the goal of promoting the annual installation of 800 kW of PV & 12,000 therms of solar thermal projects.
Boston, MA (n=617,594) 80% below 1990 levels by 2050; 25 MW cumulative installed solar capacity by 2015	Boston will create an online map of local renewable energy projects, with a tool to calculate rooftop solar potential. Support the City's Green Affordable Housing Program (GAHP), in partnership with the Department of Neighborhood Development (DND). Coordinate resources and best practices with governmental and private entities. Explore innovative financing strategies for renewable energy projects
Denver, CO (n=600,158) 10% reduction by 2012 (per capita); 25% reduction by 2020	Denver will create a municipal solar fund to reimburse upfront capital cost to residential solar installation. Evaluate city-owned and operated buildings to identify facilities for future municipal solar installations. Provide education and outreach to the Denver community through public outreach events. Plan new training and job opportunities for Metro Denver residents in the solar energy industry
Houston, TX (n=2,099,451) Make solar energy cost-competitive by 2015	Houston will develop and implement solar energy advancement policies, regulations and legislation. Install solar energy systems on demonstration sites. Implement solar programs and educational programs in focused neighborhoods. Integrate solar education into the school curriculums.
Knoxville, TN (n=178,874) 300 kw by 2010; 3 MW by 2015	Knoxville plans to install two solar systems on LEED-certified downtown transit station and a historic home that is being rehabilitated; develop a solar thermal assessment protocol to evaluate the applicability of solar domestic hot water systems for low-income home rehabilitation projects; conduct workforce training programs for solar installers, inspectors and codes officials. Work with the Historic Zoning Commission to revise building code language to be less restrictive to solar technology on historic homes and businesses. Promote the "clearinghouse" website and other solar marketing efforts.

Madison, WI (n=233,209) 25% reduction by 2011, city government; 250 kw PV and 200 solar hot water systems by 2010	Madison plans to double the use of solar energy in Madison over a two-year period. Review and modify the city's procedures and policies for solar permitting and installation & educate solar installers on those policies. Assist potential solar system owners with purchasing and installing their solar systems. Showcase and market local solar installations to the public
Milwaukee, WI (n=594,833) 7% below 1990 levels by 2012; 100 solar-electric and 50 solar thermal systems, with a total capacity of 1 MW by 2012.	Milwaukee will promote solar thermal and solar-electric technologies by increasing the number of local solar installers through assistance in training and preparation for the certification process, supporting solar manufacturing businesses by working with existing manufacturers and by encouraging new businesses to locate in the city, examining market segments to determine which are most viable for various incentive-based business models, and incorporating non-financial benefits, such as accelerated project permitting, reduced permit fees, and feebates into solar projects.
Minneapolis-Saint Paul, MN n=382,578 (Minneapolis); n=278,535 (Saint Paul) 20% below 1990 levels by 2020 1 MW (500% increase) by 2010	Minneapolis and Saint Paul are developing strategic partnerships to implement commercial and residential solar installations, provide technical training programs, and conduct city and state policy review. For immediate increases in the solar market, they will use an innovative leasing model, deploy solar systems in visible locations within the cities, and provide technical outreach. They will also increase the number of qualified solar installers by supporting education and training including developing technical college solar education curriculum, creating a PV training lab to expand professional opportunities for electricians.
New Orleans, LA (n=343,829) 10% below 1998 levels by 2015	New Orleans plans include solar technology in the construction and renovation of new homes and businesses, wherever applicable and economically feasible. Implement a publicity and outreach plan to increase demand for private solar energy. Evaluate and modify city regulations limiting the use of solar energy technologies. Install solar systems on city government properties. Develop incentives that support solar technology in residential developments. Conduct outreach and training to develop a solar supply base in New Orleans.
New York City, NY (n=8,175,133) 30% below 2005 levels for city operations by 2017 and citywide by 2030; 8.1 MW PV by 2015	The City of New York will use the City's resources to spur the market and create economies of scale to lower prices, and create institutions to plan and monitor future growth. To accomplish their goal, they will develop a long-term solar energy plan, facilitate PV projects and support workforce, conduct a feasibility study of real-time pricing for PV installations, evaluate best integration of solar energy into emergency planning and demand-reduction programs, create new municipal solar energy incentives, address interconnection and code barriers through a collaborative stakeholder process, and explore innovative financing and ownership structures.
Orlando, FL (n=238,300) 5 MW by 2008; 10 MW by 2010; 15 MW by 2015	Metro Orlando will streamline permitting process for installing solar systems, conduct solar education and training workshops, develop a GIS-based solar resource map of the city, actively engage with stakeholders, conduct a GIS-based solar resource analysis to assist in identifying existing and potential solar installation sites, work with local economic development groups to conduct a market analysis of barriers to implementing solar technologies, conduct solar education and training workshops targeting building code officials and inspectors, government officials and local legislators, solar business developers, building energy managers, residential and small commercial building owners, conduct a series of seven solar education and consensus-building charettes using electronic polling software and professional facilitation services.

Philadelphia, PA (n=1,526,006)	Philadelphia plans develop and adopt a solar implementation plan that is fully integrated with updated citywide plans and institutional processes for guiding decisions on land use, economic development and infrastructure investment. Identify and implement cost-effective tools to overcome commercial and residential solar market, including a "Solar Developer's Guide to Solar Philadelphia." They will prioritize for development and initiate planning for solar energy installations including choosing technologies, targeting districts and sites, and creating financial structures that will support the installations.
10% below 1990 levels by 2010; Generate 2.3 MW of solar electricity by 2011 and 57.8 MW by 2021	
Pittsburgh, PA (n=305,704)	Pittsburgh Solar Initiative created a new Office of Sustainability & Energy Efficiency, and received a Green Power Purchaser Award from the U.S. EPA in 2009. The city intends to install solar hot water and solar PV installations on city owned buildings to help facilitate the training of city plumbers, electricians, and carpenters (union); pass new ordinances to remove barriers in residential and commercial solar installations; host a Solar Fellowship program; create an interactive Solar Web site; develop a Roadmapping Simulation Tool (RooSTer) that will inform the City of the 10- to 15-year plan for solar (a suite of solar modeling tools, efficiency measures, and financing mechanisms that will apply to city facilities and assess results of technology and evaluate the costs, savings, payback period, carbon footprint impact, and energy portfolio composition).
20% from 2003 levels by 2023	
Portland, OR (n=583,776)	The City of Portland will evaluate solar potential on city facilities and provide solar education through workshops, informational tables, green building trainings, Build-it-Green tour, and Northwest Solar Expo. Promote solar to visible Portland-area leaders. Partner with Portland's economic development agency. Provide personal follow-up on leads. Consultation with a task force of industry, government and academic leaders. Streamline city-level regulations and practices that affect adoption of solar. Educate regulatory staff and regional solar contractors. Investigate regulatory barriers and leverage points. Convene a regional Solar Leadership Conference. Develop a presentation on lessons learned. Provide ongoing technical assistance to other cities. Evaluate the best financing options. Integrate solar into city design guidelines.
80% below 1990 levels by 2050 (Climate Action Plan 2009)	
2009 installation was to be greater than 400% of 2006 installations	
Sacramento, CA (n=466,488)	Sacramento Solar Access program will adopt a citywide demonstration, install municipally-owned solar energy systems on high visibility locations, leverage the city's assets for solar energy systems under a "surrogate roof" model, provide solar educational information and programs at high-visibility community locations such as libraries and community centers. To develop a Local Solar Industry, they will create a Clean/Green Technology Incentive Zone, work with municipal utility and other partners to develop a solar technician certificate program. To break down near- and long-term Barriers, they will develop design guidelines, best practices, and educational materials on solar's integration into historical districts, create a solar self-assessment web site, adopt solar-friendly zoning, access rights and other regulatory provisions.
40 MW total PV capacity by 2017, including 5 MW on municipal buildings by 2010	
Salt Lake City, UT (n=186,440)	"Solar Salt Lake" program is developing a fully-scoped city and county-level implementation plan. Solar Salt Lake strategy includes a combination of barrier identification, research, and policy analysis that utilizes the input of various stakeholders. The result will be a comprehensive plan for Salt Lake City and Salt Lake County that supports long-term solar deployment, including integration into City/County planning and facilities, the introduction of policies and regulations that support solar adoption, the integration of solar in new housing developments, evaluation of solar bonds and other funding sources, and community-wide solar education and outreach.
3% reduction per year for the next 10 years; 70% reduction from 2007 baseline; Additional 10 MW by 2015 from 2007 baseline	

San Antonio, TX (n=1,327,407) Sustainable solar by 2015	"Solar San Antonio 2015" will promote solar technology among residents and local businesses through outreach campaigns and rebate programs (A media relations and event campaign, Educational solar workshops or seminars, new and revised policies and procedures at the City in order to accelerate the use of solar power in existing and new city-owned buildings).
San Diego, CA (n=1,307,402) 15% below 1990 levels by 2015	San Diego will provide a blueprint for in its "Sustainable Energy 2050 Plan," NS address key issues including tariffs, data management, expedited permitting, strengthened private-sector involvement, training and technical expertise, and long-term implementation. They will also update and expand geographic information system (GIS) analysis of solar installations and potential future sites, conduct performance analysis of existing solar-electric systems, develop case studies, establish focus groups of key stakeholders, produce outreach materials, develop a citywide solar implementation plan, and study the impact of solar energy installations on property resale and value.
San Francisco, CA (n=805,235) 20% below 1990 levels by 012 31MW BY 2012	San Francisco's three-point approach will remove market barriers to solar deployment by developing a program to group commercial and residential customers into aggregated purchasing, identify sites for large installations and market to those building owners, develop a plan to address problems installing solar on multi-tenant buildings.
San Jose, CA (n= 945,942) 80% below 1990 levels by 2045 for municipal operations; 100% electricity from renewables by 2023; 15% increase in solar by 2010	San José's Solar America Cities will develop and pilot local and regional financing, and incentive and regulatory strategies to ensure that all elements of the community have effective opportunities to manufacture and install solar technologies; develop and implement a coordinated outreach and education program, and identify strategies, opportunities, and challenges to achieving the City's Green Vision goal of 100% electricity from renewable sources.
Santa Rosa, CA (n=167,815) 25% below 1990 levels by 2015 (for Sonoma County); 25 MW by 2011	The City of Santa Rosa, in partnership with eight neighboring cities, Sonoma County, and interested stakeholders, formed an organization called Solar Sonoma County to develop a countywide Solar Implementation Plan (known as "the SIP") and to conduct outreach and public education.
Seattle, WA (n=608,660) 7% reduction from 1990 levels by 2012	Seattle Solar Initiative assembled a team of partners to incorporate solar energy into City Planning efforts (including a gap analysis of Seattle codes compared to best practices; created a Five-Year Energy Efficiency Action Plan and a Small Renewables Action Plan); research innovative financing mechanisms and ownership models, develop a new Community Solar Program that supports both community-owned installations and utility-owned installations, create a revolving fund for additional installations with DOE funds, and a long-term utility-led Community Solar program, educate and conduct outreach programs to Seattle City Light customers and industry professionals, evaluate and overcome barriers to interconnection (auditing and reporting on interconnection practices, developing a Customer's Guide to interconnection, and revising City Light's interconnection standards for a more streamlined approach).
Tucson, AZ (n=518,956) 25% below 2005 levels by 2030	Tucson will focus on overcoming the market barriers of high up front cost and low levels of awareness, and will create new opportunities for solar installations, by developing and implementing a city of Tucson Solar Energy Integration Plan and a Greater Tucson Solar Energy Development Plan, identifying and enhancing financing techniques for large-scale solar energy installations, and developing and disseminating solar best practices and other outreach to stakeholders in the region.

4. Develop a more sustainable transportation system

For decades, we have underinvested in alternative transportation options, both as a state and as a nation, making them less reliable, safe, and convenient than they could be. Less than one percent of the state of Ohio's transportation budget goes toward public transit, making Ohio 40th in the nation for its relative commitment.[22] Our distorted allocation of transportation resources, exacerbated by the fact that economic development tends to follow transportation patterns, has spread jobs, homes, stores, child care, health care, schools, universities, and training centers all over the map, making it very difficult for Ohioans to get by without cars. But cars are expensive to own, operate, and maintain, and they rely heavily on polluting fossil fuels imported from out of state. Together, Ohioans used almost 118 million barrels of oil in 2009, ranking Ohio sixth in the nation for the amount of motor gasoline we consume, at an annual cost of nearly $12 billion dollars, 98 percent of which is imported from outside Ohio.[23]

Ohio needs a strategy to make our transportation sector more economically and environmentally sustainable. A 21st century transportation system includes not only roads and highways, but also a complete network of alternative transportation, including freight and passenger rail within our cities and across the state, hybrid buses, streetcars, and bike-able, walk-able neighborhoods. While many of Ohio's transportation problems require state and regional solutions, there are steps local governments can take to make it easier and safer to walk, bike, and use mass transit, and to encourage use of more efficient and alternative-fueled vehicles. (See Table 9 for some ideas.) There are also steps local governments can take to grow their communities in a more sustainable fashion.

A report from International City/County Management Association (ICMA), "*Putting Smart Growth to Work in Rural Communities,*" highlights a three-prong smart-growth strategy for smaller communities, like Oberlin, that revolves around a vibrant downtown where community events take place and residents shop, a walk-able Main Street with compact neighborhoods nearby, a variety of transportation options, and the preservation of open space and farmland (See Table 10):

- Support the rural landscape by enhancing working lands—farms, prairies, forests, and rangelands—and conserving natural lands;
- Make existing spaces a priority for investments. Build on past community investments by investing in existing assets downtown and on Main Street, in existing infrastructure and on places the community values. This will promote compact development, keep local infrastructure costs down, and preserve land;
- Create vibrant, enduring new places that people don't want to leave and that attract young people into the community.

[22] Found at http://icma.org/en/icma/knowledge_network/documents/kn/Document/301483/Putting_Smart_Growth_to_Work_in_Rural_Communities

[23] http://www.eia.doe.gov/states/_seds_updates.html

Table 9 Make it easy and safe to walk, bike and use transit; promote efficient vehicles		
Comprehensive Planning	Engage in comprehensive transportation, land-use planning for city/campus, with housing near work. Adequate lighting, network of sidewalks/bike paths, bike racks, a trail system that links neighborhoods and communities and commuter route that protects riders from high-speed traffic; fixed route transit service within the community and key locations in the region.	Miner County, South Dakota; the Katy Trail.
Sustainable Street Design	Adopt policies to ensure roadways are accessible to transit users, pedestrians, bicyclists, persons with disabilities, young and elderly. Streetscape improvements should support multiple modes of transportation, sidewalk improvements, planters, furniture, trash bins. Use EPA's Smart Growth Implementation Assistance program, draw on Metropolitan Planning Association funds. Through street design, the city can increase walkability and bikability of streets, slow traffic, incorporate local history. Reduce paved surfaces, use right-of-ways for multiple purposes, plantings for storm water management (such as tree canopies to reduce road temperatures, while encouraging walking/biking), green infrastructure.	Cobblestone Street Interpretive Park (Booneville, MO)
Encourage use of alternative transportation	Campus partnership with city/county to improve public transportation. Improve transit service and increase ridership, key partners like college to work with city/county/region for seamless system. Divert state and federal transportation dollars to buses, streetcars, light rail, etc.	Bozeman/ Montana State University
	Transit incentives. Offer free or low cost transit passes (students, faculty, staff, city employees); or, if forego parking permit, get free transit in county.	Madison & U. of Wisconsin
	Encourage biking. Bike-sharing services; tandem bike taxi service; Employee Bike to Work Program. Add bicycles to city fleet. Award credit to city employees, students, faculty, staff who bike/walk to campus/work that can be exchanged for discounts; discounts on bike maintenance; coupons for bikers to local eateries.	Kent State University; Madison, WI; Cornell
	Promote decreased car use, increase parking fees. Provide preferential parking and incentives for carpooling, carsharing. Sell parking permits only valid certain days of week; HOV lanes. Developer incentives for incorporating carsharing into project plans. Discounts, vouchers, coupons for carsharing members.	Austin & U. of Texas; Hoboken, NJ.
Alternative-fuel and Efficient vehicles	Encourage residents to make efficient car purchases. Provide incentives such as exemptions from sales tax; parking discounts, preferred parking, or free parking for hybrid vehicles	Albuquerque; Austin; Towson Univ.
	Encourage private companies to green their fleets: Grants, rebates, and other incentives; use public benefits funds; incentivize or require green cabs.	New York City; Chicago.
	Build alternative fueling stations to make green transit easier; collect waste vegetable oil. Green buses, biofuel, electric streetcars; exclusive bus lanes.	Salt Lake City, UT; Carmel, IN; Cleveland RTA
	Green city/campus fleets. Purchasing guidelines to favor fuel-efficient and alt-fuel vehicles. Set goal for 100% clean/green fleet. Require all new vehicles be most efficient technology possible. Evaluate existing fleet for size and fuel type. Upgrade fleet, reduce size, use. Biofuel buses, biofuel stations. Carsharing program for city fleet; city use during business hours, member use other times.	Boston; New York City; Seattle; Berkeley

Sources: Center on Wisconsin Strategy, "New Energy For Cities;" COWS, "New Energy For Campuses;" ICMA, *Putting Smart Growth to Work in Rural Communities*

Table 10 Smart growth policies for small cities and rural communities		
Assessment and Planning	• Assess connections to other communities, assets and challenges within community. Define community vision using collaborative visioning process, identifying highest priorities, most valuable resources, and cultural identity. • Pass a long-term plan for efficient land use, farmland protection, balanced transportation system, diverse housing options, series of interconnected parks and open spaces. Determine which land to conserve, which land can accommodate growth. Designate growth areas, consider road, transit service, trails and other existing infrastructure. Update community documents to accommodate new growth through compact and contiguous development. • Local governments often do not have the staffing resources to develop comprehensive transportation and land use plans, sustainable economic development strategies, and the tools to implement them. Local schools and colleges can support revitalization efforts through a rural resource center.	Sioux Falls 2035 Comprehensive Master Plan; Miner County, South Dakota; Horton, Kansas; Bozeman, Montana; Portland, OR; Miner County, South Dakota http://www.rurallearningcenter.org/
Preserve rural lands	• Purchase development rights in exchange for deed restrictions. Or, Transfer development rights (TDR) and collect "TDR bonuses" that allow higher density development in growth areas and use funds for conservation easements. Provide Tax credits for donating conservation easements (income, property, and inheritance tax). Or, acquire land. One method of paying for acquisitions and conservation easements would be through a bond package to preserve natural areas and protect water, financed by a small property tax assessment. • Pass agricultural, ranching, or forestry zoning, or create urban growth boundary. • Current Use Value Taxation: Allow land to be assessed based on its current use rather than at its highest market value.	Arizona Land and Water Trust; Montgomery County, Maryland; Brah Brule River, Wisconsin; Colorado state; Montana, Utah, & Arizona; Larimer County, Colorado; Portland, OR; Washington State; Oregon Exclusive Farm Use Zoning; Pennsylvania and Wisconsin locally-based rural land zoning;
Encourage and support resource-based economy	• Support renewable energy development on rural lands (Rural Renewable Energy Development zone, tax exemptions, connect with federal tax credits, methane digesters for selling electricity to grid). • Promote rural products in urban areas. Support and market farmers markets in larger cities, accept food stamps and local currency that can be used at markets and local businesses. Community Supported Agriculture (CSA) provides urban shareholders with regular, farm-fresh produce during growing season. Promote government purchase of local products (schools, prisons, government offices). • Assist in marketing, legal, organizational, and financial support for "buy local" campaigns (annual festivals, branding). Downtown Farmer's Markets in small cities to revitalize downtown • Encourage value-added processing of resources. Support producer-owned cooperatives (furniture, biomass, etc.), such as grant program for cooperatives and market development for rural products. • Develop ecosystem service market, for selling carbon credits from carbon sinks, filtering clean water, biodiversity • Promote agritourism: Farm association drawing eco-tourists to stay at farm bed and breakfasts and attend events like sheep and wool week, farmhouse kitchen visits.	Oregon; Minnesota; Ithaca Farmer's Market and Ithaca CSA; Snohomish County, Washington; Lawrence, Kansas; Blue Ridge Forest Coop in Virginia; Oregon; NY Catskill Mountains; Vermont Farm Association; Oklahoma Agritourism Association

Fix-it-First	• Prioritize public funding for repairing, restoring, and maintaining existing infrastructure (buildings, roads, water and sewer lines). • Designate priority-funding areas for development in comprehensive plan, preferably areas with existing infrastructure (financial assistance, accelerated project approval, etc.). Redevelop and retrofit existing buildings; incentivize residents to live near jobs and transit hubs. Rehabilitate existing neighborhoods. Encourage historic preservation (connect with state and federal tax credits, market businesses in historic area). • Re-use vacant or under-used lots before using undeveloped property. Provide incentives for brownfield or vacant land redevelopment, and disincentives for greenfield development (ie faster project approval and lower impact fees). Adapt existing buildings for re-use rather than demolishing them. Re-use vacant properties for community gardens. Examine codes and ordinances to remove barriers to infill development. Create Redevelopment Readiness certificate program. • Because farmland value is initially low, benefits accrue from large "increments" in Tax Increment Financing (TIF) schemes. Reform TIF to focus on redevelopment. Limit use for greenfields.	El Dorado, Arkansas; Maryland and Connecticut Priority Funding Areas; Youngstown, OH; Cadillac, Michigan; Wood River, IL; Land-of-Sky Regional Council in North Carolina; Michigan Suburbs Alliance 8 step Redevelopment Readiness process
Support more sustainable development	Low-impact development (using natural landscaping to manage stormwater): green roofs, rain barrels, permeable pavement, ponds. Can pass law requiring commercial and residential collection of roof drainage.	Santa Fe County, NM;
	Make it easy for developers to build compact, walkable, mixed-use places. Revise city plans to fit the newly established policies. Rural home cluster development, if done right, can reduce infrastructure costs for new developments and preserve open space (ie. require 50% of new development sites to be preserved as open space).	Crested Butte, CO; Littleton, NH; Thurston County, WA; Mashpee, MA; Wichita, KS; Seattle, WA.
	Provide incentives for projects that adhere to aggressive codes for existing buildings - IECC or LEED standards (such as shortened permit schedules, allow higher density than normal).	
	Acknowledge developers for using sustainable principles to generate buzz among other rural communities.	Idaho Smart Growth; Grow Smart Vermont
	Transit-oriented development. Allow fewer parking spaces, demolish unnecessary freeways; redevelop with community benefits agreement that includes access to mass transit	
	Stop subsidizing sprawl. To make town center development more competitive, assess the costs of new development on developers (costs of new schools, utility and sewer lines, roads) via impact fees; distance-based impact fees; assess transportation impact fees	Lancaster, CA
Promote regional collaboration	• Blue Ribbon Commission: Campaign to get cities across region to commit to a suite of local policies. • Promote better urban-rural links in the region to take advantage of resources in the region	

Sources: Center on Wisconsin Strategy, "New Energy For Cities;" COWS, "New Energy For Campuses;" ICMA, *Putting Smart Growth to Work in Rural Communities*

5. Promote energy savings opportunities among Oberlin residents[24]

Ohioans face unpredictable energy bills to heat their homes and run their appliances. Ohio's older housing and building stock, combined with our cold winters, means home weatherization can yield big returns here from energy use reductions in the form of energy savings. Renters and modest-income Ohioans often have the least ability to pay and tend to live in inefficient buildings that saddle them with large energy bills – for such residents, efficiency investments can help end a cycle of energy poverty. Retrofitting homes and building new buildings to green standards can create jobs for energy auditors, electricians, heating, ventilation, and air conditioning technicians, insulation installers, and others. Despite clear benefits from efficiency investments, relatively few people take advantage of existing efficiency programs. Four major barriers in the market for residential efficiency have been identified.

First, home-owners are less likely to invest in comprehensive efficiency retrofits if they are uncertain how long they will retain their property, given the relatively longer payback period for larger items such as changing heating systems, installing solar water heaters, and insulating walls.[25] Second, there is a "split incentive" involved in rental units because the owner of a property is often not the same person paying the utility bills. Third, the lack of information and motivation to invest in energy efficiency, combined with the hassle of learning, organizing, financing, and implementing a project, can amount to another barrier even if customers have interest in lowering their energy bills. Fourth, upfront costs for energy upgrades, and the availability of capital financing for these purposes, present a challenge across all energy sectors, including residents.

This section outlines some of the ways communities across the nation are approaching city-scale renewable energy and energy efficiency retrofit programming in the residential sector. The bottom line is that such programs require motivated customers in order to be effective. This means successful efficiency programs must be comprehensive – They engage the community, house a one-stop shop for efficiency solutions, offer rebates, make low- to no-interest loans accessible with longer payback periods, and make efficiency easy. Several programs offer low-cost energy audits and generous rebates to offset initial costs while financing the remaining balance.[26] Some of the more innovative financing options involve repayment of efficiency measures through the customer's utility or property tax bill. Well-informed contractor networks and community energy action groups are being utilized to engage their communities and increase participation rates through block walks and letters to homeowners from trusted community leaders. For the basics, see the *Short Guide to setting up a City-Scale Retrofit Program* at http://www.greenforall.org/resources/a-short-guide-to-setting-up-a-city-scale-retrofit. Table 11 describes the basic elements of a city-scale energy efficiency retrofit program, followed by case studies of several innovative programs.

[24] Initial synopsis is based on an interview with Satya Rhodes-Conway of the Center on Wisconsin Strategy.
[25] Alan Durning, Grist.com, *Mysteries of on-bill financing revealed* (Dec 2008), at *http://www.grist.org/article/Financing-retrofits-for-all-II/*
[26] Mathew Brown, Alliance to Save Energy, *Paying for Energy Upgrades Through Utility Bills* (2009)(citing United Illuminating company).

Table 11 Large-scale residential efficiency programs	
Key stakeholders to involve	Electric utilities may be entity to collect payments, but may also be provider of capital as well as loan and program administrator. Programs can set up network of clean energy contractors, or contractor pool meeting certain specifications. Community energy action team and energy advocates to conduct outreach. Local governments can lead by example, allowing for efficiency service on their utility or property tax bill and administering the program. Representatives of homeowners, renters, and landlords.
Customers Targeted	Several programs have established a target number of homes for retrofit (Portland started with target of 500). Some programs target both owner-occupied homes and rental units. Customers for these programs often include residential, commercial, industrial, and government customers. Could ID candidates from utility bills. May want to match up age of structure and average energy use to identify good candidates for the program. Older houses tend to have higher use. If eligible for low-income weatherization help customer sign up for weatherization services. Consider starting with people that have already had audit.
Streamlined Application	A major barrier to making efficiency investments is the time, effort, and knowledge required (transaction costs), so efficiency programs must be easy to use. Can put applications online.
Energy Agents	Successful programs often have an energy agent, or energy advocate, walking customers through the audit, recommendations, incentives, contracting, and financing process (Portland, Seattle).
Program administrator	Utilities can run these programs (consumer, public, and investor-owned). They can also be run by a partnership between municipalities, private enterprises, or partnerships.
Energy Audits	Energy audits are the first step in the process. A number of programs offer free energy audits, or subsidize the cost considerably. Some do this work in-house using city or utility staff, others use independent contractors.
Incentives	Existing incentives from utilities, public benefits funds, tax credits, are typically assembled. Connections to instruments that can finance the rest, such as low or no interest loans are also important. On-bill and PACE financing can make repayment easy. One program found that by extending the payback period, it doubled the number of participants by increasing savings during the initial period.
Pool of Contractors	Programs that have created contractor networks and educated them on financing tools have achieved higher participation rates. The City of Portland picks contractors (homeowners fill out paperwork, City handles rest, someone shows up at your house). United Illuminating in Connecticut works with a pool of contractors that must abide by strict guidelines on materials, prices, labor, licensing, and waste disposal. They found the use of a limited pool of well-informed contractors reduced the need for mass marketing of the program. Sempra requires selected contractors to participate in an education process, thereby reducing the number of jobs done poorly. A pool of contractors can also help identify training needs.
Equipment covered	When customers undergo energy audits, they typically get a list of measures that will pay back in a set number of years (typically 10). Following the audit, the auditor goes through the list of available incentives that will reduce the bottom line to the customer. The homeowner signs over the rights to those incentives, and they are subtracted from the total amount needed for financing so that they can borrow less to begin with. The final loan amount is then spread over a period of years (ranging from 3 to 20). In similar programs for renewable energy, payback may be spread over 15 to 20 years. In general, there should be certification that products are appropriate and savings estimates exceed payments. Many programs limit technologies covered, identifying technologies that can be used often to ensure maximum participation, and that are hard-wired or not easily removed. Among efficiency options seen are lighting, refrigeration, insulation, air sealing, space heating and cooling. The Hawaii program covers solar water heaters.
Data collection	Data collection demonstrates efficacy of the program. A program management system that allows for project tracking, with contractors access, is encouraged. Smart energy meters are recommended.
Sources: Center on Wisconsin Strategy, "New Energy For Cities;" COWS, "New Energy For Campuses;" ICMA, *Putting Smart Growth to Work in Rural Communities*	

Residential retrofit program case studies

Babylon, NY.[27] The city of Babylon committed to reducing their carbon footprint 12 percent by 2012. Since residential housing represented 38 percent of the town's energy consumption, they launched a green homes initiative ("green your house, slash your energy bill, reduce your carbon footprint"). The program is available to all residents, regardless of income or credit history. Because the city determined residents were hesitant to pay for improvements they couldn't see or touch, Babylon offered to finance up to $12,000 towards improvements. To cover the upfront costs of these retrofits, the city designated carbon as a solid waste, a move that enabled it to tap into a solid waste clean up fund and create a solid waste fee. The city then applied a "benefit assessment" on participating homes, paid through a municipal service bill separate from the electric utility bill and similar to bill for trash.

As a result, residents do not need to take on additional debt burden during tough economic times. Since homeowners considering moving are less likely to undertake improvements, the assessment runs with the home and not the owner. A 3 percent interest rate is incorporated into the fee in order to help cover costs to administer the program. The homeowner pays $250 for the cost of an energy audit, can choose any licensed contractor, the contractor files the paperwork and signs the contract with the city. Assessment fees are structured in part by estimated savings. The average cost of the retrofits is $7,200 and the average annual savings to homeowners is nearly $1,000, with an average payback period of a little less than eight years. Green jobs in the community increased nearly 25 percent as a result of the program. For more information, see http://www.thebabylonproject.org/.

Portland, Oregon.[28] The city of Portland program includes an extensive consumer support program, low-interest financing, and repayment through gas and electric bills over a 20-year term. The city acts as program manager, Shore Bank Enterprise Cascadia is the financial manager (a non-profit community development organization), and both entities contributed to the upfront financing of the program, with the city dedicating a portion of its federal stimulus dollars to the pilot project. Funds are secured with a loan loss reserve. The utility serves only as a medium for bill payment through an agreement with utilities that charge is on bill, but utilities are not involved financially other than to assist in marketing of the program. Repayment is not tied to the property or the meter – it is the individual's responsibility. If the loan is secured by the house, then it becomes part of the real estate transaction, to be paid off as an outstanding assessment or taken on by the new property owner, with a decision made in the transaction. Portland uses a pool of approved contractors to complete the work; 80 percent of employees must be local hires; 30 percent of work hours completed must be done by persons of color, women, and low-income residents; and new hires must come from designated training programs. Interest rates for borrowed funds are 8 percent unless the applicant is below 250 percent of the poverty level, then the interest rate is 4 percent.

[27] Home Performance Resource Center, *Case Study: Long Island Green Homes* (2010)
[28] Interview with Kat from Green for All; See also Home Performance Resource Center, *Case Study: Clean Energy Works Portland.*

Kansas rural electric/gas co-op.[29] Midwest Energy, a customer-owned utility providing natural gas and electricity to customers throughout central and western Kansas, launched its How$mart® program in 2007. The customer-owned utility owns, operates, finances, and markets by the efficiency program, and uses utility capital for upfront funds. The program is made available to both residential and commercial customers. Renters can take advantage of the programs with permission from their landlords. Landlords benefit from property improvements while tenants pay the energy bill including service payments. Repayment comes as an efficiency surcharge on customer's energy bill, and the surcharge follows the meter rather than the individual so if the occupant moves, the new occupant takes over the payment. Full disclosure of the surcharge to subsequent customers is required. Payments are structured so that energy savings are greater than efficiency service payments, for a net gain to the customer. Repayment occurs over an extended period of time to encourage bigger projects, 15 years for residential customers and 10 years for commercial customers, all at low interest rates. The program is now partnering with Efficiency Kansas to lower interest rates using stimulus funds. Read more about Midwest Energy's How$mart program at http://www.mwenergy.com/howsmart.aspx.

Boulder, Colorado.[30] A college town with a large number of rental properties, Boulder developed performance-based codes to drive demand for efficiency services in rental properties and new buildings. Called SmartRegs, they require a certain level of efficiency to be achieved without prescribing the exact means the property owner has to take to get there. To make efficiency easy, the city created EnergySmart, a one-stop shop for efficiency services and energy consulting handled by a third party (Populus). Energy consultants walk consumers through the process, starting with the energy audit, and even handle contractor bids and rebates. The program is funded with federal stimulus dollars and a local tax on electric bills. Performance requirements revolved around the Home Energy Rating System, designed by the mortgage industry to measure the energy performance of a home.

Green Jobs, Green New York.[31] The state of New York passed the Green Jobs, Green New York Act in 2009, from which came a program administered by New York State Energy Research and Development Authority (NYSERDA) that provides access to free or low-cost energy assessments, upgrades, low-cost financing, and green collar career training (launched in 2010). To make the program accessible to modest-income households, the program uses novel underwriting criteria (finding the Fannie Mae loan credit score requirement of 640 too stringent for many New York households). The new program is based on the utility bill payment history of applicants, who can qualify for unsecured loans up to $13,000 at a 4 percent interest rate.

[29] Local Clean Energy Alliance, state on-bill financing and PAYS programs, at www.localcleanenergy.org/state+on-bill+financing, and Environmental Defense Fund at http://www2.edf.org/page.cfm?tagid=39313
[30] Rob Kundert, Sustainable Cities Network
[31] Lawrence Berkeley National Laboratory, Clean Energy Program Policy Brief.

On-bill financing

This method of repayment for energy efficiency projects reduces upfront costs to customers for energy efficiency retrofits by stretching repayment over time on the customer's utility bill. Programs should be structured so that energy savings more than cover the costs for repaying the loan.[32] Many on-bill programs are similar to conventional loan programs but with repayment made via electric and/or gas utility bills. In its purest form, however, a Pay-as-you-save® program involves the use of a "tariff" that is assigned to a designated meter location for an "efficiency service," with the payment following that meter regardless of transfer in ownership or change in tenancy. Disconnection could occur for non-payment.[33] Table 12 details this innovative financing mechanisms. A similar concept discussed earlier in this document, PACE financing, applies the public works assessment-financing model—typically used for sewers, sidewalks, and other public improvements—to clean energy projects such as solar with repayment via the homeowner's tax bill. PACE debt is classified as an assessment, and non-payment turns into a lien on the property; this aspect largely stalled PACE programming in the residential sector. PACE programs are moving forward in the commercial sector. For more on PACE, see Table 7.

Addressing Market Failures. On-bill financing is an approach to consumer financing designed to address market failures in the market for energy efficiency; in some cases it has even been used for renewable energy. It is simple, easy to use, and can allow for repayment over longer periods of time to encourage deeper retrofits. The program can reach the rental housing market, it involves working with a trusted source (utility company), and energy savings are designed to outweigh costs. The repayment obligation transfers with ownership/tenancy (obligation follows the meter in a tariff-based system).

Program Administration. On-bill programs vary as to who runs the program, where upfront funds come from, who administers the loans, whether they take a conventional loan or a tariff approach, what incentives are offered, which customers are targeted, and what marketing and outreach strategies are employed. In Portland, for instance, the utility company's only involvement in the on-bill financing program is as a contractual entity to collect payments for the loan. On the other end of the spectrum is Midwest Energy, a customer-owned utility company in Kansas that operates and finances a tariff-based system where customers receive a charge on their utility bill for an on-going efficiency "service." Most programs are in-house at utility companies, while others are public/private partnerships. Upfront funds come largely from utility companies through service charges, universal surcharges for public benefit purposes, and/or utility operating revenues. Some programs draw on federal or state funds for clean energy purposes, and occasionally private matching funds.

[32] Mark Jewell, Technology Publications, *The Growing Popularity of on-bill financing incentives, zero interest can increase affordability* (September 2009).

[33] New Hampshire, Hawaii, and Kansas have tariff-based systems, and Michigan adopted legislation recently that may result in an on-bill tariff program.

Table 12 Examples of on-bill financing programs	
Alabama	Dixie Electric Cooperative, on-bill loan program.
Arizona	First Electric Cooperative Home Improvement Loan Program, on-bill loan program.
Minnesota and Wisconsin	Alliant Energy Shared Savings program. Utility company helps business customers identify savings, pay initial costs for upgrades, coordinate installation, and allow repayment on utility bill over a five-year period.
Babylon, NY	Babylon's energy efficiency loan program is repaid through municipal service bill, separate from the electric utility bill (similar to bill for trash). Solid waste fee for carbon used to fund program.
California	Southern California Edison, Southern California Gas Company, and San Diego Gas and Electric On-bill Financing Programs (Sempra Energy). Targets business and government consumers, accesses state's public benefits funds to buy down interest rates and offer zero-percent financing, and up to 10% in rebates. Sempra offers five-year terms for business customers, and ten-year terms for government customers.
Connecticut	United Illuminating Company and Connecticut Light and Power combine incentives and an on-bill loan program for small businesess that either own or lease their space (since 1993). UI pays auditor, makes recommendations based on audit (target is to lower energy costs by 20-30%), determines eligibility based on customer's bill payment history, and works directly with pre-qualified contractor. UI has a contractor pool, and participating contractors must agree to abide by strict guidelines on materials, prices, labor, licensing, and waste disposal. Efficiency project costs range from $1,000 to $60,000, with rebates covering 30 to 40% of the costs and the remaining balance financed over an average of two to three years with zero-interest loans. UI only finances projects where monthly savings will exceed repayment fee, and loans are secured by the state's public benefits fund (Connecticut Energy Efficiency Fund).
Hawaii	The state passed legislation requiring utility companies to offer Pay-as-You-Save® programs (2006). Three electric companies created pilot programs for solar water heaters (SolarSaver). Within six months of launch, over 100 units were installed, demonstrating the applicability of on-bill financing to renewable energy as well.
Illinois	State passed legislation requiring utility companies to provide on-bill financing options to its residential customers (2009). Programs will be open to small business customers also.
Kansas rural electric/gas cooperative	Midwest Energy How$mart® is owned, operated, and financed by the customer-owned utility company and is available to both residential and commercial customers, including renters/leasers with owner permission. The bill follows the meter and not individuals. Full disclosure of surcharge to subsequent customers is required. Building owners must agree to make repairs. So far, the Kansas coop hasn't had any trouble with their inclusion of renters and has stated that landlords, not renters, are showing the greatest initial interest. Repayment occurs over an extended period of time to encourage bigger projects, 15 years for residential customers and 10 years for commercial customers, all at low interest rates. The utility company runs the program in house, does its own marketing, financing, and billing, and puts up utility funds as capital. The program is now partnering with Efficiency Kansas to lower interest rates using stimulus funds.
Massachusetts	Western Massachusetts Electric Small Business Energy Advantage and National Grid. On-bill loan program at zero-percent financing.
Michigan	Michigan Saves. State passed legislation requiring their Public Utilities Commission to investigate on-bill financing program for energy efficiency.
Massachusetts Rhode Island, New	National Grid, an investor-owned utility operating. On-bill financing offered to small business customers, and on a limited basis to medium-sized commercial, industrial businesses and municipal entities in Massachusetts. Utility provides free energy audits and covers between 40 and 70 percent

Hampshire	of project costs; provides interest free loan for balance, with bonus 15% discount if the bill is paid off within a month.
New Hampshire	Public Service New Hampshire and New Hampshire Electric Coop. Since 2002, utility has offered on-bill, tariff-based financing programs for municipalities and small businesses with approval from the state utility commission. In 2004, the public utilities commission ordered utilities to continue program. In 2009, they developed a pilot program to expand the option to the residential sector, using Regional Greenhouse Gas Initiative grant funds in the form of a $200,000 revolving loan fund. The utility operates the program and provides interest-free loans (maximum loan amount $7,500), on-bill payback from 2-7 year terms, and a contract that follows the customer with the balance of loan to be paid off if customer relocates. Now exploring tying the loan to the meter (rather than customer) and using private financing. Program evaluations suggest financing key to program success. Retailers surveyed indicated an increase in business as a result of the program. New Hampshire hit its target level of participation even with a large reduction in rebates offered.
New Jersey	Public Service Electric and Gas has a small business program in Newark and Trenton, with plans to extend the program to other cities, that uses on-bill financing among other tools, including free energy audits and detailed recommendations; obligates consumers for only 20% of the project cost.
New York	The state has encouraged utilities to explore on-bill tariff-based financing, and its Public Utilities Commission is in the process of investigating the concept.
Western states (including Wyoming)	Pacificorp was the first tariff based on-bill financing program (late 1980's), which is no longer being used (largely terminated in 2000). Energy audits were given, recommendations made, unsubsidized interest rates offered; the only state involvement was regulatory oversight and approval. The utility company was uncomfortable managing credit risks and would prefer 3rd-party funding and financial management.
Portland, now statewide	Public and private matching capital through Shore Bank Enterprise Cascadia, a non-profit community development institution that has partnered with the city. In Portland, the utility company serves as medium for bill payment through agreement with utilities that charge will be on-bill, but utilities are not involved financially or otherwise. Portland is program manager, Enterprise is financial manager, both entities contributed to the upfront financing of the program (the city used portion of federal stimulus dollars). The loans are secured with a loan loss reserve fund. Not tied to property or meter, it is individual responsibility to pay loan back. If secured by house, then becomes part of real estate transaction, like payoff of outstanding assessment; decision made in transaction. Pool of approved contractors.
Seattle	In the process of replicating Portland program.
Ohio	Several investor-owned utility companies have "shared savings" programs, similar to PAYs programs, for commercial customers.

Sources: Interview with Satya Rhodes-Conway from the Center on Wisconsin Strategy; Interview with Kat from Green for All; Mathew Brown, Alliance to Save Energy, *Paying for Energy Upgrades Through Utility Bills* (2009); Local Clean Energy Alliance, *State on-bill financing and PAYS programs*, at www.localcleanenergy.org/state+on-bill+financing; Mark Jewell, Technology Publications, *The growing popularity of on-bill financing incentives, zero interest can increase affordability* (September 2009); Hyams, Michael, "*'On-bill financing' for Energy Efficiency in New Haven, CT*" (May 2010); https://www.nationalgridus.com/masselectric/business/energyeff/3_small.asp ; See Midwest Energy's How$mart program at http://www.mwenergy.com/howsmart.aspx.

Conclusion

Achieving the aggressive goals of the Oberlin Project will require a holistic approach addressing all energy-using and emissions-producing sectors. While no community has the whole package in place, communities across the nation are engaging in creative solutions, creating best practices, and providing opportunities to learn. This document details many options, not all of which will make sense for any particular community, including Oberlin. The next step in any community's research process will be to sort through the options, identify what makes sense for the city, and identify any barriers to adopting policy options. A green job sketch and workforce development strategy also needs to be fleshed out as well to ensure jobs created from green investments in the community are good jobs accessible by local residents.